



Prevalence and Correlates of Forced Sex as a Self-Reported Mode of HIV Acquisition Among a Cohort of Women Living With HIV in Canada

Carmen H. Logie, PhD,^{1,2} Angela Kaida, PhD,³
Alexandra de Pokomandy, MDCM,⁴
Nadia O'Brien, MPH,⁴ Pat O'Campo, PhD,^{2,5}
Jay MacGillivray, RM,⁵ Uzma Ahmed, MSW,²
Nikita Arora, BSc,⁶ Lu Wang, MSc,⁷
Shahab Jabbari, MSc,⁷ Logan Kennedy, RN,¹
Allison Carter, MPH,^{3,7} Karène Proulx-Boucher, MA,⁴
Tracey Conway,¹ Paul Sereda, BA,⁷
Mona Loutfy, MD, MPH,^{1,2} On Behalf of the
CHIWOS Research Team

Abstract

Gender-based violence (GBV) is a global epidemic associated with increased HIV exposure. We assessed the prevalence and correlates of HIV acquisition via forced sex among women living with HIV (WLWH) in Canada. Baseline

¹Women's College Hospital, Toronto, Ontario, Canada

²University of Toronto, Toronto, Ontario, Canada

³Simon Fraser University, Vancouver, British Columbia, Canada

⁴McGill University, Montreal, Quebec, Canada

⁵St. Michael's Hospital, Toronto, Ontario, Canada

⁶McMaster University, Hamilton, Ontario, Canada

⁷British Columbia Centre for Excellence in HIV/AIDS, Vancouver, British Columbia, Canada

Corresponding Author:

Mona Loutfy, Women's College Research Institute, Women's College Hospital, 76 Grenville Street, Room 6415, Toronto, Ontario M5S 1B2, Canada.

Email: mona.loutfy@wchospital.ca

questionnaire data were analyzed for WLWH (≥ 16 years) with data on self-reported mode of HIV acquisition, enrolled in a community-based cohort study in British Columbia, Ontario, and Québec. We assessed forced sex (childhood, adulthood) as a self-reported mode of HIV acquisition. Of 1,330 participants, the median age was 42 (interquartile range [IQR] = 35-50) years; 23.5% were Indigenous, 26.3% African/Caribbean/Black, 43% White, and 7.2% of Other ethnicities. Forced sex was the third dominant mode of HIV transmission at 16.5% ($n = 219$; vs. 51.6% consensual sex, 19.7% sharing needles, 5.3% blood transfusion, 3.8% perinatal, 1.3% contaminated needles, 0.4% other, 1.6% do not know/prefer not to answer). In multivariable analyses, significant correlates of HIV acquisition from forced versus consensual sex included legal status as a landed immigrant (adjusted odds ratio [aOR] = 1.99; 95% confidence interval [CI] = [1.12, 3.54]) or refugee (aOR = 3.62; 95% CI = [1.63, 8.04]) versus Canadian citizen; African/Caribbean/Black ethnicity versus Caucasian (aOR = 2.49; 95% CI = [1.43, 4.35]), posttraumatic stress disorder symptoms (aOR = 3.00; 95% CI = [1.68, 5.38]), histories of group home residence (aOR = 2.40; 95% CI = [1.10, 5.23]), foster care (aOR = 2.18; 95% CI = [1.10, 4.34]), and having one child relative to having three or more children (aOR = 0.52; 95% CI = [0.31, 0.89]). GBV must be considered a distinct HIV risk factor; forced sex is a significant underrecognized risk factor and mode of women's HIV acquisition. Public health reporting systems can separate consensual and forced sex in reporting modes of HIV acquisition. Practitioners can engage in screening practices to meet client needs.

Keywords

women, HIV, forced sex, HIV risk factor, violence, HIV transmission

Introduction

Girls and women across the globe experience high rates of gender-based violence (GBV) and its harmful mental, physical, and sexual health outcomes (Durevall & Lindskog, 2015; Ellsberg et al., 2008; García-Moreno et al., 2006; Pallitto & O'Campo, 2005). The World Health Organization reported that more than one third (35.6%) of women globally have ever experienced physical and/or sexual violence by an intimate partner or sexual violence by a nonpartner (García-Moreno, 2013). HIV and other sexually transmitted infections (STIs) have been causally linked with GBV (Dunkle & Decker, 2013).

Sexual violence has been associated with higher rates of HIV acquisition in research from India (Sarkar et al., 2008; Silverman, Decker, Saggurti,

Balaiah, & Raj, 2008; Wirth, Tchetgen, Silverman, & Murray, 2013), Tanzania (Sa & Larsen, 2008), South Africa (Speizer et al., 2009), Uganda (Zablotska et al., 2009), Papua New Guinea (Lewis, 2012), Togo (Burgos-Soto et al., 2014), and Benin (Toukara et al., 2014). These studies include HIV acquisition associated with lifetime experiences of sexual violence (Silverman et al., 2008; Toukara et al., 2014; Zablotska et al., 2009), recent experiences of sexual violence (Wirth, Tchetgen Tchetgen, Silverman, & Murray, 2013; Zablotska et al., 2009), experiences of sexual violence during initiation of sex work (Sarkar et al., 2008), and experiences of childhood sexual violence (Lewis, 2012). Women are also at risk of violence after acquiring and disclosing HIV status (Gielen, McDonnell, Burke, & O'Campo, 2000).

There are complex direct and indirect pathways between sexual violence and HIV acquisition. A direct pathway is that forced sex causes vaginal and anal tearing and trauma that elevates exposure to and likelihood of acquisition of HIV (McLean, Roberts, White, & Paul, 2011). Forced sex is more likely to involve anal sex versus vaginal sex acts in comparison with consensual sex, again increasing the likelihood of HIV acquisition (Campbell, Lucea, Stockman, & Draughon, 2013). In situations of forced sex, condoms are rarely, if ever, used (Campbell et al., 2013). Sexual violence survivors may experience immune system dysregulation due to the stress response that results from violence, and this can possibly elevate HIV acquisition risks and progression (Ayaydin et al., 2016; Campbell, 2002). Male perpetrators of sexual violence are more likely to have multiple and concurrent sex partners, use alcohol, have other STIs, and be HIV-positive (Decker et al., 2009; Dunkle & Decker, 2013).

Indirect pathways between sexual violence and HIV vulnerability are shaped by the psychological impacts of sexual violence that may be long lasting (Dunkle & Decker, 2013). For instance, women with forced sex histories may have a reduced ability to negotiate future safer sex, fearing that such assertiveness may provoke violence (Wingood & DiClemente, 2000). Women with a history of sexual violence may engage in maladaptive coping strategies, such as increased sexual risk practices, including multiple and concurrent sex partners, sex work, inconsistent condom use, and substance use, including injection drug use (IDU; Amin, 2015; El-Bassel et al., 2007; Wu, El-Bassel, Witte, Gilbert, & Chang, 2003).

GBV is rooted in entrenched gender inequities (Dunkle & Decker, 2013). Other social inequities based on race, sexual identity, sex work, and drug use may exacerbate exposure to both sexual violence and HIV. For example, women who experience intersecting forms of stigma that elevate exposure to HIV and sexual violence risks include women of color (Breiding, 2014), in particular Black (Campbell et al., 2013; Dupont & Sokoloff, 2005) and Latina

women (Centers for Disease Control and Prevention [CDC], 2001; Dupont & Sokoloff, 2005); Indigenous women (Brownridge, 2008); immigrant women (Dupont & Sokoloff, 2005; Ee, 2007); women who identify as lesbian, bisexual, trans, or queer (LBTQ; Logie, James, Tharao, & Loutfy, 2012; Sandfort, Baumann, Matebeni, Reddy, & Southey-Swartz, 2013); women who use drugs (El-Bassel et al., 2007); sex workers (Lang, Salazar, DiClemente, & Markosyan, 2013; Shannon et al., 2009); women who had childhood experience with foster care (Elze, Auslander, McMillen, Edmond, & Thompson, 2001); and women and girls from conflict zones (Hankins, Friedman, Zafar, & Strathdee, 2002; Mills, Singh, Nelson, & Nachegea, 2006).

