



Inequitable access to PrEP among gay, bisexual, and other men who have sex with men in Canada: A network analysis of social indicators

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ABSTRACT

This paper examines demographic, structural, and syndemic variables to map facilitators and barriers to accessing pre-exposure prophylaxis (PrEP) among gay, bisexual, and other men who have sex with men (GBM) in the three largest cities in Canada, Vancouver, Toronto, and Montreal. Focusing on factors in the later stages of the PrEP cascade, this study first performed a logistic regression analysis and reports adjusted odds ratios, then entered statistically significant social indicators into a network analysis to profile the interrelated and sometimes mutually reinforcing social conditions that shape inequitable access to PrEP among Canadian GBM. Barriers to accessing a gay-friendly health care provider (HCP) and financial barriers remain primary nodes associated with inequitable PrEP access. These two nodes are, in turn, linked to other social indicators: experiencing stigma from an HCP, being less likely to be out to an HCP (most common among bisexual and queer men), and not being able to find an HCP accepting of their sexuality (most common among Indigenous, Black, and some other GBM of colour). The cost of PrEP was also a barrier, especially for less educated and un- or under-employed GBM, as well as newcomers to Canada, who more often lacked insurance for medications. These findings point toward the importance of having a primary HCP and finding an HCP who is culturally competent regarding the sexualities of gay and bisexual men, queer and trans people. These barriers may also explain other social inequities experienced by Black, Indigenous, and other GBM of colour, and by people who do not have health insurance that covers all or most of the cost of PrEP. This pattern of inequitable access to PrEP points toward the urgency of providing universal access without financial barriers (currently available in some Canadian provinces but not others) and supporting access points with a reputation for welcoming GBM in their full diversity.

1. Introduction

The effective use of HIV prevention techniques, such as pre-exposure prophylaxis (PrEP), remains of critical importance in Canada where 56% of first-time HIV diagnoses among men ≥ 15 years of age continue to occur among men who have sex with men, accounting for 38.1% of total HIV incidence (Public Health Agency of Government of Canada, 2024, p. 31). The adoption of PrEP by gay, bisexual, and other men who have sex with men (GBM) without HIV has often been conceived as a five-step

“cascade,” parallel to the treatment cascade whereby people diagnosed with HIV come to be treated with antiretrovirals (Gaspar, Wells, et al., 2022; Kelley et al., 2015; Zapata et al., 2024). Much recent research has focused on the early steps in the PrEP cascade of: (1) recognizing risk, (2) being aware of PrEP, (3) discussing with a health-care provider, and (4) obtaining a prescription, and includes studies of attitudes and stigma inhibiting its uptake. Now that awareness is high (91.4%–98.3%) and adoption is significant among GBM (Sang et al., 2021), factors beyond awareness and attitudes are becoming

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increasingly important to PrEP uptake among those who might benefit most from it. While early phases of research have focused largely on cognitive factors and thus the responsibility of individuals to adopt PrEP (Grewal et al., 2021), this study focuses more on structural and programmatic facilitators and barriers in the later stages of the PrEP cascade, that is, access to healthcare, obtaining a prescription, and (5) procuring PrEP (see Tables 1–5).

The structure of Canada's health care system can entail inequities in PrEP access. PrEP availability in Canada occurs within the context of Medicare, a national medical insurance program intended to provide healthcare access to all citizens (Government of Canada, 2024). Nevertheless, the cost of prescription drugs is not included in the program and the administration of the national program falls to the provinces, resulting in divergent PrEP policies in each province. Among the

Table 1
Descriptive statistics.

	N	Mean/ percentage
Total	2026	
City		
Montreal	979	48.3
Toronto	420	20.7
Vancouver	627	30.9
Age		
16–24	331	16.3
25–34	952	47.0
35–44	362	17.9
45–54	186	9.2
55–80	195	9.6
Gender		
Man	1894	93.5
Trans man, genderqueer, gender non-conforming, two-spirit, others	128	6.3
Sexual Orientation		
Gay	1632	80.6
Bisexual	144	7.1
Queer	170	8.4
Questioning, asexual, pansexual, two-spirit, others	80	3.9
Ethnic identification		
Aboriginal, Indigenous	23	1.1
British, English Canadian	565	27.9
French, French Canadian	608	30.0
East Asian, Southeast Asian, South Asian	217	10.7
West Asian, Arab, North African	69	3.4
African, Black, Caribbean	53	2.6
Other Eastern & Western European	214	10.6
Latin American	170	8.4
Mixed race, Others	107	5.3
Migratory status		
Canadian Citizen	1584	78.2
Permanent Resident	178	8.8
Refugee, refugee applicant, temporary, student visa, undocumented	264	13.0
Education level		
Some high school or less	103	5.1
High school diploma or equivalent	201	9.9
Postsecondary education less than a bachelor's degree	645	31.8
Bachelor's degree	674	33.3
Graduate or professional degree	401	19.8
Employment status		
Yes	1515	74.8
No	511	25.2
Annual income		
No Income	66	3.3
\$1 - \$19,999	621	30.7
\$20,000 - \$39,999	564	27.8
\$40,000 - \$59,999	388	19.2
\$60,000 - \$79,999	208	10.3
\$80,000 - \$99,999	95	4.7
\$100,000 or more	84	4.1
Medical insurance		
Yes	1407	69.4
No	619	30.6

three most populous provinces, British Columbia covers the cost of PrEP for eligible candidates, Quebec offers a tiered approach, while Ontario depends on a patchwork of programs where people between the ages of 25 and 65 depend on workplace coverage, seniors over 65 and youth under 25 can access a provincial plan, and low income people can qualify for yet another coverage plan (Yoong, 2024). As a result, PrEP uptake is highest in British Columbia (Sang et al., 2022) and affordability remains a barrier in Ontario (Gaspar, Tan, et al., 2022; Pico-Espinosa et al., 2023) and Quebec. These provincial funding disparities may particularly affect GBM as lesbian, gay, and bisexual people in Canada appear to have lower rates of insurance for prescription drugs compared to heterosexuals (Gupta & Salway, 2022).

In addition, accumulating evidence shows that fear of neglect and overt discrimination by health care providers is a significant concern of GBM in dealing with the healthcare system (Brener et al., 2023; Haines et al., 2021) and the ability to be open with primary care providers about one's sexuality is associated with better health access and with PrEP awareness and uptake (Maksut et al., 2018; Maloney et al., 2017; Skinner et al., 2022). PrEP use varies even within GBM populations. A recent survey of Australian GBM shows that PrEP use was lower among “younger, recently-arrived, and bisexual GBM,” who may rely more on condom use than PrEP as an HIV prevention strategy (Holt et al., 2024, p. 1469).

A sizeable body of research shows that syndemic conditions affect vulnerability to acquiring HIV among GBM (Halkitis et al., 2013; Stall et al., 2007). These conditions may also be associated with access to health care and to PrEP. Both condomless sex and seroconversion have been linked to experiencing antigay harassment (Ferlatte et al., 2014; Jeffries IV et al., 2021) and intimate partner violence, alongside syndemic conditions such as depression, social anxiety, childhood sexual abuse, and substance use (Lee et al., 2020; Parsons et al., 2017). PrEP may then be particularly appropriate for GBM experiencing these psychosocial syndemic conditions, but the relationship between syndemics and PrEP uptake may be complex. While the link between syndemics and HIV risk may point to a greater need for and actual use of PrEP (Chandler et al., 2021), syndemic conditions may also be associated with barriers to PrEP access (Blashill et al., 2020).

