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Abstract

Stigma remains a significant burden for people living with HIV and while studies have examined the impacts of gender, ethnicity, and sexual orientation on stigma separately, little is known about how these factors may intersect and potentially exacerbate levels of stigma. This study examines how these intersecting social positions may relate to levels of internalised, enacted and anticipated HIV stigma. Participants were recruited in Ontario, Alberta, and Québec (n=1040) as part of the People Living with HIV Stigma Index study in Canada. Three-way interaction models were constructed by creating interaction terms from the product of gender, ethnicity, and sexual orientation variables that predicted each type of stigma. Levels of internalised, enacted and anticipated stigma were consistent across most intersecting groups; however, people occupying certain intersections experienced significantly higher levels of stigma. Three-way interaction analyses showed that for internalised stigma, people at the intersection of African/Caribbean/Black, lesbian, cis-women identities had significantly higher scores (b = 0.90, p=0.06), while people at the intersection of Indigenous, lesbian, and cis-women identities had higher scores for enacted stigma (b = 1.21, p=0.01) compared to the White, heterosexual, cis-men reference group. Interventions designed for populations that take intersectionality into account may be effective in reducing HIV stigma, although more quantitative intersectionality work must be done to understand these implications fully.

Keywords: HIV, stigma, intersectionality, gender, ethnicity, sexual orientation

Introduction

HIV-related stigma has been identified as one of the greatest challenges to preventing new HIV infections and maintaining the health and wellbeing of people living with HIV. Stigma is rooted in negative attitudes towards individuals with attributes deemed undesirable by society, which can culminate in prejudice and discrimination (Deacon 2006; Parker and Aggleton 2003). Certain key population groups who often exist at intersections of different genders, ethnicities, or sexual orientations are thought to be particularly at risk for HIV and high levels of stigma. In Canada, gay, bisexual, and other men who have sex with men represent over half of people living with HIV and almost half of new HIV cases; Indigenous peoples represent about 10% of people living with HIV and 18% of new cases; African, Caribbean, and Black individuals represent 16% of people living with HIV and 22% of new HIV cases; and over a quarter of people living with HIV and a third of new HIV cases are women (Bourgeois et al. 2017; Mbuagbaw et al. 2022; Public Health Agency of Canada 2022).

The HIV Stigma Framework is a conceptual model designed to understand the impacts of stigma by breaking it down into different dimensions that are theorised to impact an individual in distinct ways (Earnshaw and Chaudoir 2009; Earnshaw, Smith, et al. 2013; Turan, Hatcher, et al. 2017). Enacted stigma refers to actual experiences of prejudice or discrimination, internalised stigma reflects the level to which you personally associate with the negative belief systems and feelings that surround HIV, and anticipated stigma describes the expectation of negative consequences that you would face from others because of your HIV status (Earnshaw, Smith, et al. 2013). Separating these dimensions of stigma has been useful in advancing our understanding of their impact on health outcomes (Christopoulos et al. 2019; Crockett et al. 2019; Lo Hog Tian et al. 2021; Lo Hog Tian et al. 2023; Turan, Budhwani, et al. 2017; Lo Hog Tian, Watson, Cioppa, et al. 2024); however, in recent years, there has been a push to incorporate social, structural and intersectional factors in the study of how stigma impacts the lives of people living with HIV (Pantelic, Sprague, and Stangl 2019; Stangl et al. 2019; Turan, Budhwani, et al. 2017; Lo Hog Tian, Watson, Parsons, et al. 2024).

Intersectionality theory provides a useful lens for understanding the experiences of people living with HIV as they often face many forms of social stigma, discrimination, and oppression (Logie et al. 2018; Earnshaw et al. 2015; Logie et al. 2016). Intersectionality is a concept within critical race theory which emphasises that people with multiple social positions have lived experiences that interact in ways that create experiences of oppression that are distinct from any single group (Crenshaw 1989). Multiple marginalised identities are not merely independent risk factors but are mutually constitutive and interact to produce unique experiences of stigma and discrimination that shift depending on the specific combination of identities. HIV stigma is not experienced in the same way across all groups and societal views of certain genders, ethnicities, and sexual orientations can contribute in combination to the different experiences of individuals which reflect multiple systems of oppression (e.g. racism, sexism, homophobia) at the macro-social level (Bowleg 2008, 2012). For example, Black gay men living with HIV can face compounded stigma stemming from negative stereotypes associating Blackness with criminality, being gay with hypersexuality, and HIV with moral failure (Bogart, Dale, et al. 2017; Quinn and Earnshaw 2011; Schulz and Mullings 2006). This specific intersection of identities can create unique and heightened experiences of stigma and isolation whereby Black

men with HIV face racism among non-Black communities, homophobia from straight Black communities and broader society, and HIV stigma in Black and gay communities because of their serostatus (Radcliffe et al. 2010; Arnold, Rebchook, and Kegeles 2014; Bogart, Dale, et al. 2017). Similarly, women of colour living with HIV experience stigma in a way that is distinct from White women and men of colour living with HIV, not only facing HIV stigma, but also stigma shaped by racialised and gendered expectations of morality, reproduction, and sexual behaviour (Bowleg 2008; Logie et al. 2011; Fletcher et al. 2016).