Several knowledge gaps remain regarding forced sex and HIV acquisition. First, most research on HIV acquisition and forced sex has been conducted in low- and middle-income countries—little is known about HIV acquisition through forced sex in high-income countries, such as Canada (Stockman, Lucea, & Campbell, 2013). In 2014, the Public Health Agency of Canada (PHAC) reported that 26.4% of HIV cases in Canada were among women (PHAC, 2013). Most research has focused on HIV vulnerability in the context of intimate partner violence (IPV); fewer studies have examined HIV risks from sexual violence perpetrated by any person, including nonpartners (García-Moreno, 2013). Finally, little is known about the sociodemographic, psychosocial, health, and clinical factors correlated with HIV acquisition through forced sex; this information can inform GBV prevention strategies and HIV care (Batchelder et al., 2016; Hahm, Augsburg, Feranil, Jang, & Tagerman, 2017).

Our study objectives were threefold: (a) to assess the proportion of women living with HIV (WLWH) in a Canadian cohort who self-reported forced sex as the method of HIV acquisition as compared with other modes, (b) to assess factors associated with forced versus consensual sex as women's self-reported mode of HIV acquisition, and (c) to assess factors associated with forced versus consensual sex as women's self-reported mode of HIV acquisition for women born in and outside of Canada.

Method

Design and Study Population

This analysis used baseline cross-sectional data from the multisite, longitudinal community-based research cohort study titled “Canadian HIVWomen’s Sexual and Reproductive Health Cohort Study” (CHIWOS), that involved WLWH in three provinces: Ontario, British Columbia (BC), and Quebec. These provinces are home to the largest proportion of people living with HIV

in Canada. The PHAC (2013) reported that 40.9% of people living with HIV reside in Ontario, 12.8% in BC, 21.3% in Quebec. Study inclusion criteria included cisgender, intersex, or transgender women aged 16 and older residing in Ontario, BC, or Quebec, who self-reported living with HIV, and who responded to the HIV mode of acquisition question.

Participant Recruitment

This analysis includes Wave 1 data that enrolled participants from August 27, 2013, to May 1, 2015. Nonrandom, purposive sampling was used to recruit self-identified WLWH, with targeted strategies to recruit key populations of women overrepresented in Canada's HIV epidemic, including African, Caribbean, and Black (ACB) and Indigenous women (PHAC, 2013). These sampling methods included recruiting participants using peer research assistant networks and word-of-mouth, HIV clinics, AIDS Service Organizations (ASOs), community-based organizations (CBOs), provincial Community Advisory Board networks, National Steering Committee networks, listserves, and website, Facebook, and Twitter pages.

Congruent with our community-based research approach in CHIWOS, we hired a diverse group of WLWH as peer research associates (PRAs) to recruit participants and administer the questionnaire. PRAs were trained in survey methods and community-based research. Working with PRAs can reduce social distance between researchers and participants and facilitate inclusion of diverse populations underrepresented in research. CHIWOS Wave 1 included 38 PRAs who were WLWH, including six Indigenous and 14 ACB women. There was also an advisory board developed to provide guidance and to support community engagement.

Research Ethics Considerations

Research ethics board approval was attained from 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). Eligible participants provided voluntary written informed consent or oral consent with a study team member as witness for phone/Skype questionnaires.

Data Collection

Participants completed a tablet-based PRA-administered structured interview in English or French using FluidSurveys™ software at a range of locations,

including collaborating agencies such as HIV clinics, ASOs, CBOs, or at participant residences. Participants in rural and remote settings also had the option to complete questionnaires by phone or Skype with a PRA. Interview completion time was 1.5 to 2.5 hr (median = 120 min, interquartile range [IQR] = 90-150). Study participants received a Can\$50 honorarium.

Primary Outcome

The primary outcome of interest was forced sex as a self-reported mode of HIV acquisition. This was assessed with the following question: "How do you think you got HIV?" Table 1 depicts the eight choices of HIV transmission risk categories and participants could pick more than one that applied. In a separate questionnaire section, there were additional questions: "As an adult, has someone ever sexually forced themselves on you, or forced you to have sex?" "Do you think you became HIV-positive as result of these episodes?" "During your childhood, did someone ever sexually force themselves on you, or force you to have sex?" and "Do you think you became HIV-positive as result of these episodes?" If the participant stated forced sex in the question, "How do you think you got HIV?" or reported yes to either of the two additional questions (experienced sexual violence and thought they acquired HIV from that exposure in (a) adulthood or (b) childhood), then it was coded as forced sex. For analytic purposes, one mode of HIV acquisition was assigned per participant based on a hierarchy of modes with the highest likelihood of transmission being at the top (Case et al., 2012). This resulted in seven modes of HIV acquisition coded in the following hierarchical order: (a) perinatal, (b) blood transfusion, (c) sharing needles, (d) contaminated needles, (e) forced sex, (f) consensual sex, and (g) other.

Covariates of Interest

Questionnaires collected a range of sociodemographic, HIV history, clinical, mental health, violence, stigma, and social support outcomes. Sociodemographic variables assessed in the analysis included province the participant was currently residing in, country of birth, years lived in Canada, legal status in Canada, ethnicity, education level, personal gross yearly income, source of income, number of children, and currently residing with children. Psychosocial variables included early life experiences in foster care, group homes, and/or child protective services; recent incarceration; sex work in the past 6 months; and IDU in the past 3 months. Health variables included having Hepatitis C, ever having any mental health condition, and ever having anxiety, drug addiction, posttraumatic stress disorder (PTSD)

Table 1. Sociodemographic Characteristics of Participants and Self-Reported HIV Transmission Risk Categories (N = 1,330).

Variable	Overall (N = 1,330) n (%)	
Age at interview date	42	(35-50)
Province		
British Columbia	342	(25.7)
Ontario	657	(49.4)
Quebec	331	(24.9)
Gender identity		
Cisgender woman	1,269	(95.4)
Transwoman/two-spirited/queer/other	61	(4.6)
Sexual orientation		
Heterosexual	1,155	(86.8)
Lesbian, gay, bisexual, Two-Spirit, queer	170	(12.8)
Don't know/Prefer not to answer	5	(0.4)
Ethnicity		
Aboriginal	312	(23.5)
African/Caribbean/Black	350	(26.3)
Caucasian	572	(43.0)
Other	96	(7.2)
Ever incarceration		
Yes	511	(38.4)
No	818	(61.5)
Don't know/Prefer not to answer	1	(0.1)
Injection drug use ever		
Yes	430	(32.3)
No	876	(65.9)
Don't know/Prefer not to answer	24	(1.8)
HIV transmission risk categories		
Consensual sex	686	(51.6)
Sharing needles	262	(19.7)
Forced sex	219	(16.5)
Blood transfusion	70	(5.3)
Perinatal exposure	50	(3.8)
Don't know/Prefer not to answer	21	(1.6)
Contaminated needles	17	(1.3)
Other	5	(0.4)

symptoms, and/or a sleep disorder. Clinical outcomes assessed included months since last self-reported cluster of differentiation 4 (CD4) test, months since last self-reported viral load test, most recent viral load, and current antiretroviral drug use.

Data Analysis

We calculated summary statistics of sociodemographic, psychosocial, and clinical characteristics, including median and IQR for continuous variables and frequencies and proportions for categorical variables. We examined baseline differences between participants who reported forced versus consensual sex as their mode of HIV acquisition using Wilcoxon rank sum test for continuous variables and chi-square or Fisher Exact test for categorical variables. Unadjusted univariable and adjusted multivariable logistic regression analyses, using backward stepwise elimination of variables selected for their theoretical importance based on prior literature, were used to identify factors associated with reporting forced versus consensual sex as a mode of HIV acquisition. To build the final model, we used backward stepwise elimination taking into consideration Akaike's Information Criterion (AIC) and Type III *p* values to assess goodness of fit (Lima et al., 2007); least significant variables were dropped until the final model had the minimum, optimal AIC. Two-sided statistical tests were conducted with a significance level of .05. All statistical analyses were conducted using SAS version 9.4 (SAS, North Carolina, United States).

Results

Participant Characteristics

There were 1,425 women enrolled in Wave 1 who completed the baseline data. Analyses were restricted to participants who had an answer for the primary outcome (mode of HIV acquisition). Participants who responded "prefer not to answer" or "don't know" to the primary question were excluded from the analysis. This current analysis included 1,330 participants; 95 were excluded due to skipping the primary outcome. For models overall, the total sample size is 905 (consensual sex acquisition mode = 686; forced sex acquisition mode = 219); after removing the observations with any missing covariates, the multivariate model has a final sample size of 713. Multivariate models with participants born in Canada had a total sample size of 491, and for participants born outside of Canada, the final sample size was 323.

