J Public Health Pol (2018) 39:86–99
https://doi.org/10.1057/s41271-017-0098-4

ORIGINAL ARTICLE

Workplace violence among female sex workers who use drugs in Vancouver, Canada: does client-targeted policing increase safety?

Amy Prangnell[1,2] · Kate Shannon[1,3] · Ekaterina Nosova[1] · Kora DeBeck[1,4] · M.-J. Milloy[1,3] · Thomas Kerr[1,3] · Kanna Hayashi[1,5]

Published online: 6 November 2017
© Macmillan Publishers Ltd 2017

Abstract Workplace violence, by clients or predators, poses serious negative health consequences for sex workers. In 2013, the Vancouver (British Columbia), Canada Police Department changed their guidelines with the goal of increasing safety for sex workers by focusing law enforcement on clients and third parties, but not sex workers. We sought to examine the trends and correlates of workplace violence among female sex workers (FSW) before and after the guideline change, using data collected from prospective cohorts of persons who use illicit drugs in Vancouver, Canada. Among 259 FSW, 21.0% reported workplace violence at least once during

✉ Kanna Hayashi
uhri-kh@cfenet.ubc.ca

Amy Prangnell
aprangnell@cfenet.ubc.ca

Kate Shannon
gshi@cfenet.ubc.ca

Ekaterina Nosova
enosova@cfenet.ubc.ca

Kora DeBeck
uhri-kd@cfenet.ubc.ca

M.-J. Milloy
uhri-mjsm@cfenet.ubc.ca

Thomas Kerr
uhri-tk@cfenet.ubc.ca

[1] British Columbia Centre for Excellence in HIV/AIDS, St. Paul's Hospital, 608-1081 Burrard Street, Vancouver, BC V6Z 1Y6, Canada

[2] School of Population and Public Health, University of British Columbia, Vancouver, BC, Canada

[3] Department of Medicine, University of British Columbia, St. Paul's Hospital, Vancouver, BC, Canada

the study period between 2008 and 2014. There was no statistically significant change in rates of workplace violence after the guideline change. In our multivariable analysis, daily heroin use was independently associated with workplace violence. The 2013 policing guideline change did not appear to have resulted in decreased reports of workplace violence. Increased access to opioid agonist therapies may reduce workplace violence among drug-using FSW.

Keywords Female sex workers · Workplace violence · Daily drug use · Protection strategy

Introduction

Sex workers suffer from higher rates of mortality and morbidity compared to the general population [1–3], stemming in part from policies criminalizing sex work [4]. It is well documented that the criminalization of sex work increases the risk of violence and HIV [3, 4], partly by forcing sex workers to evade police detection and conduct business in secluded locations without support services nearby [5]. As of December 2012, the World Health Organization and Joint United Nations Programme on HIV/AIDS (Human immunodeficiency virus that causes AIDS) reconfirmed its call for full decriminalization of sex work to remove unjustified punitive sanctions against and increase safety for sex workers [6]. Countries such as New Zealand, the Netherlands, and Germany have previously decriminalized sex work [7]. In New Zealand, the first country to do so, decriminalization increased sex workers safety by allowing longer pre-screening to detect potentially violent clients, increased ability to refuse clients, and better ability to negotiate safer sex practices [8, 9]. Without legal recognition, sex workers may also be hesitant to report violence, that may be perpetrated by clients, predators posing as clients, police, or exploitative third parties [10]. Among street-based female sex workers who use drugs, the estimated prevalence of experiencing workplace violence, including physical, sexual, and verbal violence, varies widely both within and across regions of the world, with high rates of violence ranging from a lifetime prevalence of 82.0% and one year prevalence as high as 68.4% [11–13].

Violence against sex workers is both a human rights abuse and a public health issue linked to a range indicators of poor health including poor sexual and reproductive health, lack of access to health and social services, trauma, and depression [14–17]. Evidence-based strategies to reduce violence include screening prospective clients, access to safer workplaces, and working together with other sex workers [3, 18]. These individual level strategies may, however, have limited effectiveness without broader structural changes to ensure safer work environments.