The study of intersectionality using statistical methods is still developing and studies that claim to examine intersecting social positions often rely on multiple main effects where the effects of two intersecting categories are measured separately and subsequently added together (sometimes called additive analysis) (Bowleg and Bauer 2016). However, this can cause confusion when interpreting results as examining effects separately does not address the intersection of the two, but instead interprets the groups as mutually exclusive. One approach to solving this problem is to use statistical interactions (sometimes called multiplicative analysis), where the main effects of intersecting social positions are multiplied to create an estimate whereby both effects are dependent on each other (Bowleg and Bauer 2016; Else-Quest and Hyde 2016). This estimate is more aligned with the central tenet of intersectionality where intersecting social positions jointly create unique experiences that are more than a sum of their parts (Bauer et al. 2021; Bowleg and Bauer 2016). There are more sophisticated statistical methods being developed for analysing more complex data with a greater number of interactions such as decision tree methods, multilevel analysis of individual heterogeneity and discriminatory accuracy (MAIHDA), and discriminatory accuracy analysis; however, continued assessment of these methods and their implications is still required (Merlo et al. 2017; Cairney et al. 2014; Shaw, Chan, and McMahon 2012; Evans et al. 2018; Bauer et al. 2021).

Some research has been done using interaction analyses to examine the intersections of gender, ethnicity, and sexual orientation and their impact on various HIV-related health outcomes. One study examined interactions between HIV stigma, ethnicity, and sexual orientation discrimination and their impact on antiretroviral therapy adherence; however, no significant interactions were found (Bogart et al. 2010). Another study found that the interaction between HIV, ethnicity, and sexual orientation discrimination had a significant impact on levels of depression (Bogart et al. 2011). There is even less research on intersectionality that breaks down stigma into different dimensions (e.g. enacted, internalised, anticipated). One study found that people with high internalised stigma experienced greater depression only if they also internalised substance use stigma (Earnshaw, Bogart, et al. 2013). A study of people living with HIV in Florida examined intersectional social positions and their impact on enacted HIV stigma and found that non-White Latinos had greater odds of endorsing enacted HIV stigma (Algarin et al. 2019). Understanding the impact of these social positions on HIV stigma as an outcome remains important given its ability to act as a key driver of further deleterious health outcomes and health inequities for people living with HIV (Loutfy et al. 2012; Hatzenbuehler, Phelan, and Link 2013). To date, there has been little work in the literature using quantitative methods to comprehensively examine intersectionality and dimensions of stigma in Canada.

To fill these gaps, this study aims to examine how intersecting gender, ethnicity, and sexual orientation relates to internalised, enacted, and anticipated stigma in people living with HIV in three provinces in Canada. We use a quantitative approach beginning with main effects

analysis to separately examine each variable and its association with different dimensions of stigma, followed by three-way interaction analyses to understand how these social positions intersect to have an effect on the dimensions of stigma.

Methods

Study Design

The People Living with HIV Stigma Index was developed by and for people living with HIV to gather data on stigma, discrimination, and lived experiences of people living with HIV (Global Network of People Living with HIV 2017). Work on the HIV Stigma Index is being implemented in Canada by the team at Reach Nexus, a national research group based at Unity Health Toronto working on ending the HIV epidemic in Canada, together with academic and community partners in all provinces across Canada. In Canada, externally validated quantitative scales were added to the survey to measure types of stigma, health risks, and protective factors.

All participants over 18 years old were considered for enrolment if they were: (1) HIV-positive, (2) able to communicate in English or French, and (3) willing and able to provide informed consent and complete the interview process. Thie present study uses data from three provinces across Canada: Ontario, Alberta, and Québec. A concerted effort was made to recruit survey participants that represent a cross-section of people living with HIV from both urban and rural areas across the three provinces and include key populations such as gay, bisexual, and other men who have sex with men, African, Caribbean, and Black individuals, women, young people, Indigenous peoples, and injection drug users.

People living with HIV were trained as peer researchers who were involved throughout the entire research study including study design, participant recruitment, data analysis and interpretation, and knowledge translation (Lo Hog Tian et al. 2022). Peer researchers administered the survey through face-to-face interviews lasting approximately 2 hours and participants were given 50 CAD honoraria for participating. Targeted peer recruitment and snowball sampling were the primary sampling approaches and peer researchers used community connections and posters in HIV service organisations to facilitate recruitment.

In Ontario 724 participants were recruited between September 2018 and August 2019, in, Québec 243 participants were recruited between May 2019 and October 2019, and in Alberta 148 participants were recruited between October 2019 and March 2020. The study was approved by the Research Ethics Boards of Université du Québec à Montréal (Reference: 2019-2438), Mount Royal University (Reference: 101859), University of Calgary (Reference: 191117), University of Toronto (Reference: 35145), and Unity Health Toronto (Reference: 17-350).

