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ABSTRACT. *Objectives*: Vulnerability to HIV and Hepatitis C virus (HCV) infection for indigenous populations worldwide must be contextualized in experiences of current and past trauma. Aboriginal women entrenched in poverty face further gender-specific harms which place them at increased risk for HIV infection.

Methods: This study was cross-sectional and based on a community-based sample of Aboriginal young people (Métis, Aboriginal, First Nations, Inuit, and non-status Indians) between the ages of 14 and 30 years who used injection or non-injection non-cannabis illegal drugs (street drugs) in the previous month. Between October 2003 and July 2005, 543 participants living in either Vancouver or Prince George, Canada, were recruited by word of mouth, posters, and street outreach. Young people in the study completed a questionnaire administered by Aboriginal interviewers. Female participants ($n = 262$) were compared to male participants ($n = 281$) with respect to sociodemographics, trauma, sexual risk variables, and drug use patterns. Trained nurses drew blood samples for HIV and HCV antibodies and provided pre- and post-test counseling.

Results: Proportions positive for HIV and HCV were significantly higher among young women. HIV was 13.1% [9.5, 17.7] in women compared to 4.3% [2.5, 7.4] in men, and HCV was 43.6% [37.6, 49.8] in women as compared to 25.4% [20.5, 30.9] in men. When the analysis was restricted to young people who reported injection drug use, the proportions positive for HIV and HCV remained significantly higher among young women. Experiences of forced sex were reported by 70% of young women compared to 29% of young men, $p < 0.001$, while the median age of first forced sex was 6-years-old for both men and women.

Discussion: The results of the final model indicated that HIV had been associated with residing in Vancouver, having injected for longer, and sexual abuse, but not being female. However, this gendered analysis demonstrated that a greater proportion of young women were experiencing sexual abuse, and sexual abuse was associated with HIV positive status. Harm reduction and drug treatment programs are urgently required that target women at a young age and address complex traumatic experiences associated with childhood sexual abuse.

KEYWORDS. HIV, AIDS, hepatitis C, HCV, Aboriginal, women, gender, injection, drug use, Canada, sex work, sexual abuse

INTRODUCTION

Aboriginal leadership and AIDS organizations in Canada are deeply concerned about increasing rates of HIV and HCV among young Aboriginal men and women and the role of historic trauma in heightening their vulnerability (Barlow, 2003; Pearce et al., 2008). In the past decade, the rate of HIV infection among Aboriginal people has grown more rapidly than in any other single ethnic group in Canada. Although Aboriginal people comprise only 3.3% of the Canadian population, as of 2005, an estimated 3,600 to 5,100 Aboriginal people were living with HIV in Canada, representing 7.5% of all HIV infections and 22% of new infections. Injection drug use is the primary risk factor for HIV among Aboriginal people, accounting for 58.9% of all infections between 1998 and 2005 (Public Health Agency of Canada, 2006). Limited research indicates that before 1992, in provinces with reported ethnicity data, 9.7% of Aboriginal AIDS cases were among people under the age of 30. In 2002, however, 41.2% of the Aboriginal cases were in this age group; the majority of infections were attributed to injection drug use. National HIV/AIDS surveillance data indicate that Aboriginal women in Canada have been disproportionately affected by HIV when compared to non-Aboriginal women. Between 1998–2005, Aboriginal women in Canada comprised 47.4% of all HIV positive test reports among Aboriginal people, compared to 20.5% among non-Aboriginal people (Public Health Agency of Canada, 2006). At a time when indigenous people's vulnerability to HIV infection is becoming recognized worldwide (CDC, 2005; Wright, Giele, Dance, & Thompson, 2005), a better understanding of the processes and factors that cause drug-related harm among young Aboriginal women is urgently required.

Residential Schools, the Child Welfare System, and HIV Risk

Indigenist scholars have suggested that any research regarding the HIV-related vulnerability of Aboriginal young people, particularly girls and women, must be informed by discussion of the historical legacy of colonization, including forced removal from traditional lands, economic deprivation, cultural genocide, and, in particular, the histories of the residential school and child welfare systems (Red Road HIV/AIDS Network, 2006; Simoni, Sehgal, & Walters, 2004; Wesley-Esquimaux & Smolewski, 2004). The residential school system was arguably the most destructive Canadian institution to Aboriginal com-

munities and families. Operating in a church-state partnership from 1874 to 1996, the residential school system forcibly removed over 100,000 children from their homes in an effort to "kill the Indian" in the child for the sake of Christian civilization (Milloy, 1999, p. xv). In contrast to traditional Aboriginal ways of learning and parenting, the missionary teachers in residential schools taught students to be ashamed of their culture, history, languages, and ways of life (Milloy, 1999, p. 299). In addition, Aboriginal children in residential schools were subjected to many forms of abuse, of which sexual abuse was the most pervasive. In the aftermath of their experience, students who attended residential schools often brought back to their communities what they had learned about control and abuse, and inflicted this upon their own children (Barlow, 2003; Pearce et al., 2008). Currently, an estimated 35,000 survivors of the residential school system are living in the province of British Columbia (Provincial Health Officer, 2002). According to the 1998 British Columbia Children's Commission Annual Report, rates of child maltreatment within Aboriginal families are related to intergenerational trauma, as Aboriginal parents and grandparents are still coping with the effects of residential schools (1999, p. 7; Pearce et al., 2008). Indeed, intergenerational trauma, defined by indigenous scholars as the transmission of a collective emotional and psychological injury over the lifespan and across generations among Aboriginal people, continues to affect the health and well-being of young Aboriginal men and women (RCAP, 1996; Yellow Horse & Brave Heart, 2004).