This study builds on an earlier analysis of PrEP awareness (Cox et al., 2021), which identified that lack of medical insurance, lack of a primary care provider, and not being able to find a doctor accepting of sexual behaviours of GBM adversely affect PrEP use. These factors have also been found to be correlates of low PrEP use in Massachusetts (Fitch et al., 2021), a jurisdiction which like Canada provides wide medical insurance coverage through state and federal programs.

The present study therefore examines both the structural and the psychosocial syndemic conditions that may shape access to PrEP use in a large, multi-city study of GBM. Specifically, this study explores the demographic, structural, and syndemic indicators affecting access to a primary provider who is “sensitive and accepting enough of my sexual activities and choices to prescribe PrEP.”

2. Methods

Data come from the Engage Study, a longitudinal cohort study of GBM in Toronto, Montreal, and Vancouver, the three largest urban areas in Canada with the greatest concentrations of people living with HIV. Engage study methods have been described in detail previously (Cox et al., 2021; Hart et al., 2021; Moore et al., 2021). In brief, Engage combines data from computer-assisted self-interviewing (CASI) and the detection of HIV and other selected sexually transmitted and blood-borne infections using biological samples. Eligible participants were 16 years of age or more, identified as a man (including trans men), reported sexual activity with a man in the previous 6 months, and were able to read English or French. This study employed respondent-driven sampling (RDS) to recruit participants. RDS uses chain referral sampling and allows researchers to approximate probabilistic samples by

Table 2
Effects of syndemic and socioeconomic variables on PrEP access.

	Had you ever heard of PrEP (Pre-Exposure Prophylaxis)?			I don't think I can find a doctor that is sensitive and accepting enough of my sexual activities and choices to prescribe PrEP			I know where to go to get a prescription for PrEP			Has a health professional ever suggested that you take PrEP?			Have you ever taken PrEP yourself?							
	aOR	(95%CI)	p	aOR	(95%CI)	p	aOR	(95%CI)	p	aOR	(95%CI)	p	aOR	(95%CI)	p					
City																				
Montreal																				
Toronto	1.71	0.73	4.00	0.22	1.29	0.62	2.71	0.50	0.57	0.31	1.04	0.07	0.68	0.37	1.27	0.23	0.74	0.39	1.40	0.36
Vancouver	0.98	0.46	2.06	0.95	1.43	0.72	2.83	0.30	0.99	0.57	1.74	0.98	0.89	0.49	1.61	0.70	1.32	0.72	2.42	0.38
Age	0.95	0.93	0.97	0.00	0.99	0.97	1.02	0.64	1.03	1.00	1.05	0.02	1.01	0.99	1.03	0.40	1.00	0.98	1.02	0.83
Gender	0.25	0.09	0.71	0.01	2.25	0.74	6.83	0.15	0.98	0.38	2.53	0.96	0.25	0.06	1.06	0.06	0.75	0.24	2.35	0.62
Sexual orientation																				
Gay																				
Bisexual	0.41	0.20	0.85	0.02	4.22	1.75	10.13	0.00	0.94	0.34	2.61	0.91	1.40	0.56	3.48	0.47	0.60	0.15	2.32	0.46
Queer	1.88	0.46	7.60	0.38	1.22	0.49	3.02	0.67	1.06	0.53	2.12	0.86	0.55	0.25	1.24	0.15	0.72	0.32	1.59	0.41
Straight, Questioning, Asexual, Pansexual, Two-spirit	1.06	0.26	4.35	0.93	3.68	1.12	12.03	0.03	0.59	0.22	1.57	0.29	0.45	0.14	1.42	0.17	0.49	0.13	1.85	0.29
Ethnic background																				
British/English Canadian																				
Aboriginal, Indigenous	12.03	1.23	117.40	0.03	0.28	0.05	1.67	0.16	5.42	0.82	35.82	0.08	4.74	0.98	23.00	0.05	5.96	1.29	27.45	0.02
French, French Canadian	0.28	0.13	0.64	0.00	1.68	0.73	3.84	0.22	0.93	0.47	1.84	0.84	0.59	0.30	1.14	0.12	0.66	0.33	1.32	0.24
East Asian, Southeast Asian, South Asian	0.31	0.10	0.93	0.04	2.85	1.17	6.91	0.02	1.26	0.66	2.40	0.49	1.26	0.64	2.49	0.50	1.63	0.83	3.21	0.15
West Asian, Arab, North African	0.74	0.14	3.85	0.72	5.38	1.45	19.89	0.01	0.52	0.17	1.59	0.25	0.61	0.20	1.85	0.39	0.36	0.10	1.32	0.12
African, Black, Caribbean	0.39	0.08	1.84	0.24	3.98	1.01	15.69	0.05	0.55	0.23	1.33	0.19	0.35	0.12	1.02	0.06	0.65	0.21	2.00	0.45
Other Eastern & Western European	0.87	0.27	2.78	0.82	1.52	0.56	4.14	0.41	0.95	0.47	1.91	0.89	1.35	0.61	2.98	0.45	1.87	0.94	3.73	0.08
Latin American	0.46	0.16	1.32	0.15	1.75	0.65	4.72	0.27	0.84	0.39	1.77	0.64	1.31	0.54	3.13	0.55	0.83	0.33	2.12	0.70
Mixed race, Others	0.49	0.16	1.53	0.22	4.68	1.40	15.60	0.01	0.67	0.26	1.70	0.40	1.76	0.67	4.63	0.25	0.73	0.30	1.79	0.49
Migratory status																				
Canadian citizen																				
Permanent resident	2.27	0.52	9.91	0.28	0.679	0.30	1.56	0.36	0.80	0.39	1.65	0.54	0.72	0.36	1.43	0.35	1.03	0.50	2.12	0.94
Refugee, refugee applicant, temporary, student visa, undocumented	1.14	0.52	2.49	0.74	0.716	0.33	1.54	0.39	0.76	0.43	1.34	0.35	0.68	0.34	1.36	0.28	0.43	0.20	0.93	0.03
Marital status	0.68	0.35	1.32	0.26	1.99	1.06	3.75	0.03	0.62	0.36	1.06	0.08	1.07	0.66	1.74	0.78	0.96	0.57	1.63	0.88
Level education																				
Bachelor's degree																				
Some high school or less	0.45	0.17	1.22	0.12	0.861	0.15	4.97	0.87	0.89	0.25	3.23	0.86	1.33	0.29	6.04	0.71	0.11	0.02	0.47	0.00
High school diploma or a high school equivalency certificate	0.52	0.18	1.53	0.24	0.949	0.37	2.46	0.92	0.75	0.36	1.58	0.45	0.80	0.40	1.58	0.52	0.43	0.19	0.97	0.04
Some post-secondary education less than a bachelor's degree	0.70	0.35	1.41	0.32	0.987	0.55	1.76	0.97	1.27	0.76	2.12	0.36	1.09	0.65	1.83	0.74	0.54	0.31	0.93	0.03
Graduate or professional degree	2.71	0.94	7.80	0.07	0.56	0.27	1.15	0.11	1.84	1.12	3.03	0.02	1.30	0.77	2.19	0.32	1.22	0.71	2.13	0.47
Employment	1.59	0.81	3.12	0.18	0.558	0.31	1.01	0.06	0.91	0.52	1.58	0.74	1.17	0.71	1.93	0.53	0.81	0.48	1.37	0.44
Annual income																				
\$0 or No Income																				
\$1 - \$19,999	0.50	0.14	1.72	0.27	0.94	0.17	5.17	0.94	1.93	0.62	6.08	0.26	3.41	0.92	12.55	0.07	0.97	0.22	4.26	0.97
\$20,000 - \$39,999	0.60	0.16	2.19	0.44	0.734	0.13	4.21	0.73	2.30	0.71	7.46	0.17	1.94	0.51	7.40	0.33	0.83	0.19	3.57	0.80
\$40,000 - \$59,999	0.58	0.12	2.79	0.49	1.39	0.24	8.22	0.72	2.41	0.69	8.38	0.17	4.41	1.09	17.93	0.04	0.83	0.19	3.65	0.80
\$60,000 - \$79,999	2.31	0.27	19.45	0.44	2.01	0.33	12.16	0.45	1.56	0.42	5.81	0.50	2.03	0.46	9.01	0.35	0.62	0.13	2.94	0.55
\$80,000 - \$99,999	0.57	0.12	2.79	0.49	1.45	0.19	10.85	0.72	2.24	0.58	8.61	0.24	3.18	0.69	14.70	0.14	1.30	0.27	6.33	0.75
>\$100,000 or more	0.26	0.03	2.39	0.23	4.04	0.52	31.07	0.18	1.56	0.35	6.97	0.56	1.03	0.21	5.03	0.97	1.16	0.22	6.28	0.86
Medical insurance	1.45	0.69	3.07	0.33	0.887	0.51	1.53	0.67	1.47	0.96	2.25	0.08	1.02	0.66	1.58	0.92	1.63	0.95	2.79	0.08
Out to HCP																				
No primary health care provider																				
HCP but not out as MSM	0.78	0.25	2.37	0.66	0.83	0.39	1.75	0.63	0.63	0.34	1.16	0.14	0.91	0.44	1.89	0.80	0.81	0.30	2.19	0.67
HCP but out as MSM	2.69	1.38	5.23	0.00	0.21	0.11	0.37	0.00	4.29	2.77	6.64	0.00	2.43	1.50	3.94	0.00	1.88	1.13	3.13	0.02
Intimate Partner Violence Any	1.87	1.03	3.38	0.04	1.33	0.78	2.28	0.30	0.69	0.47	1.03	0.07	0.87	0.57	1.33	0.52	1.11	0.72	1.71	0.63
Hospital Anxiety Scale	1.66	0.86	3.23	0.13	1.20	0.67	2.14	0.55	1.29	0.86	1.95	0.22	1.67	1.05	2.65	0.03	0.87	0.53	1.42	0.58
Hospital Depression Scale	0.70	0.26	1.84	0.47	1.01	0.56	1.81	0.99	1.02	0.59	1.75	0.95	1.01	0.58	1.75	0.98	0.85	0.48	1.49	0.57
Alcohol Use AUDIT-C Scale	0.51	0.29	0.90	0.02	1.33	0.80	2.22	0.27	1.09	0.72	1.65	0.70	1.27	0.80	2.00	0.31	1.28	0.79	2.06	0.32
I believe that I was sexually abused	1.50	0.76	2.94	0.24	0.87	0.47	1.60	0.65	0.77	0.47	1.26	0.30	1.05	0.65	1.70	0.85	1.31	0.75	2.27	0.34
Chemsex	0.78	0.38	1.59	0.49	0.89	0.52	1.53	0.68	0.89	0.57	1.40	0.62	1.06	0.68	1.67	0.79	1.23	0.79	1.93	0.36
Unfair treatment	0.84	0.45	1.58	0.59	2.23	1.30	3.82	0.00	0.71	0.45	1.13	0.15	0.88	0.52	1.50	0.64	1.70	1.00	2.89	0.05
HIRI	2.74	1.39	5.37	0.00	0.89	0.52	1.52	0.67	1.49	0.96	2.32	0.08	2.89	1.82	4.59	0.00	4.05	2.08	7.87	0.00