The sample demographics, overall and by province are outlined in Table 1. The median participant age was 42 (IQR = 35-50); 657 (49.4%) were from Ontario, 342 (25.7%) from BC, and 331 (24.9%) from Quebec. Approximately one quarter (23.5%) of participants were Indigenous, one quarter (26.3%) ACB, 43% White, and 7.2% were of Other ethnicities. One third of participants had a history of IDU.

Prevalence of Forced Sex and Other Risk Factors as Mode of HIV Acquisition

Table 1 displays HIV transmission risk categories ($N = 1,330$) and the overall and provincial number of participants reporting each risk factor. Forced sex was the third dominant mode of HIV transmission at 16.5% ($n = 219$; vs. 51.6% consensual sex, 19.7% sharing needles, 5.3% blood transfusion, 3.8% perinatal, 1.3% contaminated needles, 0.4% other, 1.6% do not know/prefer not to answer). There were 68 participants who listed multiple possible modes of HIV transmission: 17 participants stated forced sex and consensual sex and were coded as forced sex; eight participants listed sharing needles and forced sex and were coded as sharing needles; 43 participants stated sharing needles and consensual sex and were coded as sharing needles.

Correlates of Forced Versus Consensual Sex as Mode of HIV Acquisition

Table 2 presents multivariate analyses of participants who reported HIV acquisition through forced sex ($n = 219$) in comparison with consensual sex ($n = 686$). In multivariate analyses ($n = 713$), factors significantly associated with acquiring HIV from forced versus consensual sex included legal status as a landed immigrant (adjusted odds ratio [aOR] = 1.99; 95% confidence interval [CI] = [1.12, 3.54]) or refugee (aOR = 3.62; 95% CI = [1.63, 8.04]) versus Canadian citizen, African/Caribbean/Black ethnicity versus Caucasian (aOR = 2.49; 95% CI = [1.43, 4.35]), PTSD symptoms (aOR = 3.00; 95% CI = 1.68, 5.38), history of group home residence (aOR = 2.40; 95% CI = [1.10, 5.23]), history of foster care (aOR = 2.18; 95% CI = [1.10, 4.34]), and having one child in comparison with having three or more children (aOR = 0.52; 95% CI = [0.31, 0.89]).

We conducted additional analyses to investigate the experiences separately for women born in and outside of Canada. Among women born in Canada ($n = 555$), 18.4% ($n = 102$) self-reported HIV acquisition through forced sex in comparison with consensual sex ($n = 453$; 81.6%). Table 3 reports multivariate analyses among women born in Canada ($n = 491$). Those who self-reported HIV acquisition through forced sex versus consensual sex were more likely to report receiving income from a parent, friend, relative, or partner (aOR = 2.17; 95% CI = [1.00, 4.67]); have experienced living in foster care (aOR = 2.49; 95% CI = [1.43, 4.34]); report current IDU (past 3 months; aOR = 3.05; 95% CI = [1.30, 7.13]); and had experienced a mental health condition in their life (aOR = 2.15; 95% CI = [1.30, 3.57]).

Table 2. Sociodemographic, Clinical, and Health Characteristics of Women Self-Reporting Acquiring HIV Through Consensual Versus Forced Sex in the CHIWOS Cohort (n = 905).

Variable	HIV Transmission Risk					
	Consensual Sex		Forced Sex		Forced Sex vs. Consensual Sex	
	n	(%)	n	(%)	Odds Ratio (95% CI)	p
Categorical						
Household gross yearly income						
Can\$20,000 or higher	102	(44.0)	32	(27.3)		.045
<Can\$20,000	125	(53.9)	84	(71.8)	1.396 [1.007, 1.936]	<.001
Born in Canada						
Yes	453	(66.0)	102	(46.6)		
No	232	(33.8)	117	(53.4)	2.24 [1.644, 3.051]	
Don't know/Prefer not to answer	1	(0.1)				
Legal status in Canada						
Canadian citizen	577	(84.1)	138	(63.0)		<.001
Landed immigrant/permanent resident	75	(10.9)	45	(20.5)	2.509 [1.659, 3.794]	
Refugee	20	(2.9)	22	(10.0)		.006
Other	14	(2.0)	11	(5.0)	4.599 [2.441, 8.665]	
Don't know/Prefer not to answer			3	(1.4)	3.285 [1.46, 7.394]	
					1.988 [1.116, 3.541]	
					3.622 [1.631, 8.042]	
					2.293 [0.82, 6.409]	

(continued)

Table 2. (continued)

Variable	HIV Transmission Risk				Forced Sex vs. Consensual Sex	
	Consensual Sex		Forced Sex		Multivariate Model	
	n	(%)	n	(%)	Odds Ratio (95% CI)	p
	(n = 686)		(n = 219)			
Ethnicity						.007
Aboriginal	150	(21.9)	37	(16.9)	1.266 [0.804, 1.993]	0.956 [0.515, 1.776]
African/Caribbean/Black	171	(24.9)	106	(48.4)	3.182 [2.203, 4.596]	2.491 [1.427, 4.348]
Caucasian	308	(44.9)	60	(27.4)		
Other	57	(8.3)	16	(7.3)	1.441 [0.775, 2.678]	1.988 [0.931, 4.245]
Education						.041
Lower than high school	74	(10.8)	35	(16.0)	1.574 [1.019, 2.432]	
High school or higher	609	(88.8)	183	(83.6)		
Don't know/Prefer not to answer	3	(0.4)	1	(0.5)		
Report their source of income is from another person (Parent/friend/relative or partner)						.017
Yes	37	(5.4)	22	(10.0)	1.963 [1.131, 3.407]	
No	647	(94.3)	196	(89.5)		
Don't know/Prefer not to answer	2	(0.3)	1	(0.5)		

(continued)

Table 2. (continued)

Variable	HIV Transmission Risk				Forced Sex vs. Consensual Sex	
	Consensual Sex		Forced Sex		Multivariate Model	
	(n = 686)	(n = 219)	Odds Ratio (95% CI)	p	Odds Ratio (95% CI)	p
	n	(%)	n	(%)		
Early life experiences—foster care						
Yes	78	(11.4)	49	(22.4)	2.236 [1.505, 3.321]	<.001
No	605	(88.2)	170	(77.6)		
Don't know/Prefer not to answer	3	(0.4)				
Early life experiences—group home						
Yes	54	(7.9)	38	(17.4)	2.449 [1.567, 3.829]	<.001
No	630	(91.8)	181	(82.6)		
Don't know/Prefer not to answer	2	(0.3)				
Current injection drug use (last 3 months)						
Currently injecting drugs in past 3 months	19	(2.8)	17	(7.8)	2.961 [1.505, 5.822]	.006
No current injection drug use but previous injection drug use	80	(11.7)	30	(13.7)	1.241 [0.789, 1.953]	

(continued)

Table 2. (continued)

Variable	HIV Transmission Risk				Forced Sex vs. Consensual Sex	
	Consensual Sex		Forced Sex		Multivariate Model	
	n	(%)	n	(%)	Odds Ratio (95% CI)	p
No injection drug use history	566	(82.5)	171	(78.1)		
Don't know/Prefer not to answer	21	(3.1)	1	(0.5)		
Current antiretroviral therapy (ART) use						.115
Currently on ART	528	(77.0)	196	(89.5)		
Not currently on ART but previously on ART	33	(4.8)	4	(1.8)	0.327 [0.114, 0.934]	0.230 [0.051, 1.047]
Never on ART	123	(17.9)	19	(8.7)	0.416 [0.25, 0.693]	0.680 [0.275, 1.541]
Don't know/Prefer not to answer	2	(0.3)				
Most recent viral load (categorical)						.014
Undetectable (<50 copies/mL)	511	(74.5)	182	(83.1)		
Detectable (≥50 copies/mL)	114	(16.6)	22	(10.0)	0.542 [0.333, 0.882]	
Don't know/Prefer not to answer	36	(5.2)	10	(4.6)		
Never received viral load results	2	(0.3)				

(continued)

Table 2. (continued)

Variable	HIV Transmission Risk				p	Multivariate Model	
	Consensual Sex		Forced Sex				Univariate Model
	n	(%)	n	(%)			
Never accessed HIV medical care	23	(3.4)	5	(2.3)			
Hepatitis C							
Yes	109	(15.9)	48	(21.9)	1.493 [1.021, 2.184]	.039	
No	573	(83.5)	169	(77.2)			
Don't know/Prefer not to answer	4	(0.6)	2	(0.9)			
Mental health condition ever							
Yes	239	(34.8)	95	(43.4)	1.458 [1.067, 1.991]	.018	
No	440	(64.1)	120	(54.8)			
Don't know/Prefer not to answer	7	(1.0)	4	(1.8)			
Mental health history of anxiety							
Yes	89	(13.0)	41	(18.7)	1.571 [1.046, 2.361]	.029	
No	590	(86.0)	173	(79.0)			
Don't know/Prefer not to answer	7	(1.0)	5	(2.3)			

(continued)

Table 2. (continued)

	Median (Q1-Q3)	Median (Q1-Q3)			
Continuous					
Odds ratio based on 1 unit increase					
Months since last self-reported CD4 test	2 (1-4)	1 (0-3)	0.899 [0.849, 0.954]	<.001	0.927 [0.859, 1.001]
Months since last self-reported viral load test	2 (1-5)	1 (0-3)	0.897 [0.847, 0.95]	<.001	

Note. CHIWOS = Canadian HIV Women's Sexual and Reproductive Health Study; CI = confidence interval.