The era of the residential school system was intersected by another era of assimilationist strategy aimed at Aboriginal children. Beginning in 1951, the federal government delegated the health, welfare, and educational services of Aboriginal people to each province. Economic incentives were provided to child welfare agencies for each child apprehended; conversely, basic housing and childcare were not available to Aboriginal families (Fournier & Crey, 1997, pp. 82–84). By the late 1960s, Aboriginal children comprised 30–40% of all legal wards but only 4% of the national population (Fournier & Crey, 1997, p. 83). Currently in BC, an estimated 49% of children under government care and 41% of youth in detention centers are Aboriginal (Latimer & Foss, 2004; Ministry of Health, 2006).

Purpose of Study

Historically, much of HIV research, particularly with people who use drugs, has been driven by a need to better understand the rela-

tionship between gender (defined in this article as female vs. male) and HIV infection. The purpose of this study was to compare sociodemographics, drug use patterns, injection practices, sexual experiences, lifetime and historical trauma, and HIV and HCV prevalence between young Aboriginal men and women using illegal drugs in two urban settings. Study locations were in Vancouver's downtown east side and Prince George, a mining and forestry town in northern British Columbia. According to the 2001 census, the proportion of Aboriginal people living in Vancouver was 36,860 (1.9% of Vancouver), while 7,960 resided in Prince George (9.4% of Prince George) (Statistics Canada, 2001). In 2001, 6,885 Aboriginal young men and 7,195 Aboriginal young women between ages 15–34 years resided in the Northern Health Authority, in which Prince George is located, and 3,900 Aboriginal young men and 3,775 Aboriginal young women in this age group resided in the Vancouver Coastal Health Authority (B.C. Stats, 2001). In this study, Aboriginal ethnicity was based upon self-reported identification as a descendent of the First Peoples of Canada, and was inclusive of status and non-status First Nations, Métis, and Inuit (for details on the definitions, see RCAP, 1996, pp. 1–22). To our knowledge, this is the only prospective study of young at-risk indigenous peoples of its kind in North America.

METHODS

Ethics

The Cedar Project Study followed the guidelines provided in the Canadian Tri-Council Policy Statement: Ethical Conduct for Research Involving Human Subjects, and paid particular attention to section 6.0 pertaining to research involving Aboriginal participants. Our Aboriginal collaborators, including Aboriginal AIDS service organizations, were involved in the conception, design, and implementation of the Cedar Project. The Cedar Project Partnership reviewed the results of this analysis and approved this manuscript for publication. In addition, the study was approved by the University of British Columbia/Providence Health Care Research Ethics Board.

Study Design and Sample

This analysis used baseline data from the Cedar Project, an ongoing prospective cohort study involving 543 Aboriginal young people who

resided in Vancouver and Prince George. Eligibility criteria stipulated that participants were between 14 and 30 years of age, self-identified as Aboriginal, and had smoked illegal drugs in the last week or injected illegal drugs in the last month, including crystal methamphetamine, crack-cocaine, heroin, or cocaine. Saliva screens (ORALscreen®, Avitar Onsite Diagnostics) were used to confirm drug use. Participants provided written informed consent. Participants in both cities were recruited through referral by healthcare providers, community outreach, and by word of mouth between October 2003 and July 2005. The majority of participants in the study were recruited by word of mouth (39%) and outreach staff (32%). Other methods of recruitment consisted of posters on street corners and postering in a variety of community organizations frequented by both men and women. The recruitment goal in each city was approximately 300 participants. This was based on sample size calculations using a two-sided alpha level of 0.05 and a power of 80% to detect risk factors for prevalent HIV infection, with an odds ratio as low as 1.5, provided the risk factor was present in at least 20% of participants. The power for detecting associations for HCV infection was higher because its higher incidence and prevalence was expected to result in a larger sample who were HCV positive.

All participants met with one Aboriginal study coordinator who explained procedures, sought informed consent, and confirmed study eligibility. In the consenting process, all participants were informed of the limitations of research confidentiality, including communicable disease reporting, self-harm involvement, and child welfare legislation regarding current sexual abuse. Study participants always had the opportunity to be interviewed by an Aboriginal person, and, since confidentiality issues were a concern, particularly in smaller communities, participants were always given a choice to be interviewed by someone they trusted from the research team. Venous blood samples were drawn and tested for HIV and hepatitis C antibodies, and interviewers were blinded to the HIV and hepatitis C status of the participants. All eligible participants had private interviews, including pre- and post-test counseling with trained nurses; participants were requested to return for their HIV/HCV sero-status test result at which time referral for HIV/AIDS and hepatitis C care was provided. We actively encouraged participants to return for their results; however, receiving a result was not a requirement of participating in the study. Participants were given a $20 stipend at each study visit as compensation for their time and to facilitate transportation. When requested, study personnel secured emotional and physical support, including access to traditional healing

support, addictions treatment, and secure housing. All participants who completed the baseline questionnaire from October 2003 to July 2005 were included in this analysis.