Table 3
Effects of syndemic and socioeconomic variables on access to health care providers.

	Do you currently have a regular primary health care provider, that is, someone you can go to for routine medical check-ups or for specific health concerns?				Does your current regular primary health care provider know that you have sex with men?			
	aOR	(95%CI)	p		aOR	(95%CI)	p	
City								
Montreal								
Toronto	3.15	1.77	5.58	0.00	1.32	0.51	3.41	0.57
Vancouver	1.86	1.08	3.19	0.02	0.78	0.31	1.97	0.60
Age	1.05	1.02	1.07	0.00	1.02	0.99	1.05	0.19
Gender	2.28	0.87	6.01	0.09	0.95	0.36	2.55	0.93
Sexual orientation								
Gay								
Bisexual	0.52	0.27	1.00	0.05	0.05	0.02	0.18	0.00
Queer	1.19	0.59	2.42	0.62	0.58	0.18	1.83	0.35
Straight, Questioning, Asexual, Pansexual, Two-spirit	0.33	0.09	1.24	0.10	0.12	0.04	0.36	0.00
Ethnic background								
British, English Canadian								
Aboriginal, Indigenous	0.08	0.01	0.77	0.03	0.04	0.00	0.80	0.04
French, French Canadian	2.61	1.36	5.01	0.00	3.15	0.96	1.29	0.06
East Asian, Southeast Asian, South Asian	2.05	1.00	4.19	0.05	0.24	0.10	0.61	0.00
West Asian, Arab, North African	2.56	0.81	8.12	0.11	2.42	0.38	15.5	0.35
African, Black, Caribbean	1.33	0.49	3.58	0.57	0.10	0.03	0.34	0.00
Other Eastern & Western European	1.50	0.71	3.17	0.29	1.11	0.39	3.23	0.83
Latin American	1.66	0.74	3.53	0.22	1.23	0.32	4.80	0.76
Mixed race, Others	1.73	0.51	5.88	0.38	1.10	0.29	4.16	0.89
Migratory status								
Canadian citizen								
Permanent resident	0.25	0.14	0.46	0.00	0.65	0.18	3.32	0.51
Refugee, refugee applicant, temporary, student visa, undocumented	0.18	0.09	0.35	0.00	1.02	0.33	3.16	0.97
Marital status	0.92	0.58	1.44	0.70	0.31	0.15	0.66	0.00
Level education								
Bachelor's degree								
Some high school or less	0.38	0.11	1.30	0.12	0.66	0.12	3.72	0.64
High school diploma or equivalent	1.47	0.72	3.04	0.29	5.13	1.19	22.0	0.03
Post-secondary education less than a bachelor's	0.92	0.57	1.48	0.74	0.98	0.42	2.28	0.97
Graduate or professional degree	0.64	0.40	1.03	0.07	1.18	0.42	3.35	0.75
Employment	0.66	0.41	1.06	0.09	0.86	0.38	1.92	0.71
Annual income								
\$0 or No Income								
\$1 - \$19,999	0.62	0.24	1.60	0.32	2.67	0.47	15.3	0.27
\$20,000 - \$39,999	0.98	0.37	2.56	0.96	4.99	0.92	27.1	0.06
\$40,000 - \$59,999	0.60	0.21	1.68	0.33	10.92	1.64	72.5	0.01
\$60,000 - \$79,999	0.89	0.29	2.76	0.84	5.02	0.72	35.3	0.10
\$80,000 - \$99,999	1.14	0.34	3.88	0.82	10.47	1.07	102.33	0.04
>\$100,000 or more	1.42	0.41	4.96	0.58	5.39	0.33	87.25	0.24
Medical insurance	2.30	1.53	3.44	0.00	0.95	0.45	2.03	0.90
Intimate Partner Violence Any	1.13	0.78	1.65	0.52	1.03	0.50	2.11	0.94
Hospital Anxiety Scale	1.05	0.69	1.60	0.81	0.63	0.30	1.31	0.22
Hospital Depression Scale	1.24	0.74	2.07	0.41	1.08	0.48	2.43	0.85
Alcohol Use AUDIT-C Scale	1.13	0.74	1.73	0.57	0.64	0.32	1.27	0.20
I believe that I was sexually abused	1.58	0.98	2.56	0.06	1.25	0.50	3.17	0.63
Chemsex	0.92	0.60	1.41	0.70	1.39	0.67	2.89	0.37
Unfair treatment	0.59	0.38	0.91	0.02	1.84	0.81	4.16	0.14
HIRI	1.01	0.67	1.53	0.95	1.42	0.69	2.97	0.34