Measures

Demographics

Various demographic information was sought from the participants. The main demographic variables of interest in this study were gender (cis-man, cis-woman, other genders), ethnicity (White, African/Caribbean/Black, Indigenous, other ethnicities), and sexual orientation

(heterosexual, gay/lesbian, bisexual, other sexual orientations). Other genders included transgender and non-binary; other sexual orientations included asexual, pansexual, queer, two-spirit; and other ethnicities included Asian/Pacific Islander, Middle Eastern/North African, and LatinX. Age (years), region (Ontario, Quebec, Alberta), education (< high school vs. high school or greater), employment (employed vs. not employed), and being on antiretroviral therapy (ART) were also measured for use as covariates.

HIV Stigma

HIV stigma was measured using the 32-item version of the HIV Stigma Scale which contains subscales for internalised stigma (formerly negative self-image), enacted stigma (formerly personalised stigma), concern with public attitudes, and disclosure concerns (Berger, Ferrans, and Lashley 2001; Bunn et al. 2007). The concern with public attitudes and disclosure concerns subscales were merged to form a single anticipated stigma subscale as has been done in previous studies (Earnshaw and Chaudoir 2009; Earnshaw, Smith, et al. 2013; Rueda et al. 2012; Lindberg et al. 2014). The internalised stigma subscale measures endorsement of negative feelings and shame around being HIV positive, the enacted stigma subscale measures individual experiences of discrimination and/or rejection from others, and the anticipated stigma subscale measures one's expectations of discrimination and/or rejection from others because of their HIV positive status (Berger, Ferrans, and Lashley 2001; Bunn et al. 2007). Items were assessed using a four-point Likert scale ranging from "strongly disagree" to "strongly agree." Subscale scores were calculated by taking the mean of items in the subscale. Stigma scores ranged from 1 to 4, with higher scores indicating greater levels of HIV stigma. Confirmatory factor analysis with varimax rotation showed that items loaded into the four factors as expected from the original scale development based on eigenvalues >1 and inspection of the scree plot. Subscales showed good internal consistency with Cronbach's alphas of 0.940, 0.894, and 0.901 for enacted, internalised, and anticipated stigma, respectively. Correlation coefficients between the three types of stigma were between 0.45-0.52, indicating a moderate correlation, but without concerns of significant multicollinearity.

Statistical Analysis

Participants who did not provide data for variables of interest were excluded, leaving a final sample of n=1040. Analysis of missing cases revealed no differences in the breakdown of sample characteristics for cases that were included versus excluded. Descriptive statistics were used to summarise the participant characteristics of the sample. For the purposes of the regression analyses, the "other" gender, sexual orientation, and ethnicity categories were not included due to smaller sample sizes and large heterogeneity that merited its own separate analysis, leaving n=1019 participants. Bivariate regression analysis was conducted to examine separately the association between ethnicity, sexual orientation, and gender and each of the three types of stigmas. A multivariate model was then conducted with each sociodemographic included predicting each type of stigma. Ethnicity and sexual orientation variables were dummy coded before being entered into models. "White" was set as the reference for ethnicity and "heterosexual" was set as the reference for sexual orientation. In examining the assumption of

normality for linear regression, the normal P-P plot of standardised residuals indicated that the data contained approximately normally distributed errors. For three-way interaction analyses, separate models were created for each type of stigma that included the main effects of gender, sexual orientation, and ethnicity as well as two-way interaction terms constructed by taking the product of each permutation of the variables of interest (i.e. ethnicity *x* gender, ethnicity *x* sexual orientation, gender *x* sexual orientation), and finally a three-way interaction term using all three variables. Age, geographic region, education, employment, and being on ART were included as covariates in all models.

All analyses were conducted in IBM SPSS Statistics Version 24 (IBM Corp. 2016). Three-way models were constructed using the PROCESS macro, a regression-based tool for conducting mediation, moderation, and conditional process analysis (Hayes 2017). The alpha was set at 0.05 for the main effects in the regression models and 0.10 for the interaction terms to allow for the reduction in power that comes with adding the interactions (Veenstra 2011; Veldhuis et al. 2020). A balloon plot was created using the "ggpubr" package in R that displays the stigma scores generated from the final three-way interaction models for each intersection of gender, ethnicity, and sexual orientation (Kassambara 2023). While the theoretical stigma scale range is 1-4, the colour scale boundaries have been set at 1.5 and 3.5 since there were no values outside this range, with "lower" stigma (1.5) indicated by a green colour, "moderate" stigma (2.5) indicated by a yellow colour, and "higher" stigma (3.5) indicated by a red colour.