Measures

Point estimates of proportions positive for HIV and HCV and 95% confidence intervals were computed separately for females and males, and estimates were stratified by injection drug use. Variables of interest included socio-demographic characteristics, sexual experiences, drug use patterns, and utilization of services. We obtained information related to the legacy of abuse and intergenerational trauma (Fournier & Crey, 1997), such as ever having been in the foster care system (yes vs. no) and having biological parents who attended residential schools (yes vs. no/unsure). "Sexual abuse" was defined for participants as any sexual activity that participants were forced or coerced into, including childhood sexual abuse, molestation, rape, and sexual assault. Interviewers gave this definition to participants prior to asking the question: "Have you ever been forced to have sex against your will and/or been molested" (yes vs. no, unsure/can't remember classified as missing). Participants were also asked if they had attempted to commit suicide in their lifetime and/or in the prior six months (yes vs. no).

Stable housing was defined as living in a house or apartment. Unstable housing was defined as living arrangements that included single room occupancy hotels (SROs), transitional living arrangements ("couch surfing"), and homelessness. Living on the street was defined as having lived on the streets for at least three nights during your lifetime (yes vs. no), and ever having been incarcerated was defined as ever being placed in prison or jail overnight or longer (yes vs. no). Measures used previously in the Vancouver Injection Drug User Study (VIDUS) on sexual experiences and drug use patterns were adapted for use in the baseline questionnaire (Spittal et al., 2006). Sexual risk variables included unsafe sex with regular and casual sex partners and with clients. Unsafe sex was defined as not always using a condom during anal and/or vaginal sex. Regular partners were defined as those partners with whom the sexual relationship lasted for over three months. Casual partners were defined as those partners with whom sexual relationships lasted less than three months. Clients were defined as partners with whom sex was traded for drugs, food, or money.

As our sample contained a greater proportion of females who reported injecting drugs, injection drug use variables were restricted to the 298 participants who reported injecting drugs in their lifetimes (yes vs. no). Opiate use was defined by the use of any of the following injection drugs: morphine, heroin, methadone, Talwin® (pentazocine with naloxone) and/or Dilaudid® (hydromorphone hydrochloride). Binging was defined for users as periods in which drugs were injected more frequently than usual. All participants were asked if they had ever overdosed (yes vs. no) and if they had visited the fixed or mobile needle exchange in the past six months. High-risk injection variables included ever needing help injecting, having needed help injecting in the past 6 months, ever having used a syringe someone else had already used, and using a syringe someone else had used in the past six months (each yes/no).

Univariate Analysis

Initially, a descriptive analysis was performed for the entire study sample. Pearson's chi-square and Fisher's exact test (if one or more expected counts were less than five) were applied to compare categorical variables, while Wilcoxon rank sum test was used to compare continuous variables. SPSS (Windows 11.0 version) and S-plus (Windows 6.2 version) statistical software were used to run these analyses.

For univariate analyses, odds ratios for the association between various risk factors and gender were calculated. Because of the potential influence of location (Prince George vs. Vancouver), the latter analyses were stratified over location and summarized using Mantel Haenszel statistical methods. For test of homogeneity, a cut-off p-value of 0.05 was used. Summary odds ratios and the corresponding 95% CIs were estimated for only those variables that provided a p-value greater than 0.05 in homogeneity test. All p-values were two-sided.

Multivariable Analysis

The multivariable analysis was restricted to participants who reported ever injecting drugs. Multivariable logistic regression was used to model independent variables that were significant in univariate analyses at the $p = 0.05$ level and for their association in literature with HIV infection. Three different models were built incrementally to model the association of gender with HIV infection. Location, duration of injection, and sexual abuse were chosen due to their association

with HIV in bivariate analyses (Table 1) and the theoretical basis for their association with HIV. Model 1 included gender adjusted for being located in Vancouver compared to Prince George, model 2 added duration of injection (as a continuous variable), and model 3 added sexual abuse. Interaction terms were tested between gender and sexual abuse, and gender and location, but were not found to be significant.

RESULTS

Demographics and Traumatic Experiences

The mean age at study enrollment was slightly lower for women (Table 2). Young women were more likely to be married/common law rather than single and nearly twice as likely to identify as bisexual or gay. Legally paid employment in the last six months was lower among females, although employment was low overall.

Women were almost six times more likely to have been sexually abused in their lifetimes, with a mean age of first abuse of approximately 7.5 years. Women were less likely to live in unstable housing in the previous six months and also to have lived on the streets. Women had lower levels of employment and were more likely to have been on welfare. A significantly higher proportion of men had been in prison or detention center overnight or longer in the previous six months, and significantly more males had been detained in their lifetime. A higher proportion of women had ever attempted suicide, although the proportions were remarkably high for both groups. Women were also more likely to use crack cocaine and to inject drugs.

Sex Work, Unsafe Sex, Regular vs. Casual Partners

Women were more likely to have been paid for sex in their lives and in the prior six months, more so in Prince George than Vancouver (Table 3). Women had much higher numbers of clients in the prior six months and were more likely to have unsafe sex with them. Significantly more women had regular partners of the opposite sex, while unprotected sex with regular partners was high for both men and women. Significantly more men had casual partners of the opposite sex. Women were less likely than men to have unsafe sex with a casual partner in Prince George, but more likely in Vancouver.