adjusting for selection bias (Heckathorn, 2002). Each participant received six vouchers to recruit GBM from their social or sexual networks. Participants received CAD\$50 for participation and a secondary incentive of \$15 for each eligible GBM recruited. Baseline data were collected from February 2017 to August 2022. All participants signed an informed consent form prior to data collection. The study was approved by research ethics boards at Toronto Metropolitan University, University of Toronto, St. Michael's Hospital, University of Windsor, University of British Columbia, Providence Health Care, University of Victoria, Simon Fraser University, and the Research Institute of the McGill University Health Centre.

2.1. Measures

2.1.1. Predictor variables: demographic

Participants reported their city of residence (Montreal, Toronto, Vancouver), age, gender (man, trans man, queer, two spirit, other),

sexual orientation (gay, bisexual, straight, queer, questioning, asexual, pansexual, two spirit, other), marital status, ethnicity, immigration status, education, employment status, and income.

2.1.2. Predictor variables: syndemic

Heterosexist victimization: The Heterosexist Harassment, Rejection and Discrimination Scale (HHRDS) consists of 14 items reflecting the frequency with which GBM report having experienced discrimination because they are GBM in the past year. Items include “How many times have you been treated unfairly by family members because you are a gay/bisexual man” and “How many times have you been treated unfairly by your employer, boss, or supervisors because you are a gay/bisexual man?” Each item is rated on a 6-point Likert scale (1 = “never”, 6 = “almost all the time”). Items were averaged and a score greater than 1 indicates experience of homophobic victimization (Szymanski, 2006).

Intimate partner violence: Participants were coded as having

Table 4
Correlation matrix of barriers to PrEP access.

	Not out	Anxiety	Indigenous	Unable to find accepting physician	Refugee ...	PrEP too costly	Un(der)em- ployed	Lack medical insurance	Difficulty accessing PrEP	Queer	Treated unfairly by HCP	High school education or less
Not out as MSM to HCP	1											
Anxiety	0.025	1										
Indigenous	-0.112	-0.184	1									
Unable to find an accepting physician	0.403***	0.162**	0.095	1								
Refugee, student, undocumented	0.076	-0.117	-0.238	0.289*	1							
PrEP too costly	0.038	0.127**	-0.075	0.219**	0.183*	1						
Un(der)employed	-0.001	0.110**	0.099	0.166	0.293***	-0.037	1					
Lack medical insurance	0.070	0.062	0.005	0.072	0.064	0.278***	0.173***	1				
Difficulty accessing PrEP	-0.300***	-0.171**	-0.066	-0.543***	-0.328***	-0.393***	-0.095	-0.229***	1			
Queer	-0.126	0.246***	-0.180	0.090	0.029	0.150**	-0.130**	0.080	-0.195***	1		
Treated unfairly by HCP	-0.174**	0.211***	0.04	0.247***	0.117	0.112***	0.091	0.024	-0.204***	0.307***	1	
High school education or less	-0.008	0.151**	0.238**	0.081	-0.059	0.010	0.396***	0.195***	0.006	-0.191**	-0.003	1

***p < 0.01, **p < 0.05, *p < 0.1.

experienced intimate partner violence if they responded “yes” to any of the following items on the Intimate Partner Violence scale (Stults et al., 2015): (1) Have you ever been insulted or verbally abused by a lover or boyfriend? (2) Have you ever been hit, kicked, or slapped by a lover or boyfriend? (3) Have you ever been sexually abused or raped by a lover or boyfriend? (4) Have you ever insulted or verbally abused a lover or boyfriend? (5) Have you ever hit, kicked, or slapped a lover or boyfriend? (6) Have you ever sexually abused or raped a lover or boyfriend?

Depression and anxiety: Participants who scored between 0 and 7 on the Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983) were categorized as not depressed or anxious. Those scoring between 8 and 10 were categorized as possibly depressed/anxious, and between 11 and 21 as depressed/anxious.

Substance use: Participants scoring 4 points or more on the Alcohol Use AUDIT-C Scale (Bradley et al., 2007) were coded as “yes” for higher alcohol use, while those scoring less than 4 were coded as “no.” To measure drugs used, participants were categorized as “yes” if they had consumed any of the following chemsex or “party drugs” in the last three months: amphetamines (including crystal methamphetamine), cocaine, or sedatives (including gamma-hydroxybutyric acid or GHB).

Childhood sexual abuse: Participants were coded as having experienced childhood sexual abuse if they scored above 1 on the Childhood Trauma Questionnaire – Short Form (CTQ-SF) (Sexual Abuse Questions only) (Bernstein et al., 2003).

HIV-Incidence Risk Index for MSM (HIRI-MSM): Eligibility for PrEP is often measured through the HIRI-MSM (Smith et al., 2012). Eligibility is measured via two categories: scores of 10 or greater (higher HIV risk) and less than 10 (lower HIV risk).

2.1.3. Outcome variables: health access

Having a primary health care provider (HCP) was measured by having replied “yes” to the question, “Do you currently have a regular primary health care provider, that is, someone you can go to for routine medical check-ups or for specific health concerns?”

Access to a gay-friendly HCP: Those who disagreed or strongly disagreed with the question, “I don’t think I can find a doctor that is sensitive and accepting enough of my sexual activities and choices to prescribe PrEP” were categorized as able to access a physician accepting of one’s sexual orientation.

Known as GBM to HCP: Those who responded “yes” to the question, “Does your current regular primary health care provider know that you have sex with men?” were coded as known as men who have sex with men to their health care provider.

Discrimination by an HCP: Participants were categorized as having experienced unfair treatment by an HCP if they responded, “once in a while” or more often to the question, “have you been treated unfairly by people in helping jobs (e.g., doctors, nurses, psychiatrists, dentists, counsellors, etc.) because you are a gay/bisexual man?”

Access to sexual health services: Participants were dichotomized between those who responded “easy” or “very easy” to the question, “At this point in time, how easy overall would you say it is for you to get information or counselling services about your sexual health?” and those who responded “difficult” or “very difficult.”

Medication insurance: Having insurance coverage was measured by having responded “yes” to the question, “Do you have insurance that covers all or part of the cost of your prescription medications?” Responding “no” was coded as not having insurance coverage.

Access to PrEP was measured by the following questions: “Before today, had you ever heard of PrEP (Pre-Exposure Prophylaxis)?” (yes); “Has a health professional ever suggested that you take PrEP (without you asking them about PrEP specifically)?” (yes); “I know where to go to get a prescription for PrEP” (agree/strongly agree); “How interested would you be in taking PrEP to prevent HIV infection?” (a little, moderately, very, or extremely interested); “I have not sought a prescription for PrEP in the past because of the cost of the medication”

Table 5
Correlation matrix of facilitators to PrEP access.