Table 3. Sociodemographic, Clinical, and Health Characteristics of Women Born in Canada Self-Reporting Acquiring HIV Through Consensual Versus Forced Sex in the CHIWOS Cohort ($n = 555$).

Variable	Univariate Model		Multivariate Model	
	Odds Ratio (95% CI)	<i>p</i>	Odds Ratio (95% CI)	<i>p</i>
Categorical				
Household gross yearly income		.993		
<Can\$20,000	0.998 [0.634, 1.571]			
Can\$20,000 or higher				
Sexual orientation		.043		
Heterosexual				
Lesbian, gay, bisexual, Two-Spirit, queer	1.817 [1.02, 3.239]			
Don't know/Prefer not to answer				
Number of children (categorical)		<.001		
0	0.293 [0.163, 0.528]			
1	0.395 [0.208, 0.750]			
2	0.610 [0.322, 1.155]			
3 or more				
Not cisgender women				
Early life experiences—foster care		<.001		.001
Yes	3.746 [2.345, 5.987]		2.494 [1.434, 4.339]	
No				

(continued)

Table 3. (continued)

Variable	Univariate Model		Multivariate Model	
	Odds Ratio (95% CI)	p	Odds Ratio (95% CI)	p
Report their source of income is from another person (parent, friend, relative or partner)		.001		.049
Yes	3.208 [1.609, 6.397]		2.166 [1.004, 4.670]	
No				
Current antiretroviral therapy (ART) use		.01		.067
Currently on ART				
Not currently on ART but previously on ART	0.698 [0.234, 2.088]		0.262 [0.055, 1.254]	
Never on ART	0.363 [0.187, 0.705]		0.526 [0.251, 1.103]	
City size		.011		
Small				
Medium	0.825 [0.371, 1.833]			
Large	0.439 [0.223, 0.864]			
Mental health condition ever		<.001		.003
Yes	2.734 [1.748, 4.275]		2.153 [1.297, 3.573]	
No				
Don't know/Prefer not to answer				

(continued)

Table 3. (continued)

Variable	Univariate Model		Multivariate Model	
	Odds Ratio (95% CI)	p	Odds Ratio (95% CI)	p
Mental health history of drug addiction				
Yes	3.584 [1.96, 6.556]	<.001		
No				
Recent incarceration (in the past year)				
Last year	3.914 [1.826, 8.386]	.001		
Ever but not last year	1.672 [1.051, 2.662]			
Never				
Current injection drug use (last 3 months)				.036
Currently injecting drugs in past 3 months	5.067 [2.449, 10.484]	<.001	3.049 [1.304, 7.130]	
No current injection drug use but previously injection drug use	1.952 [1.148, 3.318]		1.166 [0.636, 2.138]	
No injection drug use history				
Hepatitis C				
Yes	2.49 [1.57, 3.949]	<.001		
No				

Note. CHIWOS = Canadian HIV Women's Sexual and Reproductive Health Study; CI = confidence interval.

Among women born outside of Canada ($n = 349$), one third acquired HIV through forced sex ($n = 117$, 33.5%) and two thirds ($n = 232$, 66.5%) through consensual sex. In multivariate analyses ($n = 323$), participants born outside of Canada who acquired HIV through forced sex in comparison with consensual sex were more likely to report an income of less than \$20,000 (aOR = 1.87; 95% CI = [1.07, 3.26]); have lived in Canada for less than 5 years (aOR = 6.09; 95% CI = [3.03, 12.26]) or 5 to 10 years (aOR = 2.99; 95% CI = [1.60, 5.64]), in comparison with more than 10 years; have experienced PTSD symptoms (aOR = 5.86; 95% CI = [1.98, 17.37]); and have been born in an sub-Saharan African country with ongoing conflict and/or GBV issues (South Sudan, Democratic Republic of the Congo [DRC], Rwanda, Nigeria; aOR = 2.40; 95% CI = [1.24, 4.64]; Table 4).

Discussion

The high self-reported prevalence (16.5%) of HIV infection attributed to forced sex among WLWH in this national cohort study underscores the need to consider gender-based sexual violence as a distinct HIV risk factor. Women's experiences of forced sex as a mode of HIV acquisition varied based on legal status in Canada, ethnicity, early life experiences of foster care and group homes, and PTSD symptoms. Exploring correlates of forced sex separately for women born in and outside of Canada provides insights into different vulnerabilities. Among women born in Canada, those with early life experiences of foster care involvement, current IDU, and a history of mental health issues were more likely to report HIV acquisition from forced sex. Among those born outside of Canada, women reporting a shorter time living in Canada, PTSD symptoms, and being born in countries with ongoing/historical conflict had higher odds of reporting HIV transmission through forced sex. These findings highlight the need to consider GBV and its interconnection with HIV risk, as well as HIV care and support needs (e.g., psychosocial support) tailored for different populations of women (e.g., recent immigrants, women who use drugs), life experiences (e.g., foster care), and health factors (e.g., PTSD symptoms).

This is among few studies to examine prevalence and correlates of forced sex among WLWH as a self-reported direct mode of HIV acquisition (Silverman et al., 2008; Tounkara et al., 2014; Zablotska et al., 2009). We build on prior studies that report elevated rates of HIV acquisition among various populations of women with a history of forced sex, including sex workers (Sarkar et al., 2008; Tounkara et al., 2014; Wirth et al., 2013), adolescent girls and young adults (Rositch et al., 2012; Speizer et al., 2009), and women reporting IPV histories (Dunkle et al., 2004; Sa & Larsen, 2008; Silverman

Table 4. Sociodemographic, Clinical and Health Characteristics of Women Born Outside of Canada Self-Reporting Acquiring HIV Through Consensual Versus Forced Sex in the CHIWOS Cohort ($n = 349$).

Variable	Forced Sex vs. Consensual Sex			
	Univariate Model		Multivariate Model	
	Odds Ratio (95% CI)	<i>p</i>	Odds Ratio (95% CI)	<i>p</i>
Categorical				
Ethnicity		.001		
African/Caribbean/Black	4.480 [1.528, 13.136]			
Other	1.399 [0.384, 5.102]			
Caucasian				
Other	1.363 [0.388, 4.791]	.009		
Age at interview date (categorical)				
16-29				
30-39	0.594 [0.217, 1.622]			
40-49	0.283 [0.103, 0.771]			
50 or more	0.333 [0.118, 0.944]	.057		
Legal relationship status				
Married/relationship/common law				
Single	2.013 [1.134, 3.573]			
Separated/divorced/widowed/other	1.577 [0.876, 2.842]			
Years living in Canada (categorical)		<.001		<.001
Less than 5 years	5.892 [3.179, 10.922]		6.091 [3.027, 12.257]	
5-10 years	3.175 [1.823, 5.529]		2.999 [1.595, 5.636]	

(continued)

Table 4. (continued)

Variable	Forced Sex vs. Consensual Sex			
	Univariate Model		Multivariate Model	
	Odds Ratio (95% CI)	p	Odds Ratio (95% CI)	p
More than 10 years				
Report their source of income is from another person (parent, friend, relative or partner)		.999		
Yes	1 [0.392, 2.55]			
No				
Recreational drug use ever		.046		
Yes	0.44 [0.196, 0.987]			
No				
Household gross yearly income		.002		.028
<Can\$20000	2.142 [1.320, 3.475]		1.865 [1.068, 3.255]	
Can\$20000 or higher				
Legal status in Canada		.001		
Canadian citizen				
Landed immigrant/permanent resident	2.111 [1.25, 3.566]			
Refugee	3.819 [1.878, 7.769]			
Other	2.938 [1.213, 7.115]			
Years living with HIV		<.001		
Less than 6 years				