Results

Study Participants

Table 1 describes the demographics and variables of interests for study participants from each province. Participant age ranged from 18-87 years (Ontario - M: 48.2, SD: 11.5; Alberta - M: 49.3, SD: 10.9; Quebec - M: 51.6, SD: 12.1). The majority of participants identified as cis-gender men (Ontario: 63%, Alberta: 62%, Quebec: 63%), White (Ontario: 50%, Alberta: 50%, Quebec: 75%), had high school education or greater (Ontario: 88%, Alberta: 90%, Quebec: 89%), were not employed (Ontario: 76%, Alberta: 70%, Quebec: 63%), and were on ART (Ontario: 97%, Alberta: 96%, Quebec: 100%). For sexual orientation, participants mostly identified as either heterosexual (Ontario: 42%, Alberta: 57%, Quebec: 43%) or gay/lesbian (Ontario: 43%, Alberta: 32%, Quebec: 41%). Mean stigma scores were similar across provinces for internalised (Ontario: 2.11, Alberta: 2.14, Quebec: 1.96), enacted (Ontario: 2.53, Alberta: 2.51, Quebec: 2.31), and anticipated stigma (Ontario: 2.74, Alberta: 2.82, Quebec: 2.72).

Figure 1 shows a mosaic plot of the number of participants in each intersecting category. Each intersection of gender, ethnicity, and sexual orientation is represented by a box that is proportionate in size to the number of participants in that intersection. The largest proportion of participants identified as White, gay, cis-gender men (n=304). Among cis-gender women, the majority are heterosexual and relatively evenly split across ethnicities. There are also a few intersecting groups that have fewer participants including many bisexual groups and lesbian groups.

Multiple Regression Analyses

Table 2 shows the results of the bivariate and multivariate regression analysis with each variable of interest predicting each type of stigma. For bivariate models, African, Caribbean, and Black individuals (*b* = 0.12, p=0.02) and cis-gender women (*b* = 0.12, p=0.01) had greater levels of internalised stigma while gay/lesbian individuals (*b* = -0.13, p<0.01) had lower levels compared to the white, cis-gender male, and heterosexual reference groups respectively. Similar relationships were seen for enacted stigma with African, Caribbean, and Black individuals (*b* = 0.12, p=0.02), cis-gender women (*b* = 0.13, p<0.01), and gay/lesbian individuals (*b* = -0.13, p=0.01) being significant predictors. Lastly, African, Caribbean, and Black individuals (*b* = 0.27, p<0.01), cis-gender women (*b* = 0.14, p<0.01), and gay/lesbian individuals (*b* = -0.13, p<0.01) were also significant predictors for anticipated stigma. In multivariate models, the African, Caribbean, and Black group (*b* = 0.23, p<0.01) had significantly greater anticipated stigma compared to the White reference group while the Indigenous group (*b* = -0.12, p=0.02) had lower levels. For the multivariate models, adjusted R^2 for models with enacted, internalised, and anticipated stigma as the outcome were 2.9%, 6.0%, and 14.0% respectively. Omnibus F-tests for all multivariate models were significant for enacted [F(11, 1007) = 7.02, p<0.01], internalised [F(11, 1007) = 3.69, p<0.01], and anticipated stigma [F(11, 1007) = 16.22, p<0.01].

Three-Way Interaction Analyses

Table 3 shows the results of the three-way interaction analyses for each type of stigma. Figure 2 shows a balloon plot of the levels of each type of stigma for each of the intersecting groups. The levels of stigma were generated from the predicted values from the three-way interaction models. Each dot represents an intersection of gender, ethnicity, and sexual orientation with the colour gradient representing the level of stigma. In general, stigma scores were lower for internalised stigma as indicated by the greener coloured circles toward the bottom of the graph while levels of enacted and anticipated stigma were higher. For three-way interaction analyses, the lesbian African, Caribbean, Black group had greater internalised stigma (*b* = 0.90, p=0.06) and the lesbian Indigenous group had greater enacted stigma (*b* = 1.21, p=0.01) than the White, heterosexual, cis-gender men reference group as indicated by the redder circles representing these groups. Models with the three-way interaction terms had R^2 of 5%, 9%, and 17% for enacted, internalised, and anticipated stigma, respectively. Omnibus F-tests were significant for all three-way interaction analyses for all types of stigma.

Discussion

This study aimed to use three-way interaction analysis to examine how intersecting genders, ethnicities, and sexual orientations are associated with different dimensions of perceived HIV stigma for people living with HIV in three provinces in Canada. We found that people at most intersections had consistent levels of perceived stigma, with some people occupying specific intersections that may have greater experiences of perceived stigma in our sample including lesbian cis-gender women who are African, Caribbean, Black, or Indigenous. Firstly, this may indicate that, overall, experiences or levels of perceived HIV stigma do not differentiate drastically based on these intersecting groups but may be driven primarily by other social or

health-related factors. Secondly, it may suggest that differences in perceived stigma may apply at intersections that represent population groups that are not often considered when developing interventions or well understood in research which underlies the importance of conducting further quantitative intersectionality research to more fully understand how HIV stigma is affected by these and other intersecting factors.

While some researchers and policy makers may assume that many of these key population groups would have greater levels of HIV stigma than other groups, our data suggests that this is largely not the case. One explanation for this may be that levels of perceived stigma are high across groups, leaving little room for variation in levels (i.e. a ceiling effect). It is also important to note that these stigma measures were specific to HIV stigma and did not capture other stigmas related to gender, ethnicity, or sexual orientation. This might mean that, while we did not observe many significant differences in perceived HIV stigma, individuals at the intersections of these social positions may experience greater "total stigma" comprised of HIV stigma and other intersectional stigmas related to their gender, ethnicity, or sexual orientation including sexism, racism, transphobia, and homonegativity.