	Asian	Lack medical insurance	Gay	Out as MSM to HCP	Have taken PrEP	Know where to get a scrip for PrEP	Regularly accessing health care	Easy access to treatment for substances	Recent drug use	Not refugee	Permanent resident	HIRI
Asian	1											
Lack medical insurance	0.028	1										
Gay	0.090	0.199***	1									
Out as MSM to HCP	-0.398***	0.070	0.431***	1								
Have taken PrEP	0.111*	0.181***	0.105	0.293***	1							
Know where to get a scrip for PrEP	-0.075	0.149***	0.092	0.367***	0.539***	1						
Regularly accessing health care	-0.044	0.187***	0.115***	0.402***	0.260***	0.289***	1					
Easy access to treatment for substances	-0.061	0.116*	0.093	0.118	0.022	0.092	0.033	1				
Recent drug use	-0.178***	-0.008	-0.020	0.167**	0.179***	0.068*	0.074	0.034***	1			
Not refugee	-0.229*	0.045	-0.019	-0.227	0.011	0.173	0.025	0.126*	0.319**	1		
Permanent resident	0.125	-0.043	-0.010	0.034	0.112*	0.012	-0.043*	-0.093*	-0.071	0.278	1	
HIRI	-0.052	0.021	0.278***	0.256***	0.457***	0.126***	0.054	0.050***	0.488***	0.006	0.067	1

***p < 0.01, **p < 0.05, *p < 0.1.

(agree/strongly agree); “At this time, how easy overall would you say it is for you to access PrEP?” (easy/very easy); and “Have you ever taken PrEP yourself?” (yes).

3. Analysis

A two-step analytic strategy was employed: (1) logistic regression comparing RDS-II weighted and unweighted data to identify significant variables, and (2) a network analysis of significant social indicators. Network analysis is particularly useful for graphically representing a set of social indicators that may have mutually interacting or synergistic relationships in a complex network (Borsboom & Cramer, 2013; Lee et al., 2020). Network graphs depict variables as nodes connected to each other by lines or edges, thereby showing which nodes are more closely related to one another, which are more central, and which are potentially more important or influential. Nodes need not be interpreted as “causal,” rather their positions among a set of strong and weak ties help identify points of leverage that may be particularly useful for intervention by community-based or clinical organizations. Having an effect on a more central node, for example, may have greater influence on a network of social indicators as a whole, compared to affecting a more peripheral node.

As data for this study were collected using respondent-driven sampling (RDS), the analysis was first adjusted using RDS-II weights (inverse probability of sampling weights that are proportional to participant network size), to account for the likelihood that people with larger social networks would be recruited. This analysis was then followed by a comparison using unweighted data, which does not presume that respondents drawn from larger social networks are so similar that their responses need to be discounted proportionate to the size of their networks.

3.1. Logistic regression models

This model was executed using Stata (14.2), employing the “logistic” command to conduct logistic regression analysis to explore the

association between sociodemographic variables and syndemic factors (predictor variables) with dimensions of health access (outcome variables). Subsequently, adjusted odds ratios were computed to assess the relationship between each predictor variable and the outcome of interest. Variables showing statistically significant relationships (p > 0.05) were subsequently entered into the network analysis.

3.2. Network analysis model

This analysis was conducted using R software (4.3.1), utilizing packages such as qgraph, bootnet, networktools, and NetworkComparisonTestggplot2. For this study, edges represent bidirectional, partial polychoric correlations between nodes, representing the variables in the facilitating and impeding variables model. To plot the partial polychoric correlation network analysis, we utilized the LASSO regularization method with Bayesian information criterion (EBIC), applying a penalty to network connection coefficients to reduce overfitting and enhance model generalization. Subsequently, the estimated network was graphed using a force-based layout algorithm (“spring”), with solid lines for positive associations and broken lines for negative associations, and a legend specifying the variables in the graph. The results provide a graphical representation of the estimated network of indicators, where nodes and edges denote the relationships between them, with the strength of the relationship depicted by the thickness/darkness and direction of the edges.

These findings suggest an underlying structure of interdependence between variables, highlighting the importance of considering both individual associations and global connections within the system for a complete understanding of its dynamics. These results, with high stability coefficients, give validity to the network structure. They indicate that the connections and importance of nodes are consistent and not random, suggesting that there are underlying patterns of interdependence that need to be considered.

4. Results

There were 2026 self-reported HIV-negative/unknown participants, 979 (48.3%) in Montreal, 420 (20.7%) in Toronto and 627 (30.9%) in Vancouver.

Among HIV-negative/unknown status respondents, 87.6% had heard of PrEP. Of those who were aware of PrEP, 57.1% considered access to PrEP to be easy or very easy, 19.7% considered it difficult or very difficult, and 23.2% did not know. Considering only those who had heard of PrEP and indicated they were moderately, very, or extremely interested in PrEP, 23.5% considered it difficult or very difficult to access PrEP, 31.5% did not know where to go to get a prescription for PrEP, 44.9% stated they “have not sought a prescription for PrEP in the past because of the cost of the medication,” and 30.3% have ever taken PrEP.

4.1. The PrEP cascade

4.1.1. Having a regular health care provider

In this study, 28.8% of respondents reported that they did not have a regular health care provider. This is higher than estimates of the proportion of the general population without a family physician in British Columbia (17.7%), Ontario (9.4%), or Quebec (21.5%) (Li et al., 2023) or the estimate of 16% for Ontario provided by the Ontario Medical Association (2024). Having a regular HCP showed variability by sexual

orientation, ethnic background, migration status, and insurance status. Bisexual men were less likely to have an HCP (aOR = 0.51, CI 0.27–0.97, p = 0.04) relative to gay-identified men, as were Indigenous men (aOR = 0.11, CI 0.02–0.71, p = 0.02) compared to the largest ethnic category, British ancestry. A combined category of refugees, refugee applicants, holders of temporary work permits, international students, and undocumented people (aOR = 0.18, CI 0.10–0.35, p < 0.01) and permanent residents (aOR = 0.25, CI 0.14–0.45, p < 0.01) also were less likely to have a primary HCP compared to Canadian citizens. Finally, those who had insurance for medications were much more likely to have an HCP (aOR = 2.26, 1.53–3.34, p < 0.01) than those without.

Having a current regular health care provider and being out as a GBM with that provider was strongly associated with several dimensions of access to PrEP in multivariate analysis as well. This analysis provides insight into the complex of interacting social indicators that shape this access. Of the GBM in this study, 71.2% reported having a regular health care provider and 59.3% report having disclosed their sexual orientation. Being known as GBM to an HCP was associated with being aware of PrEP (aOR = 2.69, CI 1.38–5.23, p < 0.01), having had an HCP suggest PrEP (aOR = 2.43, CI 1.50–3.94, p < 0.01), knowing where to get a prescription for PrEP (aOR = 4.29, CI 2.77–6.64, p < 0.01), and having taken PrEP (aOR = 1.88, CI 1.13–3.13, p < 0.02), when compared with those who did not have an HCP. Those who did have a regular HCP, but were not known to have sex with men by the HCP, were not significantly different from those who did not have an HCP along these dimensions.