In Canada, selling sex for money has always been legal; however, activities relating to the exchange of sex (such as communication for the purposes of sex work

[4] School of Public Policy, Simon Fraser University, Vancouver, BC, Canada

[5] Faculty of Health Sciences, Simon Fraser University, 8888 University Drive, Burnaby, BC, Canada

including soliciting sexual transactions) were previously prohibited [19]. In response to growing concerns for sex workers' safety, the Vancouver Police Department (VPD) updated their sex work enforcement guidelines in January of 2013, intending to build trust and ensure safety for sex workers in Vancouver. Previously the focus of the police had been to target sex workers as well as clients. With the changed guidelines, police officers no longer targeted sex workers, except in cases of last resort (e.g., gang affiliations, human trafficking), although consistent with the previous law targeting clients and third parties remained in place [20]. At the Canadian federal level in December 2014 after a constitutional challenge, Bill C-36 *Protection of Communities and Exploited Persons Act* (S.C. 2014, c. 25) came into effect, officially making the purchasing of sex a criminal act; it resembles the Nordic model.

Previous studies indicate that this model might *increase* safety concerns for sex workers [13]. For example, when purchasing sex is criminalized and clients are targets of police officers, it is in the best interest of clients and sex workers to avoid police detection by rushing negotiations about services and charges, that are known to increase the likelihood of workplace violence [3]. In light of these concerns, beginning in December 2014, the VPD stopped targeting clients and third parties as well.

Given the serious and well documented harms associated with experiencing workplace violence among sex workers [14, 15], conducting research on the impact of the 2013 VPD guidelines offered potential to learn if the intended goals were achieved. An evaluation of the impact of the guidelines among street-based sex workers had previously shown that there were no differences in rates of physical or sexual violence in the year following the guidelines, compared to before the guidelines [21]. Our study extends this work by drawing on longer-term longitudinal data to assess rates of workplace violence before and after the 2013 policing guidelines change. Our study is also positioned to help identify sub-populations of sex workers at higher risk of experiencing workplace violence. Taking advantage of data from ongoing prospective cohorts of people who use drugs in Vancouver, we sought to identify trends and factors associated with reporting workplace violence amongst female sex workers in these cohorts, both before and after the 2013 VPD guideline change.

Methods

Study procedures

The Vancouver Injection Drug Users Study (VIDUS), the AIDS Care Cohort to evaluate Exposure to Survival Services (ACCESS), and the At-Risk Youth Study (ARYS) are ongoing open prospective cohorts of people who use illicit drugs. Participants in all these studies are recruited through self-referral and street outreach in Vancouver, British Columbia, Canada. These studies have been described in detail previously [22, 23]. Briefly, VIDUS enrolls HIV-negative adults (aged $\geq$ 18 years) who report injecting an illicit drug at least once in the month preceding

enrollment; ACCESS enrolls HIV-positive adults who report using illicit drugs (other than or in addition to cannabis) in the previous month. ARYS enrolls street-involved youth, defined as currently homeless or using services for homeless youth, aged 14–26 years who use illicit drugs (other than or in addition to cannabis) in the previous month. For all cohorts, other eligibility criteria include residing in the greater Vancouver region and providing written informed consent. The study instruments and all other follow-up procedures for each study are essentially identical to allow for combined analyses. At baseline and semi-annually thereafter, participants complete an interviewer-administered questionnaire eliciting socio-demographic data as well as information pertaining to drug use patterns, risk behaviors, and health care utilization. Participants receive a $30 (CDN) honorarium for each study visit. The University of British Columbia/Providence Healthcare Research Ethics Board provided ethical approval for all studies.

Study sample and primary outcome measure

Included in the present analysis are all female adult participants aged $\geq$ 18 years who completed study visits between December 1, 2008 and November 30, 2014, and who reported sex work (exchanging sex for gifts, food, clothing, shelter, money, or drugs) and resided within the VPD's jurisdiction in the previous 6 months at each follow-up. The primary outcome of interest was having reported workplace violence in the previous six months during a follow-up interview. This variable was ascertained from a question: "In the past 6 months, have you had a bad date?" In the questionnaire a 'bad date' was an all-encompassing term for when a client or predator posing as a client becomes violent. Each participant was also asked what happened the last time she experienced workplace violence. For the present study, we restricted the definition of workplace violence to having reported physical, sexual, or verbal violence, including abduction, rape, strangling, assault without weapon, assault with weapon, assault with a gun, attempted sexual assault, and verbal abuse. Participants were also asked: if they reported the workplace violence to anyone other than study staff during interviews, and if so to whom; if they received medical attention from anyone, and if so from whom; and if they received any counseling or talked to anyone about it, and if so to whom. Because the reports of workplace violence referred to anytime in the past six months, we excluded data collected between January 1st and June 30th of 2013 so that we could compare the time periods before and after the VPD guideline change that occurred in January 2013.