Overall levels of internalised stigma were moderately high, with enacted stigma being higher, and anticipated stigma being higher still, which is a pattern consistent with the studies that developed and validated the scale as well as other studies that use the same measure (Bunn et al. 2007; Franke et al. 2010). Interestingly, while modest in all the models, the percentage of variance explained varied for each of the types of stigma. The ethnicity, gender, and sexual orientation variables explained less of the variance in enacted stigma ($R^2 = 0.05$) compared to internalised stigma ($R^2 = 0.09$), or anticipated stigma ($R^2 = 0.17$). This might suggest that these sociodemographic characteristics may not be large drivers of enacted and internalised HIV stigma and that these types of stigma may be driven more by other factors and resources (Turan, Hatcher, et al. 2017; Pantelic, Sprague, and Stangl 2019; Stangl et al. 2019). However, these factors do have a greater association with anticipated stigma which could be explained by other ethnicity, gender, and sexual orientation forms of stigma these individuals may face. If people are experiencing these intersecting factors together, they may be more likely to anticipate HIV stigma from others.

While many intersections did not have significantly different levels of perceived stigma, we did see a few populations experiencing higher levels. In our three-way interaction analysis, Indigenous lesbian cis-gender women had significantly higher enacted stigma and African, Caribbean, Black lesbian cis-gender women had significantly higher internalised stigma. These findings may be explained through the intersectional invisibility hypothesis which contends that individuals belonging to multiple disadvantaged groups are socially invisible as they do not reflect prototypical groups (Purdie-Vaughns and Eibach 2008). African, Caribbean, Black, or Indigenous lesbian women might not fit the stereotypical idea of an African, Caribbean, Black or Indigenous person, a lesbian, or a woman (Watson-Singleton, Lewis, and Dworkin 2021; Sesko and Biernat 2010). This makes them invisible, underrepresented in research and in local or global HIV prevention and treatment strategies, and not considered in HIV interventions or programmes, which may in part explain their greater levels of HIV stigma.

To date, interventions have been inconsistent at reducing HIV stigma and few have focused on incorporating intersectionality (Batey et al. 2016; Logie et al. 2019; Dunbar et al. 2020; Brown, Macintyre, and Trujillo 2003; Relf et al. 2021; Stangl et al. 2013; Turan et al. 2019). With

high levels of HIV-related stigma continuing to persist, especially for those who live at the intersection of multiple social positions (Loutfy et al. 2015; Algarin et al. 2019), studies like this highlight the need for developing programmes and interventions that consider the needs and circumstances of specific communities. Our findings may suggest that different population groups experience different types of perceived stigma to varying degrees and that interventions designed with a lens of gender, ethnicity, and sexual orientation may be important to have the biggest impact on these populations (Smith et al. 2020). For example, interventions that have targeted specific intersections such as African, Caribbean, Black women, and gay, bisexual and other men who have sex with men living with HIV have been effective in reducing HIV stigma (Loutfy et al. 2015; Bogart, Mutchler, et al. 2017; Demarco and Chan 2013; Li et al. 2018; Adam et al. 2011).

Limitations

The findings from this study should be interpreted while considering some limitations. Firstly, this study used a non-random, convenience sample, which limits the generalisability of the findings beyond the study population. Since participants were recruited from HIV service organisations, the sample may also have had a greater representation of people who are connected to HIV care, involved in the HIV community, and are on HIV medication which may not fully reflect the breakdown of people living with HIV in Canada. This could result in underestimations of stigma and a lack of representation from population groups that are hardest to reach.

Beyond this, the inference tests undertaken here are more robust when applied to probability samples and so the findings from these tests must be interpreted simply as a tool to assess patterns and relationships, rather than to make conclusive statements about the entire population. Additionally, the cross-sectional nature of the study does not permit us to make conclusions about causality. Future research using probability sampling and longitudinal study designs are needed to examine if the relationships found here remain consistent in the larger population.

There was a moderate correlation between the three stigma subscales and while factor analysis did support drawing a distinction between these types of stigma, there may be some redundancy in modelling them independently. The anticipated stigma subscale was also created by merging two constructs from the original scale together to more closely match current stigma conceptualisations and frameworks; however, future work may be needed using the original four factor model or the total score to further clarify any conceptual and analytical distinctions between these types of stigma. With the large number of interaction terms entered in the models, alpha was increased to 0.1 for three-way interaction analyses to account for the reduction in power when running tests of significance for interaction terms; however, this can also increase the chance of a type 1 error (i.e. finding a significant interaction effect when there is none present) and any conclusions must be drawn with care.