Network analysis of barriers to PrEP access among those with a health care provider

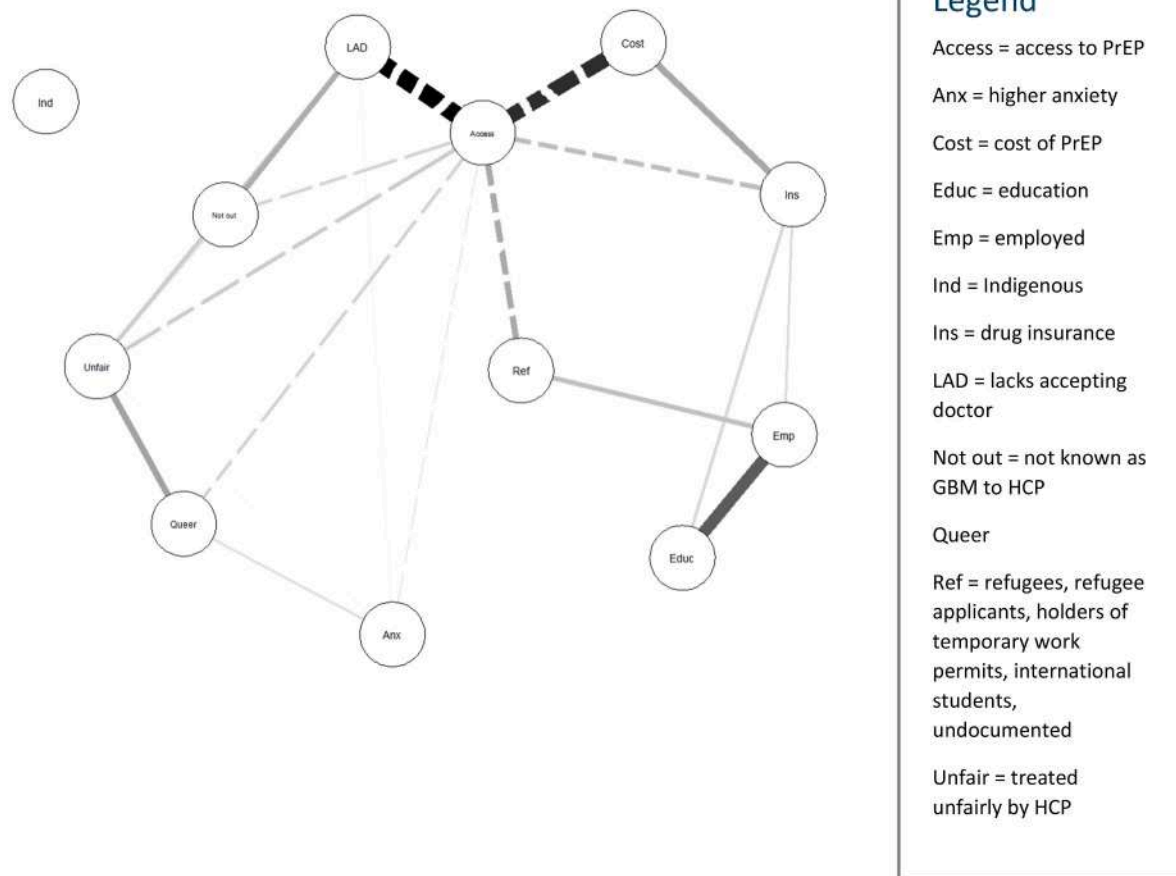


Fig. 1. Network analysis of barriers to PrEP access among those with a health care provider. Solid line = positive association, Broken line = negative association. The thickness and darkness of the line indicates the strength of the association between indicators.

Network analysis of facilitators to PrEP access among those with a health care provider

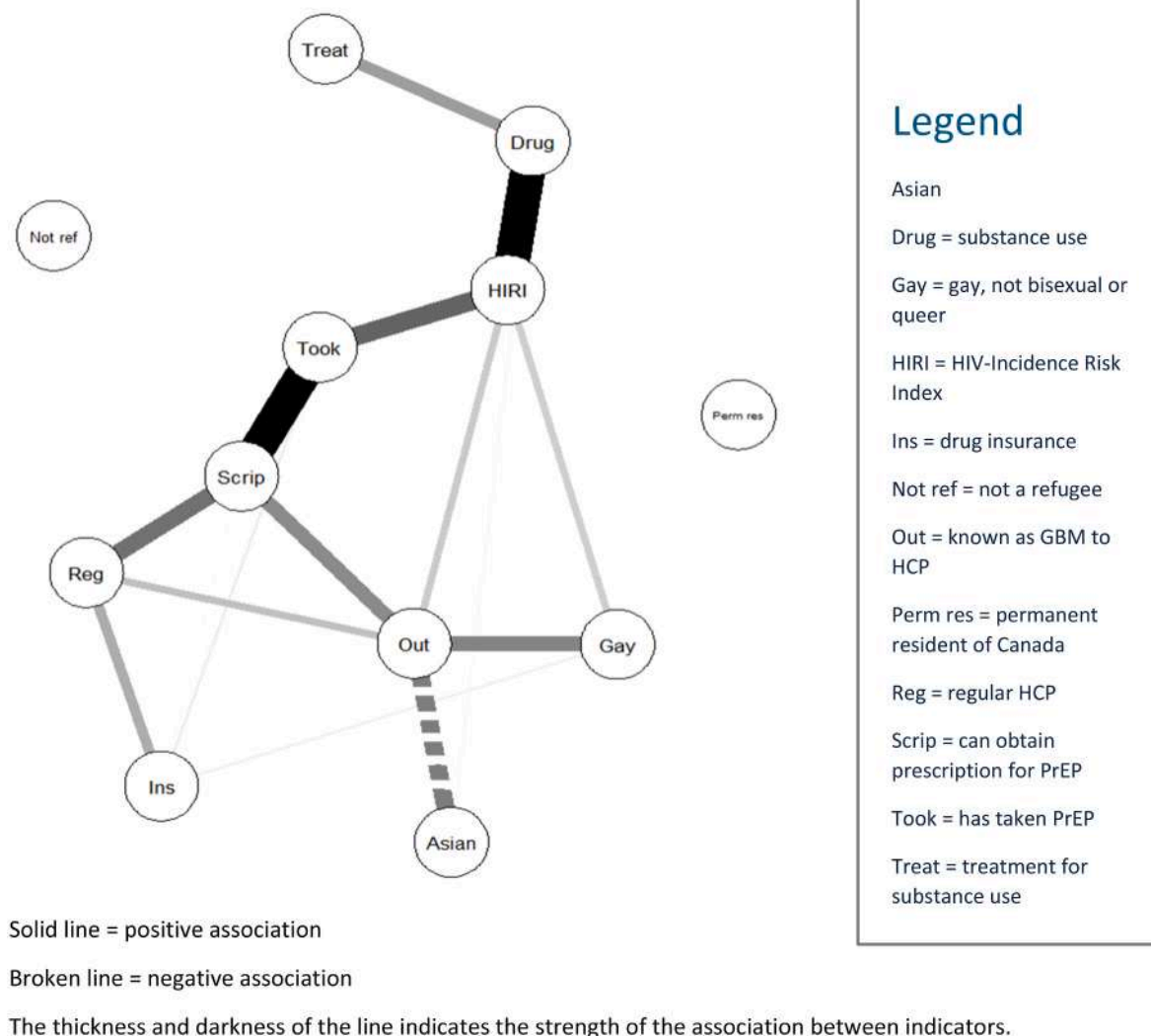


Fig. 1. (continued).

4.1.2. Having a gay-friendly health care provider

Lack of access to a doctor who is “sensitive and accepting enough of my sexual activities and choices to prescribe PrEP” and being out about having sex with a man to an HCP were strongly related to accessing PrEP. The network graph (Fig. 1) shows several interconnected networks of variables that identify characteristics of GBM with (in)equitable access to an accepting HCP and to PrEP. These clusters of social indicators are defined by sexual identity and ethnicity. Bisexual identity, which was more common among younger study participants, was associated with being less likely (aOR = 0.41, CI 0.20–0.85, $p < 0.02$) to have heard of PrEP when compared to gay-identified respondents. Bisexual respondents were also less likely to “think I can find a doctor that is sensitive and accepting enough of my sexual activities and choices to prescribe PrEP” (aOR = 4.22, CI 1.75–10.13, $p < 0.01$) or to have disclosed having sex with men to an HCP (aOR = 0.06, CI 0.02–0.19, $p < 0.01$). A combined category of questioning, asexual, pansexual, and two-spirit study participants were also less likely to think they could find an accepting doctor (aOR = 3.68, CI 1.1–12.03, $p = 0.03$) or to be known to have sex with men by an HCP (aOR = 0.12, CI 0.04–0.36, $p < 0.01$) compared to gay study participants.