TABLE 1. Univariate and Multivariate Modeling for HIV Prevalence Restricted to Participants Who Reported Ever Injecting ($n = 298$)

	HIV Positive *n* (%)	HIV Negative *n* (%)	Unadjusted OR (95% CI)	Adjusted OR Model 1	Adjusted OR Model 2	Adjusted OR Model 3 ($n = 293$)
Gender						
Male	11 (28)	119 (46)	Reference	Reference	Reference	Reference
Female	28 (72)	140 (54)	2.16 (1.03, 4.53)	2.15 (1.02, 4.52)	2.06 (0.95, 4.46)	1.55 (0.69, 3.49)
Location						
Prince George	10 (26)	114 (44)	Reference	Reference	Reference	Reference
Vancouver	29 (74)	145 (56)	2.28 (1.07, 4.87)	2.26 (1.05, 4.86)	2.30 (1.04, 5.07)	2.68 (1.19, 6.05)
Median duration of injection						
Months (SD)	83.1 (44.2)	43.3 (44.2)	1.02 (1.01, 1.02)	—	1.02 (1.01, 1.02)	1.02 (1.01, 1.03)
Sexual abuse						
No	9 (23)	123 (48)	Reference	—	—	Reference
Yes	30 (77)	131 (52)	3.13 (1.43, 6.86)	—	—	3.24 (1.37, 7.66)

TABLE 2. Comparisons of Demographic Characteristics and Traumatic Events Between All Female ($n = 260$) and Male ($n = 278$) Cedar Participants

Variable	Prince George			Vancouver			Test for Heterogeneity	Summary Odds Ratio (95% CI)	p Value
	Males n (%)	Females n (%)	Odds Ratio (95% CI)	Males n (%)	Females n (%)	Odds Ratio (95% CI)			
Mean age at enrollment visit (SD)	23.0 (4.4)	21.6 (4.1)	0.9 (0.9, 1.0)	23.8 (3.7)	23.3 (3.7)	1.0 (0.9, 1.0)	N/A	1.0 (0.9, 1.0)	0.024
Married/common law vs. single	20 (16)	40 (36)	3.1 (1.7, 5.7)	25 (17)	38 (26)	1.7 (1.0, 3.0)	0.170	2.2 (1.5, 3.4)	<0.001
Bisexual or gay (two-spirited)	2 (2)	16 (14)	10.7 (2.4, 47.6)	19 (13)	22 (15)	1.2 (0.6, 2.2)	0.003	—	—
Either biological parent ever attended residential school	57 (45)	51 (46)	1.0 (0.6, 1.7)	75 (51)	61 (41)	0.7 (0.4, 1.1)	0.239	0.8 (0.6, 1.2)	0.286
Ever taken from biological parent	74 (57)	77 (69)	1.7 (1.0, 2.9)	96 (64)	99 (66)	1.1 (0.7, 1.8)	0.237	1.3 (0.9, 1.9)	0.119
Mean age first taken from biological parents (SD)	6.0 (3.9)	5.4 (3.8)	1.0 (0.9, 1.1)	4.5 (4.2)	5.4 (4.2)	1.1 (1.0, 1.1)	N/A	1.0 (1.0, 1.1)	0.604
Ever sexually abused	36 (29)	82 (75)	7.3 (4.1, 13.0)	42 (30)	96 (66)	4.7 (2.8, 7.7)	0.246	5.7 (3.9, 8.2)	<0.001
Mean age of first sexual abuse (SD)	6.9 (3.6)	8.2 (4.6)	1.1 (1.0, 1.2)	7.1 (4.0)	6.8 (4.4)	1.0 (0.9, 1.1)	N/A	1.0 (1.0, 1.1)	0.455

TABLE 2 (continued)

Variable	Prince George			Vancouver			Test for Heterogeneity	Summary Odds Ratio (95% CI)	*p* Value
	Males *n* (%)	Females *n* (%)	Odds Ratio (95% CI)	Males *n* (%)	Females *n* (%)	Odds Ratio (95% CI)			
Did not complete high school[1]	109 (85)	101 (91)	1.8 (0.8, 4.0)	111 (75)	119 (82)	1.5 (0.8, 2.6)	0.719	1.6 (1.0, 2.5)	0.058
Unstable housing (previous six months)	44 (34)	32 (29)	0.8 (0.4, 1.4)	94 (68)	76 (56)	0.6 (0.4, 1.0)	0.421	0.7 (0.5, 1.0)	0.038
Ever been on the street (>3 nights)	75 (58)	55 (50)	0.7 (0.4, 1.2)	122 (83)	111 (75)	0.6 (0.3, 1.1)	0.635	0.7 (0.5, 1.0)	0.033
Employed in last 6 months	40 (31)	11 (10)	0.3 (0.1, 0.5)	26 (17)	8 (5)	0.3 (0.1, 0.6)	0.870	0.3 (0.2, 0.4)	<0.001
On welfare last 6 months	46 (36)	56 (51)	1.8 (1.1, 3.1)	80 (54)	84 (56)	1.1 (0.7, 1.8)	0.156	1.4 (1.0, 2.0)	0.060
Ever detained by police	119 (92)	80 (72)	0.2 (0.1, 0.5)	129 (87)	101 (68)	0.3 (0.2, 0.6)	0.405	0.3 (0.2, 0.4)	<0.001
Been in jail, prison, or detention center overnight or longer (previous six months)	92 (71)	53 (48)	0.4 (0.2, 0.6)	121 (81)	93 (62)	0.4 (0.2, 0.7)	0.907	0.2 (0.3, 0.6)	<0.001
Ever attempted suicide	42 (33)	52 (47)	1.8 (1.1, 3.0)	43 (29)	57 (38)	1.5 (0.9, 2.5)	0.647	1.7 (1.2, 2.4)	0.006
Frequent crack use (last 6 months)	51 (40)	63 (57)	2.0 (1.2, 3.4)	74 (50)	105 (71)	2.4 (1.5, 3.9)	0.603	2.2 (1.6, 3.2)	<0.001
Injection drug use (ever)	56 (43)	68 (61)	2.1 (1.2, 3.5)	74 (50)	100 (67)	2.1 (1.3, 3.3)	0.992	2.1 (1.5, 2.9)	<0.001

Note: Participants who answered unsure were grouped as "no" answers.
[1]Analysis restricted to participants age 19 or older, $n = 447$.