The sample sizes for the intersections studied here varied, with some having much lower numbers than others which may have introduced bias. There are more complex analyses that can better manage these sample size challenges such as multilevel analysis of individual heterogeneity and discriminatory accuracy (MAIHDA) which must be used to further assess the relationships examined here (Bauer et al. 2021). Additionally, some key intersecting groups were

not included in the analyses at all or were combined into broader groups due to insufficient representation in the data. Moving forward, intersectionality research must aim to examine these intersecting groups that commonly have lower sample sizes individually and understand the needs and experiences of stigma *within* these groups rather than comparing across groups. Lastly, there were several other key social and structural factors (notably social class) as well as other types of stigma that were not included here that may intersect with the variables in this study to have an impact on stigma.

Conclusion

This is one of the few studies to quantitatively examine the role of intersecting genders, ethnicities, and sexual orientations on experiences of perceived HIV stigma in a large sample across Canada. Overall, population groups had mostly consistent levels of perceived stigma, with people occupying certain intersections including lesbian women who are African, Caribbean, Black, or Indigenous having greater experiences of stigma. Taken together, the results suggest that incorporating intersectionality and tailoring future HIV interventions and programmes to specific communities at the intersection of gender, ethnicity, and sexual orientation may be important to consider when aiming to reduce HIV stigma among people living with HIV in Canada.

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Author Disclosure Statement

The authors state theyhave no competing interests to declare.

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Data Availability Statement

The datasets used and/or analysed in this study are available from the corresponding author upon reasonable request.

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Table 1. Participant demographics and variables of interest (n=1040)

	Total (n=1040)		Ontario (n=675)		Alberta (n=136)		Quebec (n=229)	
Variable	N or mean	% or SD	N or mean	% or SD	N or mean	% or SD	N or mean	% or SD
Age (Years)	48.92	11.62	48.02	11.48	49.33	10.93	51.31	12.09
Gender								
Cis-gender man	655	63%	427	63%	84	62%	144	63%
Cis-gender woman	350	34%	227	34%	49	36%	74	32%
Other	35	3%	21	3%	3	2%	11	5%
Sexual Orientation								
Heterosexual	461	44%	286	42%	77	57%	98	43%
Gay/Lesbian	424	41%	287	43%	43	32%	94	41%
Bisexual	100	10%	66	10%	12	9%	22	10%
Other	55	5%	36	5%	4	3%	15	7%
Ethnicity								
White	579	56%	340	50%	68	50%	171	75%
African/Caribbean/Black	207	20%	156	23%	25	18%	26	11%
Indigenous	187	18%	125	19%	40	29%	22	10%
Other	67	6%	54	8%	3	2%	10	4%
Education								
< High School	120	12%	81	12%	14	10%	25	11%
High School or Greater	920	89%	594	88%	122	90%	204	89%
Employment								
Employed	288	28%	160	24%	44	32%	84	37%
Not Employed	752	72%	515	76%	92	68%	145	63%
Medication								
On ART	1012	97%	653	97%	131	96%	228	100%
Not on ART	28	3%	22	3%	5	4%	1	0%
Stigma								
Internalised	2.08	0.67	2.11	0.69	2.12	0.66	1.97	0.63
Enacted	2.57	0.66	2.53	0.68	2.51	0.69	2.72	0.56
Anticipated	2.66	0.62	2.75	0.56	2.81	0.53	2.32	0.70

SD Standard deviation

Notes: ART = Antiretroviral therapy;

Notes: Other genders include transgender and non-binary; other sexual orientations include asexual, pansexual, queer, two-spirit; other ethnicities include Asian/Pacific Islander, Middle Eastern/North African, and LatinX

Table 2. Bivariate and multivariable regression with ethnicity, gender, and sexual orientation predicting dimensions of stigma

	Bivariate			Multivariate		
	b	SE	p-value	*b*	SE	p-value
Internalised Stigma						
Ethnicity						
White		ref			ref	
ACB	0.12	0.05	**0.02**	0.07	0.06	0.21
Indigenous	0.06	0.06	0.28	0.02	0.06	0.70
Gender						
Cis-gender man		ref			ref	
Cis-gender woman	0.12	0.04	**0.01**	0.06	0.05	0.29
Sexual Orientation						
Heterosexual		ref			ref	
Gay/Lesbian	-0.13	0.04	**<0.01**	-0.07	0.06	0.20
Bisexual	0.05	0.07	0.51	0.08	0.08	0.27
Enacted Stigma						
Ethnicity						
White		ref			ref	
ACB	0.12	0.05	**0.02**	0.07	0.06	0.24
Indigenous	-0.02	0.06	0.77	-0.04	0.06	0.51
Gender						
Cis-gender man		ref			ref	
Cis-gender woman	0.13	0.04	**<0.01**	0.08	0.05	0.13
Sexual Orientation						
Heterosexual		ref			ref	
Gay/Lesbian	-0.12	0.07	**0.01**	-0.06	0.06	0.26
Bisexual	-0.09	0.07	0.23	-0.04	0.08	0.62
Anticipated Stigma						
Ethnicity						
White		ref			ref	
ACB	0.27	0.05	**<0.01**	0.23	0.05	**<0.01**
Indigenous	-0.09	0.05	0.06	-0.12	0.05	**0.02**
Gender						
Cis-gender man		ref			ref	
Cis-gender woman	0.14	0.04	**<0.01**	0.07	0.05	0.14
Sexual Orientation						
Heterosexual		ref			ref	
Gay/Lesbian	-0.13	0.04	**<0.01**	-0.04	0.05	0.40
Bisexual	-0.02	0.06	0.81	0.04	0.07	0.51