Finding an accepting HCP and being out as having sex with men with

the HCP also varied by ethnicity. East or South Asian and Pacific Islander men showed a unique pattern of more often having a primary HCP (aOR = 2.06, CI 1.02–4.17, $p = 0.04$), but at the same time were more pessimistic about being able to find a “sensitive and accepting” doctor (aOR = 2.85, CI 1.17–6.91, $p = 0.02$) and their HCP was less likely to know that they had sex with men (aOR = 0.24, CI 0.10–0.61, $p < 0.01$), compared to men of British descent. West Asian, Arab, and North African men (aOR = 5.38, CI 1.45–19.89, $p = 0.01$) and African, Black, and Caribbean men (ACB) (aOR = 3.98, CI 1.01–15.69, $p = 0.05$) were also less likely to think they could find a “sensitive and accepting” doctor and ACB men were less likely to have disclosed they have sex with men to an HCP (aOR = 0.10, CI 0.03–0.34, $p < 0.01$) compared to men of British descent.

Further evidence of the central importance of gay-friendly HCPs comes from responses to the question, “How many times have you been treated unfairly by people in helping jobs (e.g., doctors, nurses, psychiatrists, dentists, counsellors, etc.) because you are a gay/bisexual man?” Those reporting unfair treatment did not think they could find a “sensitive and accepting” doctor (aOR = 2.23, CI 1.30–3.82, $p < 0.01$), did not seek a prescription for PrEP because of the cost (aOR = 1.85, CI 1.15–2.96, $p < 0.01$), considered PrEP hard to access (aOR = 0.54, CI

0.33–0.89, $p = 0.02$), but were nevertheless interested in taking PrEP (aOR = 1.83, CI 1.12–3.00, $p = 0.02$).

4.1.3. Having taken PrEP

Whether GBM in this sample perceived access to PrEP to be easy and had, in fact, taken PrEP was influenced by migration status, education, and medication insurance. Study participants with less than a high school education (aOR = 0.11, CI 0.02–0.47, $p < 0.01$), who had completed high school (aOR = 0.43, CI 0.19–0.97, $p = 0.04$), or had less than a bachelor's level of postsecondary education (aOR = 0.54, CI 0.31–0.93, $p = 0.03$) were all less likely to have ever taken PrEP, compared to those who had completed four or more years of postsecondary education. A combined category of refugees, refugee applicants, holders of temporary work permit, international students, and undocumented people was also associated with less uptake of PrEP (aOR = 0.43, CI 0.20–0.93, $p = 0.03$) compared to Canadian citizens. Finally lacking insurance for medications was associated with not seeking a prescription for PrEP because of the cost (aOR = 0.38, CI 0.24–0.60, $p < 0.01$) and perceiving PrEP to be not easy to access (aOR = 1.94, CI 1.21–3.11, $p = 0.01$).

4.2. Comparison with unadjusted data

Overall, the same patterns emerge from the unadjusted data, when compared to the data adjusted with RDS II weights, with a few exceptions. GBM with less than high school (aOR = 0.29, CI 0.13–0.63, $p < 0.01$), high school (aOR = 0.48, CI 0.25–0.92, $p = 0.03$), or less than a bachelor's level of education (aOR = 0.51, CI 0.31–0.84, $p = 0.01$) appear to be significantly less aware of PrEP in the unadjusted data compared to the adjusted data, and yet significantly less likely to have taken PrEP in the adjusted data, but not the unadjusted data. Higher anxiety is associated with not being able to find a sensitive and accepting doctor (aOR = 1.53, CI 1.02–2.28, $p = 0.04$), not seeking PrEP because of the cost (aOR = 1.33, CI 1.00–1.76, $p = 0.05$), and having had an HCP suggest PrEP (aOR = 1.35, CI 1.03–1.77, $p = 0.03$) in the unadjusted data, but only with having had an HCP suggest PrEP in the adjusted data.

4.3. Network analysis

Network analysis is well-suited to syndemic work insofar as it enables a graphical depiction of the inter-related social indicators to bring these social conditions into view (Lee et al., 2020). This permits visualization and quantification of patterns of relationships between nodes in networks, identifying central or influential nodes and their intersections to grasp syndemic conditions. The thickness and length of the lines provide an immediate visual representation of the strength of association between variables where thick and short lines depict the strongest relationships and distant and thin lines show weaker ties. Broken lines indicate negative associations between variables.

The graphical results of the network analysis were sorted into two sets of related networked variables for easier visual apprehension. Facilitator and barrier indicators are depicted in Fig. 1, revealing several highly interconnected networks among the variables. The barrier model graph provides powerful evidence for the centrality of lacking a physician who was sensitive and accepting of GBM sexuality and of lacking insurance for medications to the perception that PrEP is difficult to access. These core relationships were, in turn, connected to two sets of interrelated indicators that influence these core relations. Not having an accepting physician and perceiving PrEP as difficult to access are further interconnected with not being out as GBM to one's physician and to having been treated unfairly by an HCP. Those identifying as queer were more likely than those identifying as gay to perceive themselves as having been treated unfairly and to believe that PrEP is difficult to access. This complex of interrelationships is also connected with scores for heightened anxiety.

The other complex of interrelated factors shows mutually reinforcing

relations among indicators of economic vulnerability. The strong link between PrEP being too costly and the difficulty in accessing PrEP is further connected to lacking medication insurance and to indicators of more precarious placement in the economy, such as GBM with less education, un- or under-employment, and vulnerable migration status (i.e. refugees, refugee applicants, holders of temporary work permits, international students, and undocumented). These findings suggest an underlying structure of interdependence among variables, underscoring the importance of considering not only individual associations but also global connections within the system under study.

The facilitator figure mirrors the barriers graph in some ways in that being known to be GBM by one's physician is linked to getting regular health care, knowing how to obtain a prescription for PrEP, and having actually taken PrEP. Having medication insurance again shows a significant role. This graph shows, as well, a branch that links having taken PrEP to higher risk scores on the HIRI scale and to having taken "party drugs." The edge stability coefficient for this case is 0.672, indicating consistency in connection weights across 1000 bootstrap samples and suggesting reliability in the network structure. Additionally, the strength centrality stability coefficient is 0.75, indicating stable relative importance of nodes in the network across bootstrap samples.

5. Discussion

The graphic representation of the core variables provided by network analysis offers a map of the interrelated and sometimes mutually reinforcing characteristics that shape inequitable access to PrEP among Canadian GBM. It is noteworthy that the overall sample of GBM with HIV-negative or unknown serostatus was fairly optimistic about accessing PrEP, with 57.1% deeming it easy or very easy to access, but that optimism was somewhat tempered among those who were moderately, very, or extremely interested in PrEP and who were therefore more likely to have made efforts to obtain it. Financial barriers were perceived to be a major impediment for study participants with 44.9% deterred from seeking a prescription because of cost. At the same time, having medical insurance that covered the cost of medications remained a significant predictor of PrEP access.