TABLE 3. Comparisons of Sexual Experiences Between All Female ($n = 260$) and Male ($n = 278$) Cedar Participants

	Prince George			Vancouver					
Variable	Males *n* (%)	Females *n* (%)	Odds Ratio (95% CI)	Males *n* (%)	Females *n* (%)	Odds Ratio (95% CI)	Test for Heterogeneity	Summary Odds Ratio (95% CI)	*p* Value
Ever been paid for sex	11 (9)	77 (69)	24.3 (11.6, 50.8)	37 (25)	107 (72)	7.8 (4.5, 12.7)	0.011	—	—
Paid for sex (last 6 months)	4 (3)	69 (63)	52.6 (18.1, 153.0)	16 (11)	83 (56)	10.3 (5.6, 19.0)	0.007	—	—
Regular partner of opposite sex	49 (56)	71 (68)	1.7 (0.9, 3.0)	51 (51)	88 (66)	1.9 (1.1, 3.2)	0.764	1.8 (1.2, 2.6)	0.004
Unsafe sex with regular partners	42 (86)	61 (86)	1.0 (0.4, 2.9)	37 (76)	71 (82)	1.4 (0.6, 4.5)	0.612	1.3 (0.7, 2.4)	0.504
Regular partner you knew injected drugs (last 6 months)	11 (23)	21 (32)	1.6 (0.7, 3.7)	16 (31)	19 (23)	0.7 (0.3, 1.4)	0.133	1.0 (0.6, 1.7)	0.952
Regular partner you knew was HIV positive (last 6 months)	1 (2)	3 (5)	2.2 (0.2, 22.5)	0 (0)	6 (8)	1.1 (1.0, 1.16)	0.242	6.1 (0.7, 51.0)	0.093
Casual partner of opposite sex	51 (47)	57 (45)	0.6 (0.4, 1.1)	60 (59)	40 (30)	0.3 (0.2, 0.5)	0.071	0.4 (0.3, 0.6)	<0.001
Unsafe sex with casual partner	26 (53)	13 (28)	0.4 (0.2, 0.8)	28 (46)	21 (54)	1.4 (0.6, 3.1)	0.018	—	—

Injection Drug Use

Among participants having used injection drugs in their lifetime ($n = 298$), frequent use of any injection category was higher among women than among men (58% in women as compared to 37% in men, $p < 0.001$). The single-drug category in which significantly more young men reported drug use was frequent intravenous (IV) crystal methamphetamine, although use was low overall at 11% as compared to 4%, $p = 0.013$. Frequent opiate use was significantly higher among females at 47% as compared to 19%, $p < 0.001$, as was frequent speedball use (15% compared to 2%, $p < 0.001$). Frequent-injection cocaine use was found to be slightly higher among females (29% as compared to 22%, $p = 0.160$), although no significant difference was detected.

Women were less likely than men to use crystal methamphetamine but more likely to inject opiates and speedballs. Women were more likely than men in Prince George to report binges, but less likely in Vancouver. No significant differences were observed in needle borrowing, lending, reported barriers to access, or use of fixed needle exchange sites in the last six months between men and women (Table 4). Use of the mobile needle exchange in the past six months was higher among young women. Significantly more women reported drug overdose in the last six months, and significantly more women had ever been on methadone maintenance treatment or were currently on methadone maintenance therapy. No significant difference was detected in the proportion that had needed help injecting.

Proportion of HIV and HCV Positive by Gender

The proportions positive for HIV and HCV were significantly higher among females in the study (Table 5), with the exception of HCV among non-injectors, which occurred in similar proportions among both men (3.5%) and women (3.4%), $p = 1.000$. HIV was 4.3% among males compared to 13.1% in among females, $p < 0.001$, and HCV was 25.4% among males compared to 43.6% in all females, $p < 0.001$. When the analysis was restricted to young people who reported injection drug use (IDU), 8.5% of males involved in IDU were HIV positive and 16.7% of females involved in IDU, $p = 0.037$, while HCV positivity was 50.4% among males involved in IDU and 65.4% among females involved in IDU, $p = 0.010$.

TABLE 4. Comparisons of Substance Use Patterns Between Female ($n = 170$) and Male Cedar Participants ($n = 131$) Restricted to Participants Who Reported They ''Ever Injected Drugs''

	Prince George			Vancouver					
Variable	Males *n* (%)	Females *n* (%)	Odds Ratio (95% CI)	Males *n* (%)	Females *n* (%)	Odds Ratio (95% CI)	Test for Heterogeneity	Summary Odds Ratio (95% CI)	*p* Value
Median duration of injection in months (SD)	53.3 (50.4)	44.9 (44.9)		41.7 (43.0)	54.1 (47.2)		—	—	
Mean age of first injection (IQR)	19.2 (4.0)	17.0 (3.6)		19.4 (4.2)	18.0 (4.3)		—	—	
Daily IV cocaine use (previous six months)	17 (30)	26 (39)	1.5 (0.7, 3.2)	12 (16)	23 (23)	1.5 (0.7, 3.3)	0.994	1.5 (0.9, 2.6)	0.124
Daily IV speedball	1 (2)	7 (10)	6.3 (0.8, 3.2)	2 (3)	18 (18)	7.8 (1.8, 34.8)	0.873	7.3 (2.2, 24.8)	0.001
Daily IV opiate use (morphine, heroin, methadone, Talwin and/or Dilaudid)	8 (14)	20 (29)	2.5 (1.0, 6.2)	17 (23)	59 (58)	4.7 (2.4, 9.2)	0.271	3.8 (2.2, 6.4)	<0.001
Daily IV crystal use (previous six months)	2 (4)	1 (1)	0.40 (0.1, 4.6)	12 (16)	5 (5)	0.2 (0.1, 0.8)	0.763	0.3 (0.1, 0.8)	0.014
Daily use of any single injection drug category last six months	22 (39)	34 (49)	1.5 (0.8, 3.2)	27 (37)	65 (64)	3.1 (1.7, 5.9)	0.141	2.3 (1.4, 3.7)	<0.001