(continued)

Table 4. (continued)

Variable	Forced Sex vs. Consensual Sex			
	Univariate Model		Multivariate Model	
	Odds Ratio (95% CI)	p	Odds Ratio (95% CI)	p
6-14 years	0.544 [0.318, 0.929]			
More than 14 years	0.266 [0.137, 0.514]			
Mental health history of post-traumatic stress disorder symptoms		.001		.001
Yes				
No	5.203 [1.943, 13.934]		5.862 [1.978, 17.371]	
Continent of origin		.001		
Africa				
Caribbean	0.313 [0.146, 0.671]			
North America (United States)	0.211 [0.034, 1.309]			
Europe	0.358 [0.132, 0.97]			
Central America/South America	0.267 [0.092, 0.775]			
Asia/Oceania	0.247 [0.06, 1.022]			
Unknown				
African countries with historical and/or ongoing conflict/war and gender-based violence in conflict		<.001		.011
South Sudan/DRC/Rwanda/Nigeria	3.009 [1.663, 5.443]		2.401 [1.243, 4.639]	
Others				

Note. CHIWOS = Canadian HIV Women's Sexual and Reproductive Health Study; CI = confidence interval; PTSD = posttraumatic stress disorder; DRC = Democratic Republic of the Congo.

et al., 2008; Zablotska et al., 2009) and childhood sexual abuse (Burgos-Soto et al., 2014; Lewis, 2012). This prior research illuminated complex, multifaceted indirect pathways between sexual violence and HIV acquisition (Dunkle & Decker, 2013), but largely did not assess sexual violence as a direct pathway to HIV acquisition (García-Moreno, 2013). Our study is also among the first to explore forced sex among WLWH in North America, and Canada specifically (Stockman et al., 2013), complementing prior work conducted in sub-Saharan Africa (Burgos-Soto et al., 2014; Sa & Larsen, 2008; Speizer et al., 2009; Tounkara et al., 2014; Zablotska et al., 2009), India (Sarkar et al., 2008; Silverman et al., 2008; Wirth, Tchetgen Tchetgen, et al., 2013), and Papua New Guinea (Lewis, 2012) that highlight sexual violence as a risk factor of HIV infection. Our findings add to the evidence base showing the harmful health impacts of sexual violence against women across the globe.

Women who inject drugs, women with foster care involvement, and women born in countries with ongoing conflict and GBV were more vulnerable to experiencing forced sex as a mode of HIV acquisition in this study. Prior research reveals increased risks of sexual violence among each of these populations. First, a rich body of literature details social and structural risk environments among women who inject drugs (Rhodes, Singer, Bourgois, Friedman, & Strathdee, 2005), including elevated rates of violence and male partner control over injection tools. A study in BC, Canada, reported more than two thirds (68%) of women who injected drugs reported a lifetime history of sexual violence, and HIV prevalence was higher among those who had experienced sexual violence (Braitstein et al., 2003). Second, a literature review reported increased STI rates during and after youth's foster care involvement (Winter, Brandon-Friedman, & Ely, 2016). Foster youth may experience deficits in education, living skills, social skills, and may lack a knowledge base that facilitates healthy sexual decision making (Surratt & Kurtz, 2012; Winter et al., 2016). Finally, a review of conflict on HIV in sub-Saharan Africa reported that this region has both the highest rates of HIV and internal conflict (Mills et al., 2006). Internal conflict can lead to widespread sexual violence as an instrument of war, in particular, rape targeting women, which elevates HIV transmission risks.

The finding of PTSD as a correlate of forced sex as a mode of HIV acquisition is of important clinical relevance. As this analysis was cross-sectional, the direction of associations cannot be determined; however, it is likely that PTSD is a downstream effect of forced sex. Extant literature underscores the ways in which following IPV, including events of forced sex, survivors experience intense biological, psychological, and social distress, such as PTSD symptoms (Chivers-Wilson, 2006; Varma, Chandra, Thomas, & Carey, 2007). A study conducted among rape survivors ($n = 55$) found that within 2

weeks of the sexual assault, the majority of participants—almost 80%—reported PTSD symptoms (Dahl, 1989). A meta-analysis reports PTSD rates among WLWH in the United States are fivefold greater than their HIV-negative counterparts (Machtinger, Wilson, Haberer, & Weiss, 2012), underscoring that WLWH are at elevated risk of PTSD, even without experiences of forced sex. As PTSD is associated with bodily responses that weaken the immune system (Campbell, Greeson, Bybee, & Raja, 2008), this is of importance to an array of clinical outcomes. In studies examining the impact of PTSD among WLWH, it is well established that traumatic events predict poor health outcomes due to reduced quality of life, decreased medication compliance, antiretroviral therapy (ART) failure, and increased sexual risk practices (Machtinger et al., 2012; Whetten, Reif, Whetten, Reif, Whetten, & Murphy-McMillan, 2008).

It is important to examine the complexity between traumatic events and GBV. Although we note PTSD as a probable consequence of forced sex, it is well established that early childhood trauma can also contribute to one's vulnerability to experience repeated trauma, such as forced sex (Coid et al., 2001; Whitfield, Anda, Dube, Felitti, 2003; Van Der Kolk, 1989). A large study with 8,629 participants from the Adverse Childhood Events (ACE) study, found that both experiencing and witnessing abuse increased women's risks of experiencing IPV (Whitfield et al., 2003). The original 1994 ACE study (Felitti et al., 1998) highlights that the more exposure to adverse events in childhood (e.g., physical, emotional, sexual abuse, neglect), the greater likelihood of co-occurring health and social disparities in adulthood including perpetrating or being a victim of violence, drug use, alcohol use, depression, STIs, as well as other poor sexual and reproductive health outcomes (Felitti et al., 1998). The study results showed that women who experienced physical abuse in childhood had a greater likelihood of being victimized in adulthood. More specifically, the findings highlight that following an increase in the number of adverse, violent experiences among women, there is a 60% increase in the risk of victimization (Whitfield et al., 2003).

These findings on early childhood adversity also help to contextualize our findings on foster care involvement and forced sex. Higher forced sex among persons with a foster care history may be understood in part to be connected with the likelihood of experiencing adversity preceding as well as during child welfare involvement, including but not limited to neglect, familial discord, loss of community and social networks, as well as overall attachment impairment with a primary caregiver as a fundamental determinant of well-being (Bruskas & Tessin, 2013; Hillis, Anda, Felitti, Marchbanks, 2001). These contexts, in conjunction with internal factors that result from the impacts of trauma (e.g., emotional instability, aggression, feelings of

hopelessness, powerlessness), which may have initiated during childhood, continue and are sustained in the face of repeated trauma (Browne & Winkelman, 2007; Van Der Kolk, 1989). These long-term consequences may manifest in chronic poor decision making and self-destructive behavior that may elevate exposure to sexual violence in adulthood (Van Der Kolk, 1989).

This study has several limitations. First, women affected by violence may have been likely less likely to enroll in the study or self-report sexual violence in the survey, so the rate of 16.5% could be an underrepresentation. Second, the cross-sectional design precludes understanding of the directionality and causality of correlates of forced sex; for example, were women born in Canada who experienced a mental health issue more vulnerable to experiencing forced sex, or did women develop mental health issues as a result of forced sex? Were women who experienced forced sex as a mode of HIV acquisition more likely to use drugs as a coping strategy, or did contexts of IDU elevate exposure to sexual violence? Future research could focus on disentangling temporality of risks of experiencing sexual violence among women with experiences of IDU, foster care, and could explore whether mental health issues existed prior to experiences of forced sex. This information can inform GBV prevention strategies tailored for women's differential vulnerabilities. It can also inform support strategies to promote optimal health and well-being for GBV survivors living with HIV. Finally, the mode of HIV acquisition was self-reported, and in some cases, women did list different possible routes, and thus, the prevalence estimates are imperfect.

A strength of this study is that it contributes knowledge of rates and prevalence of forced sex as a self-reported direct pathway to HIV acquisition to the body of literature that has largely focused on indirect pathways from sexual violence to HIV infection. We identified subgroups of women who are at elevated risk of HIV through sexual violence, and this information can inform tailored interventions for both HIV and GBV prevention and for engaging women in the HIV care cascade.