Health care providers emerge as key facilitators of PrEP access in this analysis, but being able to find and retain a regular, primary HCP remains an issue in the Canadian health system. Respondents in this study were at even higher risk of not having an HCP compared with the Canadian population as a whole; 28.8% of participants reported no HCP compared to provincial estimates ranging from 9.4% to 21.5% lacking an HCP. Indigenous people, as well as refugees, refugee applicants, holders of temporary work permit, international students, and undocumented people, were even less likely to have a primary HCP than other GBM in this study.

Also clear from these numbers is the importance of HCPs who are perceived to be "sensitive and accepting" of the sexualities of gay and bisexual men. GBM are much more likely to disclose their sexualities to sensitive and accepting HCPs and this, in turn, is strongly associated with regularly accessing health care, and knowing where to get a prescription for PrEP. Conversely, having been treated unfairly by people in the healthcare field was strongly associated with perceiving access to PrEP to be difficult. It is also noteworthy that study participants who reported significant consumption of "party" or chemsex drugs, which are repeatedly associated with HIV risk and seroconversion in past studies, perceived PrEP to be relatively easy to access (aOR = 0.59, CI 0.36–0.95, $p = 0.03$). These findings are consistent with a growing research literature on the importance of familiarity with and awareness of the healthcare needs of GBM among healthcare workers in the alleviation of health inequities.

In this study, 59.2% indicate that they have found sensitive and accepting HCPs, but this access varied according to several characteristics. Bisexual participants, who were younger on average than gay-identified participants, were less likely to have a primary HCP, less

likely to have disclosed their sexuality to them, and less likely to have heard of PrEP. Similarly, questioning, asexual, pansexual, and two-spirit identifying study participants were less likely to disclose that they have sex with men to their HCP. In previous work examining this sample of GBM, Jordan Sang et al. (2023) found that internalized homonegativity was associated with less uptake of PrEP.

Indigenous, Black, and other people of colour more often agreed that they did not think that they could find a doctor who is sensitive and accepting enough of their sexual activities and choices to prescribe PrEP. More specifically, these findings held for Indigenous, African, Black, Caribbean, west Asian, Arab, north African, and south, southeast, and south Asian study participants. Asian participants were unique in more often having a primary HCP, than the study as a whole, despite being less likely to be out to that HCP. Finally, having insurance for the cost of medications influenced perception of how easy it is to access PrEP.

Overall, many of the social indicators associated with HPV vaccine uptake hold true for PrEP access, where lower socioeconomic and education status, as well as sexual orientation non-disclosure, decrease adoption of both (Grewal et al., 2021).

Among the syndemic variables, anxiety appeared to have the strongest relationship with PrEP access, while other syndemic indicators did not reach statistical significance in this study (with a few exceptions). Anxiety has frequently been found among the syndemic conditions associated with HIV risk and seroconversion (Jeffries IV et al., 2021). While cross-sectional analysis cannot provide evidence for causation, the associations between anxiety and health access difficulties suggest that some anxiety may be rooted in problems such as not being able to find a sensitive and accepting HCP and difficulty finding access to counselling services about sexual health. On the other hand, it is noteworthy that several research studies have found lower rates of anxiety among those taking PrEP, often attributed to the anxiety-relieving effect of PrEP itself in reducing HIV risk (Moeller et al., 2020).

While there are alternative providers of PrEP available in Canada, such as online sources, pharmacists, and dedicated clinics, regular primary healthcare providers appear to be key agents in facilitating PrEP access. Having an HCP and feeling comfortable enough to disclose same-sex sexual activity to them are fundamental to access PrEP. Often this means having HCP and other PrEP providers in neighbourhoods frequented by GBM (Kim et al., 2021). If PrEP is conceptualized as a cascade, similar to the treatment cascade identified in linking people with HIV to effective treatment, then several conditions need to be in place to assure that those who would most benefit from PrEP, are able to access it. Being able to have a primary HCP, finding an HCP who is culturally competent regarding the sexualities of gay and bisexual men, queer and trans people, as well as the experiences of Black, Indigenous, and other people of colour, and having health insurance that covers all or most of the cost of PrEP prove to be critical elements in a PrEP treatment cascade.

The results of this study should be read keeping mind the following limitations: (1) Engage is based in the three largest urban areas of Canada; results may vary in smaller urban and rural areas. (2) RDS recruitment is based on social networks and GBM who are not connected with other GBM or are isolated may be underrepresented. (3) Results may not be representative of people who are not engaged in care, for whom barriers such as cost may be even more important, or who are less active on social media with less access to information about PrEP. (4) Measures are based on self-reported data where misreporting and social desirability bias are possible, but the use of computer-assisted self-interviewing may have helped mitigate these biases.

6. Conclusion

Differential uptake of PrEP may stem from a variety of considerations including perceived need, habit, personal preference, and reliance on other HIV prevention techniques such as condom use and treatment as prevention, as well as the facilitators and barriers examined here.

Nevertheless, the factors identified here point toward structural conditions that shape or delimit the options available to GBM in selecting PrEP as an HIV prevention measure. The use of network analysis helps extend the notion of syndemics by graphically depicting intersecting social conditions that show how the structure of health care provision and financial barriers impact some subgroups of GBM more than others. As such, it provides cues to help identify GBM who could most benefit from resources provided by AIDS service organizations, as well as the health care system. These findings point toward the critical function of GBM-affirming health care, including such initiatives as the Health Initiative for Men in Vancouver, the Gay Men's Sexual Health Alliance, HQ Clinic, and Blue Door Clinic in Toronto, and the Clinique l'Actuel and Clinique du Quartier Latin in Montreal, as well as individual practitioners specializing in GBM, trans, or LGBTQ health. While this study did not find strong associations between individuals reporting syndemic conditions and PrEP access, it may be argued from a public health perspective that GBM with syndemic conditions ought to have facilitated access to PrEP at even higher rates than their peers, given the strong research evidence associating major syndemic conditions with HIV seroconversion. This study does show that anxiety and depression may affect both the antecedents and outcomes to PrEP access. Finally, these findings point to the central role of health policy and the structure of the healthcare system in generating and reproducing patterns of inequitable access. Having a decisive impact on HIV prevention through equitable access to PrEP will require providing universal access without financial barriers and supporting access points with a reputation for welcoming GBM in their full diversity.

CRedit authorship contribution statement

Barry D. Adam: Writing – original draft, Methodology, Conceptualization. **Diego Monteza-Quiroz:** Formal analysis, Data curation. **Trevor A. Hart:** Writing – review & editing, Funding acquisition, Conceptualization. **Shayna Skakoon-Sparling:** Writing – review & editing, Project administration. **David M. Moore:** Conceptualization. **Terri Zhang:** Project administration. **Aki Gormezano:** Writing – review & editing. **Daniel Grace:** Writing – review & editing, Conceptualization.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to privacy concerns for this ongoing cohort study. De-identified participant data used in this analysis are stored at the British Columbia Centre for Excellence in HIV/AIDS (BCCFE). For information regarding these databases, please contact Joseph Cox, a principal investigator on the Engage Study, at the Department of Epidemiology, Biostatistics & Occupational Health, McGill University.

Ethical standards

The Engage cohort study was approved by the research ethics boards of the following institutions: the Research Institute of the McGill University Health Centre, Toronto Metropolitan University, St. Michael's Hospital, University of Toronto (Health Sciences), University of Windsor, University of British Columbia, University of Victoria and Simon Fraser University.

Declaration of generative AI and AI-assisted technologies in the writing process

No generative AI or AI-assisted technologies were used in the writing process.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The datasets generated and/or analyzed during the current study are not publicly available due to privacy concerns for this ongoing cohort study.

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