TABLE 4 (continued)

Variable	Prince George			Vancouver			Test for Heterogeneity	Summary Odds Ratio (95% CI)	*p* Value
	Males *n* (%)	Females *n* (%)	Odds Ratio (95% CI)	Males *n* (%)	Females *n* (%)	Odds Ratio (95% CI)			
Runs or binges with injection drugs in last 6 months	8 (17)	17 (32)	2.2 (0.9, 5.8)	15 (25)	13 (14)	0.5 (0.2, 1.2)	0.020	—	—
Ever overdosed	17 (30)	27 (39)	1.5 (0.7, 3.1)	27 (37)	43 (43)	1.3 (0.7, 2.5)	0.842	1.4 (0.9, 2.2)	0.174
Overdosed past six months	1 (6)	9 (33)	8.0 (0.9, 70.3)	4 (14)	12 (25)	2.0 (0.6, 6.9)	0.263	3.1 (1.1, 8.8)	0.036
Ever needed help injecting	34 (79)	42 (81)	1.1 (0.4, 3.0)	39 (66)	55 (62)	0.8 (0.4, 1.7)	0.638	0.9 (0.5, 1.6)	0.745
Needed help injecting (last six months)	19 (44)	23 (49)	1.2 (0.5, 2.8)	14 (24)	35 (39)	2.1 (1.0, 4.3)	0.337	1.6 (1.0, 2.8)	0.073
Needle lending (last 6 months)	10 (24)	14 (27)	1.2 (0.5, 3.0)	3 (5)	13 (15)	3.2 (0.9, 11.9)	0.211	1.7 (0.8, 3.7)	0.141
Ever borrowed used needle	27 (47)	28 (41)	0.8 (0.4, 1.5)	22 (31)	27 (27)	0.8 (0.4, 1.6)	0.869	0.8 (0.5, 1.3)	0.348
Needle borrowing (last 6 months)	13 (30)	17 (33)	1.1 (0.5, 2.7)	8 (14)	13 (14)	1.0 (0.4, 2.7)	0.903	1.1 (0.6, 2.1)	0.814
Difficulty accessing clean needles	16 (37)	20 (39)	1.1 (0.5, 2.4)	9 (16)	24 (27)	2.0 (0.9, 4.7)	0.287	1.5 (0.8, 2.6)	0.207

Variable	Prince George			Vancouver			Test for Heterogeneity	Summary Odds Ratio (95% CI)	*p* Value
	Males *n* (%)	Females *n* (%)	Odds Ratio (95% CI)	Males *n* (%)	Females *n* (%)	Odds Ratio (95% CI)			
On average, use the same rig more than once	26 (61)	30 (58)	0.9 (0.4, 2.0)	18 (31)	23 (26)	0.7 (0.4, 1.6)	0.469	0.8 (0.5, 1.4)	0.470
Mobile needle exchange use (last 6 months)	4 (9)	7 (14)	1.7 (0.5, 6.1)	26 (50)	61 (71)	2.3 (1.2, 4.8)	0.652	2.2 (1.2, 4.0)	0.016
Fixed needle exchange use (last 6 months)	34 (76)	43 (83)	1.5 (0.6, 4.2)	21 (41)	47 (54)	1.7 (0.8, 3.3)	0.894	1.6 (0.9, 2.9)	0.092
Daily visit of any needle exchange	11 (26)	21 (40)	2.0 (0.8, 4.8)	13 (23)	23 (26)	1.2 (0.5, 2.6)	0.406	1.5 (0.8, 2.7)	0.178
Ever been on methadone maintenance treatment	5 (9)	19 (28)	4.0 (1.4, 11.4)	11 (15)	45 (46)	4.8 (2.2, 10.1)	0.776	4.5 (2.4, 8.3)	<0.001
Currently in alcohol or drug treatment program	21 (37)	22 (32)	0.8 (0.4, 1.7)	8 (11)	17 (17)	1.7 (0.7, 4.2)	0.208	1.1 (0.6, 1.9)	0.757
Tried but failed to access drug treatment (last 6 months)	9 (16)	14 (20)	1.4 (0.5, 3.4)	10 (14)	16 (16)	1.2 (0.5, 2.8)	0.833	1.3 (0.7, 2.4)	0.466
Currently in methadone treatment	2 (4)	5 (7)	2.1 (0.4, 11.5)	5 (7)	18 (18)	3.0 (1.1. 8.5)	0.742	2.7 (1.1, 6.6)	0.025

TABLE 5. Prevalence of HIV and HCV Infection Among Female and Male Cedar Project Participants Stratified by Injection Drug Use