Identifying strategies to reduce sexual violence targeting women is a public health priority. A clear understanding of who, and how many, women report forced sex as a mode of HIV acquisition can inform practice and policy. Public health reporting systems can separate the reporting of mode of acquisition through heterosexual sex to include consensual and forced sex. Increased awareness of sexual violence experiences among their clients can help HIV practitioners to prepare to meet their client needs. For example, the Southern Alberta Clinic implemented a universal IPV screening protocol in HIV care, and found that only 22% had been screened for IPV in any health care setting (Raissi, Krentz, Siemieniuk, & Gill, 2015). Multilevel interventions are required to address the needs of WLWH who

experienced forced sex, and to reduce GBV. For instance, clinic-based screening and resource referrals can help to link clients with mental health services and support groups (Dunkle & Decker, 2013). On a population level, inequitable gender norms that create the context for sexual violence and its associated HIV risk need to be challenged. Evidence-based practice interventions in sub-Saharan Africa such as Stepping Stones and IMAGE have addressed both HIV risk and GBV, engaging both men and women in violence prevention (Dunkle & Decker, 2013). Policy and practice interventions can tailor the HIV cascade of care for WLWH who experienced forced sex.

Authors' Note

Meetings at which parts of the data were presented are as follows: Poster presentation: 6th International Workshop on HIV & Women, February 2016 Conference, Boston, United States. Oral presentation: Canadian Association for HIV Research, May 2016 Conference, Winnipeg, Canada.

Acknowledgments

Canadian HIV Women's Sexual and Reproductive Health Study (CHIWOS) Research Team would like to thank women living with HIV for their contributions to this study. We also thank the national team of coinvestigators, collaborators, and peer research associates and acknowledge the national Steering Committee, our three provincial Community Advisory Boards, the National CHIWOS Aboriginal Advisory Board, the BC Centre for Excellence in HIV/AIDS for data support and analysis, and all our partnering organizations for supporting the study.

Listed here are all research team members and affiliated institutions:

The CHIWOS Research Team:

British Columbia: Aranka Anema (University of British Columbia), Denise Becker (Positive Living Society of British Columbia), Lori Brotto (University of British Columbia), Allison Carter (British Columbia Centre for Excellence in HIV/AIDS and Simon Fraser University), Claudette Cardinal (Simon Fraser University), Guillaume Colley (British Columbia Centre for Excellence in HIV/AIDS), Erin Ding (British Columbia Centre for Excellence), Janice Duddy (Pacific AIDS Network), Nada Gataric (British Columbia Centre for Excellence in HIV/AIDS), Robert S. Hogg (British Columbia Centre for Excellence in HIV/AIDS and Simon Fraser University), Terry Howard (Positive Living Society of British Columbia), Shahab Jabbari (British Columbia Centre for Excellence), Evin Jones (Pacific AIDS Network), Mary Kestler (Oak Tree Clinic, BC Women's Hospital and Health Centre), Andrea Langlois (Pacific AIDS Network), Viviane Lima (British Columbia Centre for Excellence in

HIV/AIDS), Elisa Lloyd-Smith (Providence Health Care), Melissa Medjuck (Positive Women's Network), Cari Miller (Simon Fraser University), Deborah Money (Women's Health Research Institute), Valerie Nicholson (Simon Fraser University), Gina Ogilvie (British Columbia Centre for Disease Control), Sophie Patterson (Simon Fraser University), Neora Pick (Oak Tree Clinic, BC Women's Hospital and Health Centre), Eric Roth (University of Victoria), Kate Salters (Simon Fraser University), Margarite Sanchez (ViVA, Positive Living Society of British Columbia), Jacquie Sas (CIHR Canadian HIV Trials Network), Paul Sereda (British Columbia Centre for Excellence in HIV/AIDS), Marcie Summers (Positive Women's Network), Christina Tom (Simon Fraser University, BC), Lu Wang (British Columbia Centre for Excellence), Kath Webster (Simon Fraser University), Wendy Zhang (British Columbia Centre for Excellence in HIV/AIDS).

Ontario: Rahma Abdul-Noor (Women's College Research Institute), Jonathan Angel (Ottawa Hospital Research Institute), Fatimatou Barry (Women's College Research Institute), Greta Bauer (University of Western Ontario), Kerrigan Beaver (Women's College Research Institute), Anita Benoit (Women's College Research Institute), Breklyn Bertozzi (Women's College Research Institute), Sheila Borton (Women's College Research Institute), Tammy Bourque (Women's College Research Institute), Jason Brophy (Children's Hospital of Eastern Ontario), Ann Burchell (Ontario HIV Treatment Network), Allison Carlson (Women's College Research Institute), Lynne Cioppa (Women's College Research Institute), Jeffrey Cohen (Windsor Regional Hospital), Tracey Conway (Women's College Research Institute), Curtis Cooper (Ottawa Hospital Research Institute), Jasmine Cotnam (Women's College Research Institute), Janette Cousineau (Women's College Research Institute), Marisol Desbiens (Women's College Research Institute), Annette Fraleigh (Women's College Research Institute), Brenda Gagnier (Women's College Research Institute), Claudine Gasingirwa (Women's College Research Institute), Saara Greene (McMaster University), Trevor Hart (Ryerson University), Shazia Islam (Women's College Research Institute), Charu Kaushic (McMaster University), Logan Kennedy (Women's College Research Institute), Desiree Kerr (Women's College Research Institute), Maxime Kiboyogo (McGill University Health Centre), Gladys Kwaramba (Women's College Research Institute), Lynne Leonard (University of Ottawa), Johanna Lewis (Women's College Research Institute), Carmen Logie (University of Toronto), Shari Margolese (Women's College Research Institute), Marvelous Muchenje (Women's Health in Women's Hands), Mary (Muthoni) Ndung'u (Women's College Research Institute), Kelly O'Brien (University of Toronto), Charlene Ouellette (Women's College Research Institute), Jeff Powis (Toronto East General Hospital), Corinna Quan (Windsor Regional Hospital), Janet Raboud (Ontario HIV Treatment Network), Anita Rachlis (Sunnybrook Health Science Centre), Edward Ralph (St. Joseph's Health Care), Sean Rourke (Ontario HIV Treatment Network), Sergio Rueda (Ontario HIV Treatment Network), Roger Sandre (Haven Clinic), Fiona Smail (McMaster University), Stephanie Smith (Women's College Research Institute), Tsitsi Tigere

(Women's College Research Institute), Wangari Tharao (Women's Health in Women's Hands), Sharon Walmsley (Toronto General Research Institute), Wendy Wobeser (Kingston University), Jessica Yee (Native Youth Sexual Health Network), Mark Yudin (St-Michael's Hospital).

Quebec: Dada Mamvula Bakombo (McGill University Health Centre), Jean-Guy Baril (Université de Montréal), Nora Butler Burke (University Concordia), Pierrette Clément (McGill University Health Center), Janice Dayle, (McGill University Health Centre), Danièle Dubuc, (McGill University Health Centre), Mylène Fernet (Université du Québec à Montréal), Danielle Groleau (McGill University), Aurélie Hot (COCQ-SIDA), Marina Klein (McGill University Health Centre), Carrie Martin (Native Women's Shelter of Montreal), Lyne Massie, (Université de Québec à Montréal), Brigitte Ménard, (McGill University Health Centre), Nadia O'Brien (McGill University Health Centre and Université de Montréal), Joanne Otis (Université du Québec à Montréal), Doris Peltier (Canadian Aboriginal AIDS Network), Alie Pierre, (McGill University Health Centre), Karène Proulx-Boucher (McGill University Health Centre), Danielle Rouleau (Centre Hospitalier de l'Université de Montréal), Édénia Savoie (McGill University Health Centre), Cécile Tremblay (Centre Hospitalier de l'Université de Montréal), Benoit Trottier (Clinique l'Actuel), Sylvie Trottier (Centre Hospitalier Universitaire de Québec), Christos Tsoukas (McGill University Health Centre).

Other Canadian provinces or international jurisdictions: Jacqueline Gahagan (Dalhousie University), Catherine Hankins (University of Amsterdam), Renee Masching (Canadian Aboriginal AIDS Network), Susanna Ogunnaike-Cooke (Public Health Agency of Canada).

All other CHIWOS Research Team Members who wish to remain anonymous.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: CHIWOS is funded by the Canadian Institutes of Health Research (CIHR), the CIHR Canadian HIV Trials Network (CTN 262), the Ontario HIV Treatment Network (OHTN), and the Academic Health Science Centres (AHSC) Alternative Funding Plans (AFP) Innovation Fund. A.d.P. received support from Fonds de Recherche du Québec Santé' (FRQS; Chercheur-boursier clinicien Junior 1), N.O.B. received support from FRQS and A.K. received salary support through a Tier 2 Canada Research Chair in Global HIV and Sexual and Reproductive Health.