Study variables

Based on the literature [24, 25], we selected explanatory variables that we hypothesized might be associated with experiencing workplace violence. These included a time variable to compare the effect of interview dates (on and after 1 July 2013–30 November 2014 vs. before 1 January 2013). The period before 1 January 2013 referred to before the VPD guideline change, while on and after 1 July 2013 referred to the period after. Socio-demographic data included: age (per year

increase); self-reported white ancestry; and homelessness (no fixed address, sleeping on the street, couch surfing, or staying in a shelter or hostel). Drug use patterns in the previous six months included: daily heroin use; daily prescription opioid use; daily stimulant drug use (specifically powder or crack cocaine or crystal methamphetamine); binge drug use, defined as high-intensity drug use that exceeds normal patterns of consumption [26]; and heavy alcohol use, defined by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) as more than 3 drinks per day or more than 7 drinks per week for females [27]. Variables for health status and healthcare access included: ever diagnosed with a mental health disorder; HIV seropositivity; enrolled in drug or alcohol treatment; inability to access community health or social services (counselor, dentist, social worker, housing); and having been 'jacked up' (stopped, searched, or detained) by the police. Sex work related variables included: having 'serviced' clients (performed sexual acts) in public places; used drugs and/or alcohol with clients; ever used services specific for sex workers (mobile outreach, drop-in centers, food services) and protection strategies of only taking known clients; working out of home; and carrying a weapon including sharp household objects. All behavioral variables referred to the 6 months prior to the interview, unless otherwise stated, and were dichotomized as yes versus no.

Statistical analysis

As a first step, we examined the baseline sample characteristics stratified by reports of experiencing workplace violence, using the Pearson's Chi squared test (for binary variables) and Wilcoxon Rank Sum test (for continuous variables). Fisher's exact test was used when one or more of the cells contained expected values less than or equal to five.

Because analyses of factors potentially associated with experiencing workplace violence included serial measures for each participant, we used generalized estimating equation (GEE) with logit link that provided standard errors adjusted by multiple observations per person using an exchangeable correlation structure. Therefore, data from every participant follow-up visit were considered in this analysis. Because our study aimed to identify the set of variables that best explain a higher odds of reporting workplace violence, we used an a priori-defined backward model selection procedure based on examination of quasi-likelihood under the independence model criterion statistic (QIC) to fit a multivariable model. In brief, we first included all explanatory variables that were associated with reporting workplace violence in bi-variable analyses in a full model. After examining the QIC of the model, we removed the variable with the largest p value and built a reduced model. We continued this iterative process and selected the multivariable model with the lowest QIC value [28].

In a sub-analysis, we used descriptive statistics to examine specifically what happened the last time a participant experienced workplace violence, if and to whom she reported the workplace violence, if she received medical attention and from whom, and if she received counseling and if so from whom. All p-values are two sided. All statistical analyses were performed using RStudio, version 0.99.892 (R Foundation for Statistical Computing, Vienna, Austria).

Results

In total, 259 participants were eligible for the present study. Among this sample, 126 (48.6%) self-reported white ancestry, and the median age at baseline was 35.5 years (interquartile range [IQR] = 28.1–44.9). Overall, the 259 individuals contributed 767 observations to the analysis and were followed for a median of 6.9 months (IQR: 0–41.8). Of the 259 individuals, 54 (21.0%) reported a total of 70 incidents of workplace violence. The baseline characteristics of all participants stratified by reporting workplace violence are presented in Table 1.

The results of the bi-variable and multivariable GEE analyses of factors associated with experiencing workplace violence are presented in Table 2. As shown, in the final

Table 1 Baseline sample characteristics, stratified by reporting workplace violence in the past six months among female sex workers who use drugs in Vancouver, Canada ($n = 259$)