Note; All models controlled for age, geographic region, education, employment, and being in receipt of ART*;* ACB = African, Caribbean, Black

Table 3. Three-way interactions with ethnicity, gender, and sexual orientation predicting dimensions of stigma

					Internalised Stigma			Enacted Stigma			Anticipated Stigma		
					b	SE	p-value	b	SE	p-value	b	SE	p-value
Gender *x* Ethnicity *x* Sexual Orientation													
Cis-gender woman	*x*	Gay/Lesbian	*x*	ACB	0.90	0.47	**0.06**	0.35	0.48	0.47	0.10	0.42	0.81
				Indigenous	0.57	0.47	0.23	1.21	0.48	**0.01**	0.60	0.42	0.15
Cis-gender woman	*x*	Bisexual	*x*	ACB	0.44	0.40	0.27	0.28	0.41	0.49	0.36	0.35	0.31
				Indigenous	0.00	0.38	0.99	0.18	0.38	0.65	0.30	0.33	0.36
					R^2 = 0.09			R^2 = 0.05			R^2 = 0.17		
					F(23, 892) = 3.84, p<0.01			F(23, 892) = 1.86, p<0.01			F(23, 892) = 7.96, p<0.01		

Notes: All models controlled for age, geographic region, education, employment, and being on ART*;* ACB = African, Caribbean, Black