References

- Amin, A. (2015). Addressing gender inequalities to improve the sexual and reproductive health and wellbeing of women living with HIV. *Journal of the International AIDS Society*, 18(Suppl. 5), Article 20302.
- Ayaydin, H., Abali, O., Akdeniz, N. O., Kok, B. E., Gunes, A., Yildirim, A., & Deniz, G. (2016). Immune system changes after sexual abuse in adolescents. *Pediatrics International*, 58, 105-112.
- Batchelder, A., Lounsbury, D. W., Palma, A., Carrico, A., Pachankis, J., Schoenbaum, E., & Gonzalez, J. S. (2016). Importance of substance use and violence in psychosocial syndemics among women with and at-risk for HIV. *AIDS Care*, 28, 1316-1320.
- Braitstein, P., Li, K., Tyndall, M., 'Spittal, P. O., Shaughnessy, M. V., Schilder, A., . . . Schechter, M. T. (2003). Sexual violence among a cohort of injection drug users. *Social Science & Medicine*, 57, 561-569.
- Breiding, M. J. (2014). Prevalence and characteristics of sexual violence, stalking, and intimate partner violence victimization—National Intimate Partner and Sexual Violence Survey, United States, 2011. *Morbidity and Mortality Weekly Report*, 63, 1-18.
- Browne, C., & Winkelman, C. (2007). The effect of childhood trauma on later psychological adjustment. *Journal of Interpersonal Violence*, 22(6), 684-697.
- Brownridge, D. A. (2008). Understanding the elevated risk of partner violence against aboriginal women: A comparison of two nationally representative surveys of Canada. *Journal of Family Violence*, 23, 353-367.
- Bruskas, D., & Tessin, D. H. (2013). Adverse childhood experiences and psychosocial well-being of women who were in foster care as children. *The Permanente Journal*, 17(3), e131.
- Burgos-Soto, J., Orne-Gliemann, J., Encrenaz, G., Patassi, A., Woronowski, A., Kariyare, B., . . . Becquet, R. (2014). Intimate partner sexual and physical violence among women in Togo, West Africa: Prevalence, associated factors, and the specific role of HIV infection. *Global Health Action*, 7, 1-14.
- Campbell, J. C. (2002). Health consequences of intimate partner violence. *The Lancet*, 359, 1331-1336.
- Campbell, J. C., Lucea, M. B., Stockman, J. K., & Draughon, J. E. (2013). Forced sex and HIV risk in violent relationships. *American Journal of Reproductive Immunology*, 69(Suppl. 1), 41-44.
- Campbell, R., Greeson, M. R., Bybee, D., & Raja, S. (2008). The co-occurrence of childhood sexual abuse, adult sexual assault, intimate partner violence, and sexual harassment: A mediational model of posttraumatic stress disorder and physical health outcomes. *Journal of Consulting and Clinical Psychology*, 76, 194-207.
- Case, K. K., Ghys, P. D., Gouws, E., Eaton, J. W., Borquez, A., Stover, J., . . . on Behalf of the HIV Modelling Consortium. (2012). Understanding the modes of transmission model of new HIV infection and its use in prevention planning. *Bulletin of the World Health Organization*, 90, 831-838.

- Centers for Disease Control and Prevention. (2001). *HIV prevalence trends in selected populations in the United States*. Atlanta, GA: Centers for Disease Control and Prevention. Retrieved from <https://www.cdc.gov/hiv/pubs/hivprevalence/HIVPrevalTrendsPop.pdf>.
- Chivers-Wilson, K. A. (2006). Sexual assault and posttraumatic stress disorder: A review of the biological, psychological and sociological factors and treatments. *McGill Journal of Medicine*, *9*, 111-118.
- Coid, J., Petrukevitch, A., Feder, G., Chung, W. S., Richardson, J., & Moorey, S. (2001). Relation between childhood sexual and physical abuse and risk of revictimisation in women: A cross-sectional survey. *The Lancet*, *358*(9280), 450-454.
- Dahl, S. (1989). Acute response to rape—A PTSD variant. *Acta Psychiatrica Scandinavica*, *80*, 56-62.
- Decker, M. R., Seage, G. R., Hemenway, D., Gupta, J., Raj, A., & Silverman, J. G. (2009). Intimate partner violence perpetration, standard and gendered STI/HIV risk behaviour, and STI/HIV diagnosis among a clinic-based sample of men. *Sexually Transmitted Infections*, *85*, 555-560.
- Dunkle, K. L., & Decker, M. R. (2013). Gender-based violence and HIV: Reviewing the evidence for links and causal pathways in the general population and high-risk groups. *American Journal of Reproductive Immunology*, *69*, 20-26.
- Dunkle, K. L., Jewkes, R. K., Brown, H. C., Gray, G. E., McIntyre, J. A., & Harlow, S. D. (2004). Gender-based violence, relationship power, and risk of HIV infection in women attending antenatal clinics in South Africa. *The Lancet*, *363*, 1415-1421.
- Dupont, I., & Sokoloff, N. J. (2005). Domestic violence at the intersections of race, class, and gender. *Violence Against Women*, *11*, 38-64.
- Durevall, D., & Lindskog, A. (2015). Intimate partner violence and HIV infection in sub-Saharan Africa. *World Development*, *72*, 27-42.
- Ee, F. (2007). HIV/AIDS and African immigrant women in Philadelphia: Structural and cultural barriers to care. *AIDS Care: Psychological and Socio-Medical Aspects of AIDS/HIV*, *17*, 1030-1043.
- El-Bassel, N., Gilbert, L., Wu, E., Chang, M., Gomes, C., Vinocur, D., & Spevack, T. (2007). Intimate partner violence prevalence and HIV risks among women receiving care in emergency departments: Implications for IPV and HIV screening. *Emergency Medicine Journal*, *24*, 255-259.
- Ellsberg, M., Jansen, H. A., Heise, L., Watts, C. H., García-Moreno, C., & WHO Multi-Country Study on Women's Health and Domestic Violence Against Women Study Team. (2008). Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: An observational study. *The Lancet*, *371*, 1165-1172.
- Elze, D. E., Auslander, W., McMillen, C., Edmond, T., & Thompson, R. (2001). Untangling the impact of sexual abuse on HIV risk behaviors among youths in foster care. *AIDS Education and Prevention*, *13*, 377-389.
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and household dys-

- function to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, 14(4), 245-258.
- García-Moreno, C. (2013). *Global and regional estimates of violence against women: Prevalence and health effects of intimate partner violence and non-partner sexual violence*. Geneva, Switzerland: World Health Organization.
- García-Moreno, C., Jansen, H. A., Ellsberg, M., Heise, L., Watts, C. H., & WHO Multi-Country Study on Women's Health and Domestic Violence Against Women Study Team. (2006). Prevalence of intimate partner violence: Findings from the WHO multi-country study on women's health and domestic violence. *The Lancet*, 368, 1260-1269.
- Gielen, A. C., McDonnell, K. A., Burke, J. G., & O'Campo, P. (2000). Women's lives after an HIV-positive diagnosis: Disclosure and violence. *Maternal and Child Health Journal*, 4, 111-120.
- Hahm, H. C., Augsberger, A., Feranil, M., Jang, J., & Tagerman, M. (2017). The associations between forced sex and severe mental health, substance use, and HIV risk behaviors among Asian American women. *Violence Against Women*, 23(6), 671-691.
- Hankins, C. A., Friedman, S. R., Zafar, T., & Strathdee, S. A. (2002). Transmission and prevention of HIV and sexually transmitted infections in war settings: Implications for current and future armed conflicts. *AIDS*, 16, 2245-2252.
- Hillis, S. D., Anda, R. F., Felitti, V. J., & Marchbanks, P. A. (2001). Adverse childhood experiences and sexual risk behaviors in women: A retrospective cohort study. *Family Planning Perspectives*, 33(5), 206-211.
- Lang, D. L., Salazar, L. F., DiClemente, R. J., & Markosyan, K. (2013). Gender based violence as a risk factor for HIV-associated risk behaviors among female sex workers in Armenia. *Aids and Behavior*, 17, 551-558.
- Lewis, I. R. (2012). At risk: The relationship between experiences of child sexual abuse and women's HIV status in Papua New Guinea. *Journal of Child Sexual Abuse*, 21, 273-294.
- Lima, V. D., Geller, J., Rangsberg, D. R., Patterson, T. L., Daniel, M., Kerr, T., . . . Hogg, R. S. (2007). The effect of adherence on the association between depressive symptoms and mortality among HIV-infected individuals first initiating HAART. *AIDS*, 21, 1175-1183.
- Logie, C. H., James, L., Tharao, W., & Loutfy, M. R. (2012). "We don't exist": A qualitative study of marginalization experienced by HIV-positive lesbian, bisexual, queer and transgender women in Toronto, Canada. *Journal of the International Aids Society*, 15(2), Article 17392.
- Machtiger, E. L., Wilson, T. C., Haberer, J. E., & Weiss, D. S. (2012). Psychological trauma and PTSD in HIV-positive women: A meta-analysis. *Aids and Behavior*, 16, 2091-2100.
- McLean, I., Roberts, S. A., White, C., & Paul, S. (2011). Female genital injuries resulting from consensual and non-consensual vaginal intercourse. *Forensic Science International*, 204, 27-33.