Group	Male Prevalence (%) [95% CI] (# Infected/Total #)	Female Prevalence (%) [95% CI] (# Infected/Total #)	Odds Ratio (95% CI)	*p*-Value
HIV Prevalence ($n = 538$)				
All participants	4.3 [2.5, 7.4] 12/278	13.1 [9.5, 17.7] 34/260	3.34 (1.69, 6. 59)	<0.001
Injectors (ever)	8.5 [4.8, 14.5] 11/130	16.7 [11.8, 23.0] 28/168	2.16 (1.03, 4.5)	0.037
Non-injectors (ever)	0.7 [0, 3.7][1] 1/148	6.5 [2.4, 13.7][1] 6/92	10.26 (1.21, 86.62)	0.014[2]
HCV Prevalence ($n = 518$)				
All participants	25.4 [20.5, 30.9] 68/268	43.6 [37.6, 49.8] 109/250	2.27 (1.57, 3.30)	<0.001
Injectors (ever)	50.4 [41.8, 59.0] 63/125	65.4 [57.8, 72.3] 106/162	1.86 (1.56, 3.00)	0.010
Non-injectors (ever)	3.5 [1.1, 7.8][1] 5/143	3.4 [0.7, 9.6][1] 3/88	0.974 (0.23, 4.18)	1.00[2]

[1]Exact Binomial Confidence Interval.
[2]Based on Fisher's Exact Test.

Among non-injectors, the proportion of HIV positive was eight times higher among females (6.5%) compared to males (0.7%), $p = 0.014$.

Multivariable Analysis

Using forward stepwise multiple logistic regression, living in Vancouver vs. Prince George (unadjusted odds ratio [UOR]: 2.3, 95% confidence Interval [CI] 1.1, 4.9), increased duration of injection drug use as a continuous variable in months (UOR: 1.0, 95% CI: 1.01, 1.02), and ever having been sexually abused (UOR: 3.1, 95% CI: 1.4, 6.9) were independently associated with HIV infection (Table 1). These variables were used to investigate the association of gender with HIV seropositivity. When the model was built in a stepwise

fashion beginning with gender, being female was significantly associated with HIV seropositivity as seen in model 1. However, being female was not significantly associated with HIV in the final model (model 3). The final model included location, duration of infection, and history of sexual abuse as significant independent variables related to HIV infection. Inclusion of location and duration of infection did not dramatically alter the odds ratio estimate for gender. However, when sexual abuse was added to the model, the association with being female on HIV was attenuated (model 3). Interactions terms were tested in the model, specifically for being female, location of residence, and having experienced sexual abuse, but no interaction terms were found to be significant.

DISCUSSION

Indigenist scholars agree that the cumulative effects of historical and lifetime trauma are related to the HIV epidemic among Aboriginal women in North America (Walters & Simoni, 2002; Simoni, Sehgal, & Walters, 2004). In this study, we found that young Aboriginal women were three times more likely than men to be HIV positive. When the analysis was restricted to participants who had ever injected drugs at baseline, women were twice as likely to be HIV positive. In addition, two-thirds of the young Aboriginal women in this study who injected drugs were HCV positive at baseline, 30% higher than young men, despite the fact that the women were slightly younger. To our knowledge, this is the first study addressing gender-related HIV vulnerability among young Aboriginal people who use drugs in Canada.

Gender was not associated with HIV infection independent of sexual abuse. While it is possible that the study was unable to detect an independent effect due to the sample size being too small or to measurement issues, this finding should not diminish the importance of gender related to HIV vulnerability among young Aboriginal people who use drugs. Indeed, because a greater number of women reported having experienced sexual abuse, an uncritical use of gender may not have highlighted the significance of women's vulnerability to HIV.

It is widely accepted that sexual abuse in Aboriginal communities was relatively rare prior to colonization, and traditional child protection mechanisms effectively enforced moral codes and cultural taboos (Aboriginal Peoples Collection, 1997; Fournier & Crey, 1997; Hylton, 2002, p. 7). In the aftermath of European colonization, Aboriginal

cultural principles that fostered a sacredness of sexuality were dismantled, impacting preventative values and traditions (Chester, Robin, Koss, Lopez, & Goldman, 1994). Consequently, sexual violence among indigenous women in Canada, the U.S., and Australia have reached epidemic proportions (Brownridge, 2003; Evans-Campbell, Lindhorst, Huang, & Walters, 2006; Raphael, Swan, & Martinek, 1998; Walters & Simoni, 2002). An established body of literature has addressed the healthcare needs of female survivors of sexual trauma and focused upon high rates of substance abuse, depression, posttraumatic stress syndrome injection drug use, sexual risk, and HIV infection later in life (Miller, 1999; Simoni, Sehgal, & Walters, 2004; Barker-Collo, 1999; Kue Young & Katz, 1998; Robin, Chester, Rasmussen, Jaranson, & Goldman, 1997; Wyatt et al., 2002; Pearce et al., 2008). These findings have clear implications for clinicians, outreach workers, and the criminal justice system. Health programming for vulnerable populations, including women who use drugs, often ignores the effects of sexual violence (Amaro, 1995; Craib et al., 2003; Duran & Walters, 2004). Policies aimed at reducing HIV risk among Aboriginal women often fail to consider the psychological consequences of imposed sexual activity that has roots in historical trauma (Walters & Simoni, 1999; Pearce et al., 2008). Addressing the issue of sexual trauma within Aboriginal families may require a dynamic multilevel approach at the individual, family, organizational, community, and policy levels (Oetzel & Duran, 2004; Pearce et al., 2008). Certainly, a significant increase in resources to provide intensive healing programs for victims, offenders, and their families must be supported by leadership, chief and council, community-based health representatives, addiction specialists, crown attorneys, and law enforcement (Duran & Walters, 2004; Aboriginal Peoples Collection, 1997; Ross, 2006).