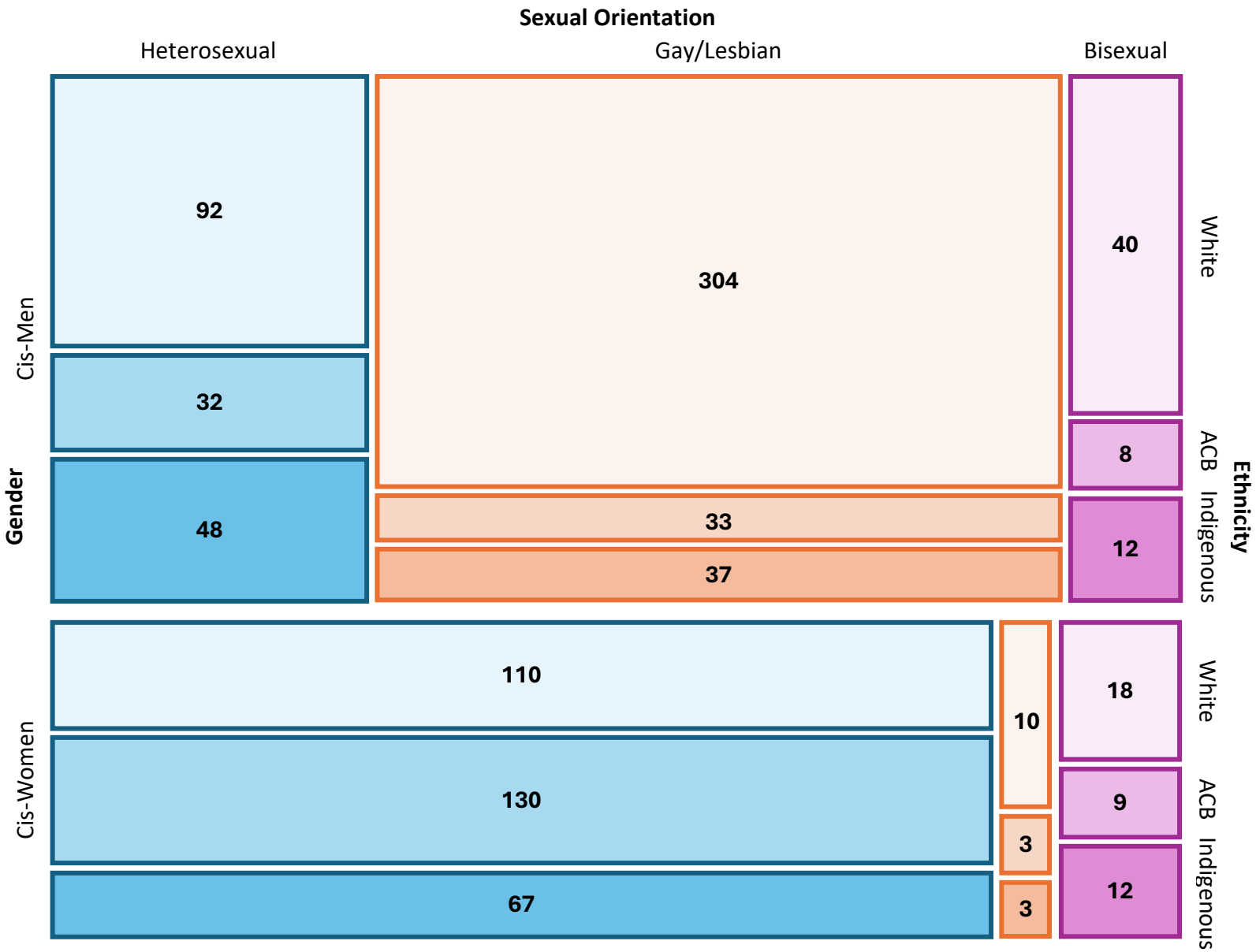

Figure 1. Mosaic plot showing number of participants in each intersection of gender, ethnicity, and sexual orientation. Box size represents the number of participants occupying that intersection.
Note: *ACB* = African, Caribbean, Black

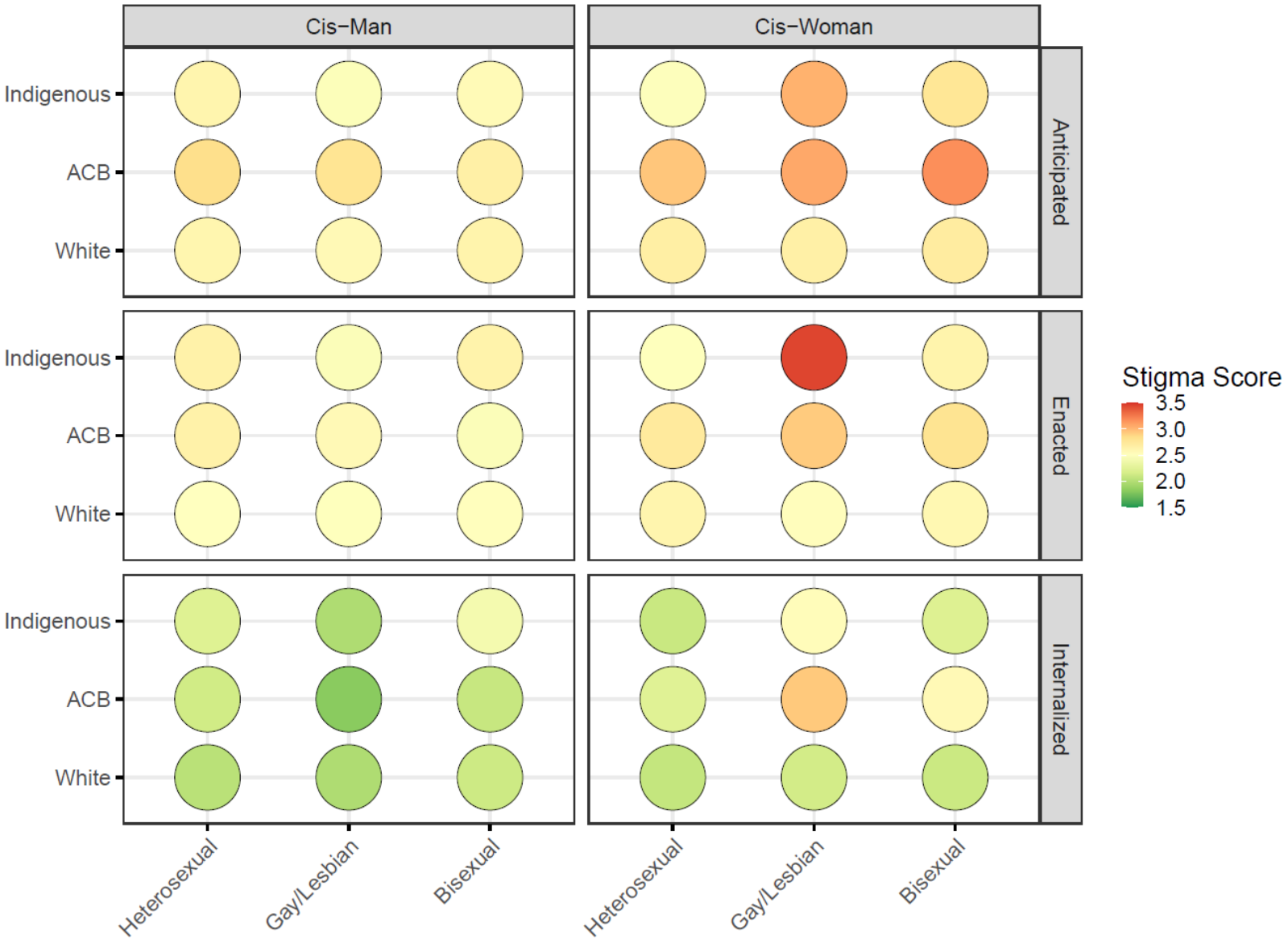

Figure 2. Balloon plot of internalized, enacted, and anticipated stigma scores for each intersection of gender, ethnicity, and sexual orientation. Colour of the circles represent the stigma score for that intersection with lower stigma in green and higher stigma in red.

Notes: ACB = African, Caribbean, Black; all models controlled for age, geographic region, education, employment, and being in receipt of ART