Characteristic	Reporting workplace violence[a]		Odds ratio (95% CI)	p value
	Yes *n* (%) 32 (12.4)	No *n* (%) 227 (87.6)		
Period before January 2013	21 (65.6)	174 (76.7)	1.72 (0.78–3.80)	0.176
On and after July 2013	11 (34.4)	53 (23.3)		
Age (median, IQR)	31 (25–44)	36 (30–45)	0.97 (0.94–1.00)	0.139
White	15 (46.9)	111 (48.9)	0.92 (0.44–1.94)	0.830
Homelessness[a]	19 (59.4)	89 (39.2)	2.25 (1.06–4.78)	0.032
Daily heroin use[a,b]	16 (50.0)	74 (32.6)	2.05 (0.97–4.33)	0.055
Daily prescription opioid use[a,b]	4 (12.5)	9 (4.0)	3.40 (0.72–13.23)	0.063
Daily stimulant use[a,b]	17 (53.1)	152 (67.0)	0.56 (0.26–1.18)	0.124
Binge drug use[a,b]	28 (87.5)	139 (61.2)	4.36 (1.45–17.69)	0.003
Heavy alcohol use [a,b]	6 (18.8)	35 (15.4)	1.25 (0.48–3.27)	0.644
Mental health disorder diagnosis ever	26 (81.2)	151 (66.5)	2.18 (0.86–5.53)	0.094
HIV-positive	8 (25.0)	81 (35.7)	0.62 (0.27–1.46)	0.271
Drug or alcohol treatment[a]	20 (62.5)	149 (65.6)	0.84 (0.39–1.81)	0.654
Inability to access community health or social services[a]	14 (43.8)	51 (22.5)	2.73 (1.26–5.91)	0.009
Jacked up by police[a]	13 (40.6)	50 (22.0)	2.42 (1.12–5.24)	0.022
Sex work in public[a]	25 (78.1)	125 (55.1)	2.83 (1.17–6.81)	0.016
Used drug with client[a]	20 (62.5)	144 (63.4)	0.96 (0.45–2.06)	0.918
Used services for sex workers ever	26 (81.2)	179 (78.9)	1.16 (0.45–2.98)	0.755
Only took known clients	2 (6.2)	64 (28.2)	0.17 (0.02–0.71)	0.008
Carry a weapon	9 (28.1)	44 (19.4)	1.63 (0.70–3.76)	0.251
Working out of home	1 (3.1)	25 (11.0)	0.26 (0.01–1.72)	0.219

CI confidence interval, *IQR* interquartile range

[a]Denotes activities in the previous six months

[b]Refers to any route of consumption (i.e., sniffing, snorting, smoking, or injecting)

Table 2 Bi-variable and multivariable GEE analysis of factors associated with reporting workplace violence among female sex workers who use drugs in Vancouver, Canada ($n = 259$)

Characteristic	Unadjusted		Adjusted	
	Odds ratio (95% CI)	p value	Odds ratio (95% CI)	p value
Interview date				
Before January 2013 versus After July 2013	1.09 (0.59–2.04)	0.780		
Age				
Per 10 years older	0.68 (0.50–.93)	0.015		
Ethnicity				
White versus other	0.82 (0.46–1.45)	0.500		
Homelessness[a]				
Yes versus no	2.89 (1.63–5.11)	< 0.001		
Daily heroin use[a,b]				
Yes versus no	2.32 (1.40–3.85)	0.001	1.99 (1.10–3.60)	0.023
Daily prescription opioid use[a,b]				
Yes versus no	2.23 (0.74–6.72)	0.153		
Daily stimulant use[a,b]				
Yes versus no	0.87 (0.50–1.52)	0.622	0.53 (0.29–0.97)	0.040
Binge drug use[a,b]				
Yes versus no	2.30 (1.24–4.24)	0.008	2.11 (1.05–4.25)	0.036
Heavy alcohol use[a,b]				
Yes versus no	0.95 (0.53–1.70)	0.868		
Mental illness diagnosis ever				
Yes versus no	1.40 (0.74–2.66)	0.305		
HIV-positive				
Yes versus no	0.74 (0.40–1.40)	0.358		
Drug or alcohol treatment[a]				
Yes versus no	0.99 (0.57–1.74)	0.977		
Inability to access community health or social services[a]				
Yes versus no	3.99 (2.31–6.87)	< 0.001	3.65 (2.15–6.19)	< 0.001
Jacked up by police[a]				
Yes versus no	3.24 (1.78–5.88)	< 0.001	2.42 (1.33–4.40)	0.004
Sex work in public[a]				
Yes versus no	2.62 (1.45–4.76)	0.001	2.19 (1.14–4.21)	0.019
Used drugs with client[a]				
Yes versus no	2.12 (1.22–3.68)	0.008		
Used services for sex worker ever				
Yes versus no	0.96 (0.40–2.32)	0.933		
Only took known clients				
Yes versus no	0.26 (0.13–0.52)	< 0.001	0.32 (0.15–0.70)	0.005
Carry a weapon				
Yes versus no	1.55 (0.87–2.76)	0.137		