With the exception of crystal methamphetamine, the young Aboriginal women in this study were more likely to report more frequent drug use for nearly every drug use category examined in univariate analyses. Young women in this study were almost four times more likely than men to report daily opiate use and seven times more likely to report daily speedball use. Literature suggests that drug-dependent women use opiates to mitigate the effects of physical and emotional pain associated with early abuse experiences and survival sex work (Miller et al., 2002). The HIV epidemic that has occurred in Vancouver among people who use injection drugs has been related to needle sharing, which is exacerbated by frequent use of injection cocaine (Tyndall et al., 2003). However, pain associated with withdrawal in addition to memories of trauma that emerge as the numbing effect of drug

use subsides, makes it difficult for drug-dependent women to protect themselves against HIV (Connors, 1994). In addition, women who inject drugs and are in a relationship where there is an imbalance of power are more vulnerable when they are going through withdrawal, as they are more likely to accept sex without a condom and inject second on the needle (Spittal et al., 2002).

Significant proportions of young Aboriginal women in this study reported using opiates in the last six months, but only a fraction of the women reported currently using methadone maintenance therapy (MMT). Despite expansions in the availability of MMT in BC in 2000, and its demonstration of successful opiate addiction treatment and HIV prevention (Gibson, Flynn, & McCarthy, 1999) physicians in public health clinics in Vancouver have recently reported an inability to meet patient demand (Buxton, 2007). Increased efforts should be made to determine other barriers of MMT access among Aboriginal women and to explore alternative therapies for opiate addiction where MMT is not successful.

The HIV epidemic among Aboriginal people in Canada has been predominantly associated with injection drug use; however, we found that among Cedar Project participants who had never injected drugs, women had a significantly higher HIV infection rate than men (M:F = 0.7%:6.5%). Although the proportion of HIV seropositivity was comparatively lower than among participants who reported injection drug use, this result suggests increased heterosexually acquired HIV among young Aboriginal women. Significantly more young Aboriginal women in this study reported having regular partners of the opposite sex and over 80% reported unsafe sex with their regular partners. Unsafe sex among regular sexual partners has been reported among men and women in the general population (PHAC, 1999) and in a systemic review of condom use among Aboriginal people (Devries, Free, & Jategaonkar, 2007). However, it should not be assumed that young Aboriginal women in this study are negotiating condom use with their regular partners in consensual circumstances (Wyatt et al., 2002). Established literature has indicated that the negotiating power of marginalized women for condom use is often constrained by an imbalance of power in relationships and contextual factors such as the fear of anger, violence, or abandonment from their male partners (Amaro, 1995; Fenaughty, 2003). Violence in relationships greatly reduces women's ability to make safe sex choices with their regular partners, and compounds existing factors, including antecedent sexual abuse, unstable housing, and poverty (Vernon, 2001).

The significantly higher percentage of young Aboriginal women in this study who had injected in their lifetime is a cause for concern (M:F = 47%:65%). Recently, in response to the increased HIV/HCV prevalence in the north of BC, the Northern Aboriginal HIV/AIDS Task Force implemented a mobile needle exchange van (Northwest Tribal Treaty Nations, 2005). Further evaluation is necessary to ensure that women surviving on the streets in this northern community are accessing this critically important harm reduction initiative. Meaningful involvement of young people who use drugs in the design of injection prevention programming is urgently required.

Limitations to this study should be acknowledged. As a probability sampling framework was not available for the population under study, recruitment for the Cedar Study was non-random. Therefore, we cannot discount the possibility that our recruitment method was biased toward particularly vulnerable young Aboriginal men and women using drugs. Further, we were not able to determine non-response biases within the study. Our study was based on self-report; participants may under-report behaviors that are illegal or stigmatizing. Self-reports of drug use have been found to be fairly reliable, however, and valid when participants feel that confidentiality is assured and that they are not judged. As study participants were aware of the duty of the interviewer to report sexual abuse for those under the age of 18, under-reporting of sexual abuse among participants under 18 years of age may have occurred. Gender differences between men and women under age 18 and who reported sexual abuse were not found; therefore, we do not believe this affected the direction of the associations. Finally, this was a cross-sectional study, and we were therefore unable to determine the temporality of variables associated with HIV seropositivity. Due to the limited focus of the population under study, generalizations cannot be made to the general population of Aboriginal young people who reside in urban settings. It is important to note that the comparison group of men was an extremely vulnerable group themselves, and differences that did not obtain statistical significance should not be considered as lacking importance; rather, this population of young people was experiencing similar conditions. Conversely, numerous statistical comparisons were undertaken, thereby increasing the possibility of detecting associations due to chance.

In summary, this study highlighted that, among a cohort of young Aboriginal people who used injection and non-injection street drugs, women were significantly more likely to be HIV positive among both young people who used injection drugs and those who did not. The

high rates of traumatic life events reported by young women involved in this study, including sexual abuse, attempted suicide, incarceration, survival sex work, and overdose are an indication that young Aboriginal people are still grappling with multigenerational effects of both the residential school and child welfare systems. In particular, the high rate of lifetime sexual abuse and the very young median age of first sexual abuse among young women in the Cedar Project was one of the most distressing findings of this study, particularly in light of its association with HIV infection. Young Aboriginal women who are sexual abuse survivors must be afforded the opportunity to provide leadership in the design and implementation of programming for healing unresolved historical and lifetime grief.

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