- Mills, E. J., Singh, S., Nelson, B. D., & Nachega, J. B. (2006). The impact of conflict on HIV/AIDS in sub-Saharan Africa. *International Journal of STD & AIDS, 17*, 713-717.
- Pallitto, C. C., & O'Campo, P. (2005). Community level effects of gender inequality on intimate partner violence and unintended pregnancy in Colombia: Testing the feminist perspective. *Social Science & Medicine, 60*, 2205-2216.
- Public Health Agency of Canada. (2013). *HIV and AIDS in Canada: Surveillance report to December 31st, 2011*. Retrieved from <http://www.phac-aspc.gc.ca/aids-sida/publication/survreport/2011/dec/index-eng.php>.
- Raissi, S. E., Krentz, H. B., Siemieniuk, R. A. C., & Gill, M. J. (2015). Implementing an intimate partner violence (IPV) screening protocol in HIV care. *AIDS Patient Care and STDS, 29*, 133-141.
- Rhodes, T., Singer, M., Bourgois, P., Friedman, S. R., & Strathdee, S. A. (2005). The social structural production of HIV risk among injecting drug users. *Social Science & Medicine, 61*, 1026-1044.
- Rositch, A. F., Cherutich, P., Brentlinger, P., Kiarie, J. N., Nduati, R., & Farquhar, C. (2012). HIV infection and sexual partnerships and behaviour among adolescent girls in Nairobi, Kenya. *International Journal of STD & AIDS, 23*, 468-474.
- Sa, Z., & Larsen, U. (2008). Gender inequality increases women's risk of HIV infection in Moshi, Tanzania. *Journal of Biosocial Science, 40*, 505-525.
- Sandfort, T. G. M., Baumann, L. R. M., Matebeni, Z., Reddy, V., & Southey-Swartz, I. (2013). Forced sexual experiences as risk factor for self-reported HIV infection among Southern African Lesbian and bisexual women. *PLoS ONE, 8*(1), e53552.
- Sarkar, K., Bal, B., Mukherjee, R., Chakraborty, S., Saha, S., Ghosh, A., & Parsons, S. (2008). Sex-trafficking, violence, negotiating skill, and HIV infection in brothel-based sex workers of eastern India, adjoining Nepal, Bhutan, and Bangladesh. *Journal of Health, Population and Nutrition, 26*, 223-231.
- Shannon, K., Kerr, T., Strathdee, S. A., Shoveller, J., Montaner, J. S., & Tyndall, M. W. (2009). Prevalence and structural correlates of gender based violence among a prospective cohort of female sex workers. *British Medical Journal, 339*, b2939.
- Silverman, J. G., Decker, M. R., Saggurti, N., Balaiah, D., & Raj, A. (2008). Intimate partner violence and HIV infection among married Indian women. *Journal of the American Medical Association, 300*, 703-710.
- Speizer, I. S., Pettifor, A., Cummings, S., MacPhail, C., Kleinschmidt, I., & Rees, H. V. (2009). Sexual violence and reproductive health outcomes among South African female youths: A contextual analysis. *American Journal of Public Health, 99*, S425-S431.
- Stockman, J. K., Lucea, M. B., & Campbell, J. C. (2013). Forced sexual initiation, sexual intimate partner violence and HIV risk in women: A global review of the literature. *AIDS and Behavior, 17*, 832-847.
- Surratt, H. L., & Kurtz, S. P. (2012). Foster care history and HIV infection among drug-using African American female sex workers. *Aids and Behavior, 16*, 982-989.
- Tounkara, F. K., Diabate, S., Guedou, F. A., Ahoussinou, C., Kintin, F., Zannou, D. M., . . . Alary, M. (2014). Violence, condom breakage, and HIV infection among

- female sex workers in Benin, West Africa. *Sexually Transmitted Diseases*, *41*, 312-318.
- Van der Kolk, B. A. (1989). The compulsion to repeat the trauma. *Psychiatric Clinics of North America*, *12*(2), 389-411.
- Varma, D., Chandra, P. S., Thomas, T., & Carey, M. P. (2007). Intimate partner violence and sexual coercion among pregnant women in India: Relationship with depression and post-traumatic stress disorder. *Journal of Affective Disorders*, *102*, 227-235.
- Whetten, K., Reif, S., Whetten, R., & Murphy-McMillan, L. K. (2008). Trauma, mental health, distrust, and stigma among HIV-Positive persons: Implications for effective care. *Psychosomatic Medicine*, *70*, 531-538.
- Whitfield, C. L., Anda, R. F., Dube, S. R., & Felitti, V. J. (2003). Violent childhood experiences and the risk of intimate partner violence in adults: Assessment in a large health maintenance organization. *Journal of Interpersonal Violence*, *18*(2), 166-185.
- Wingood, G. M., & DiClemente, R. J. (2000). Application of the theory of gender and power to examine HIV-related exposures, risk factors, and effective interventions for women. *Health Education & Behavior*, *27*, 539-565.
- Winter, V. R., Brandon-Friedman, R. A., & Ely, G. E. (2016). Sexual health behaviors and outcomes among current and former foster youth: A review of the literature. *Children and Youth Services Review*, *64*, 1-14.
- Wirth, K. E., Tchetgen, E. J. T., Silverman, J. G., & Murray, M. B. (2013). How does sex trafficking increase the risk of HIV infection? An observational study from Southern India. *American Journal of Epidemiology*, *177*, 232-241.
- Wu, E., El-Bassel, N., Witte, S. S., Gilbert, L., & Chang, M. (2003). Intimate partner violence and HIV risk among urban minority women in primary health care settings. *AIDS and Behavior*, *7*, 291-301.
- Zablotska, I. B., Gray, R. H., Koenig, M. A., Serwadda, D., Nalugoda, F., Kigozi, G., . . . Wawer, M. (2009). Alcohol use, intimate partner violence, sexual coercion and HIV among women aged 15-24 in Rakai, Uganda. *Aids and Behavior*, *13*, 225-233.

Author Biographies

Carmen H. Logie is an assistant professor at the Factor—Inwentash Faculty of Social Work, University of Toronto. She is also an adjunct scientist at Women's College Research Institute, University of Toronto.

Angela Kaida is an associate professor at the Faculty of Health Sciences, Simon Fraser University.

Alexandra de Pokomandy is an assistant professor at the McGill University Health Center and a family physician specialized in HIV patient care.

Nadia O'Brien is a doctoral student at McGill University, Department of Family Medicine.

Pat O'Campo is a professor at the Dalla Lana School of Public Health, University of Toronto.

Jay MacGillivray is a registered midwife and cofounded the Positive Pregnancy Program, St. Michael's Hospital.

Uzma Ahmed is a master of social work graduate from the Factor—Inwentash Faculty of Social Work, University of Toronto.

Nikita Arora is an MD candidate at the Faculty of Medicine, McMaster University.

Lu Wang is a research scientist at the BC Center for Excellence in HIV/AIDS.

Shahab Jabbari is a research scientist at the BC Center for Excellence in HIV/AIDS.

Logan Kennedy is a registered nurse and research associate at the Women's College Research Institute, Women's College Hospital.

Allison Carter is a doctoral candidate, public health researcher affiliated with the Faculty of Health Sciences, Simon Fraser University, as well as the BC Center for Excellence in HIV/AIDS.

Karène Proulx-Boucher is a research associate with CHIWOS.

Tracey Conway is a research associate with CHIWOS.

Paul Sereda is a senior data analyst at the BC Center for Excellence in HIV/AIDS.

Mona Loutfy is a clinician scientist at Women's College Hospital and an associate professor in the Department of Medicine at the University of Toronto.