Table 2 continued

Characteristic	Unadjusted		Adjusted	
	Odds ratio (95% CI)	*p* value	Odds ratio (95% CI)	*p* value
Working out of home				
Yes versus no	0.69 (0.32–1.51)	0.356		

GEE generalized estimating equations, *CI* confidence interval

[a]Denotes activities in the previous six months

[b]Refers to any route of consumption (i.e., sniffing, snorting, smoking, or injecting)

multivariable model, factors that remained independently associated with reporting workplace violence included: daily heroin use (adjusted odds ratio [AOR] 1.99, 95% CI 1.10–3.60), daily stimulant use (AOR 0.53, 95% CI 0.29–0.97), binge drug use (AOR 2.11, 95% CI 1.05–4.25), inability to access community health or social services (AOR 3.65, 95% CI 2.15–6.19), jacked up by police (AOR 2.42, 95% CI 1.33–4.40), sex work in public (AOR 2.19, 95% CI 1.14–4.21), and only taking known clients (AOR 0.32, 95% CI 0.15–0.70). Among individuals who experienced workplace violence, the community health or social services required—but which they were unable to obtain—included housing (18.5%), medical services (16.7%), drug treatment (14.8%), and dental services (9.3%). Additionally, the time period after the 2013 policy change was not significantly associated with experiencing workplace violence (OR 1.09, 95% CI 0.59–2.04).

In the sub-analysis, the top three descriptions of reported workplace violence included assaulted without weapon (47.1%), raped (28.6%), and strangled (11.4%) as shown in Table 3. Overall, participating women reported the majority of violent episodes to no one (50.0%), followed by reported to police (31.4%), and reported to a local drop-in center for female sex workers (20.0%), as shown in Table 4. After the workplace violence only women having made 21 (30.0%) reports received any medical attention, and going to the emergency room 17 (24.3%) was the most common response by far (Table 4). Additionally, the top three groups of individuals to whom participants talked about the workplace violence were friends (12.9%), counselors (10.0%), and family (8.6%) (Table 4).

Discussion

We found that approximately one-fifth of our study sample of female sex workers who used drugs experienced physical, sexual, or verbal workplace violence at least once during the study period. There was no significant change in reporting workplace violence before and after the VPD guideline change. The positive associations identified in the multivariable analysis appeared to speak largely to markers of intense substance dependence and social-structural vulnerability.

Our findings suggest that despite the 2013 VPD guideline change intended to increase safety for sex workers, there has been no statistically significant decrease in

Table 3 Type of workplace violence reported by female sex workers who use drugs in Vancouver, Canada ($n = 70$)

Type	Number of reports	% of reports
Assaulted without weapon	33	47.1
Raped	20	28.6
Strangled	8	11.4
Attempted sexual assault	5	7.1
Abducted	4	5.7
Assaulted with a weapon	2	2.9
Other (threatened, verbal abuse, aggressive)	14	20.0

Table 4 Descriptions for events following workplace violence reported by female sex workers who use drugs in Vancouver, Canada ($n = 70$)

Characteristic	Number of reports	% of reports
Individuals workplace violence was reported to		
No one	35	50.0
Police	22	31.4
Sex workers drop-in center	13	18.6
Hospital	6	8.6
Other sex workers	6	8.6
Health van	3	4.3
Other (e.g., a nurse)	4	5.7
Locations medical attention received		
None	49	70.0
Emergency room	17	24.3
Ambulance	2	2.9
Nurse	1	1.4
Drop-in clinic	1	1.4
Individuals participants spoke to regarding experience		
Friends	9	12.9
Counselor	7	10.0
Family	6	8.6
Other sex workers	5	7.1
Social workers	1	1.4
Nurse	1	1.4
Other (Victim services)	2	2.8

experiencing workplace violence among our sample. This is consistent with a previous study in Vancouver that found, eight months after the policy change, there was no statistically significant change in violence experienced by sex workers [21]. Although our findings suggest that the 2013 guideline change has not achieved the

intended goal of reducing workplace violence experienced by sex workers, our study period concluded in November 2014 and the VPD further updated their guidelines in December 2014 to no longer target clients and third parties. Additional research should be conducted using a longer time frame to account for this further policy shift.

Our finding that female sex workers who only took clients known to them were less likely to report workplace violence had not been specifically identified previously as a protection strategy, but previous studies have identified careful screening of clients as an effective risk reduction technique for sex workers [3, 29]. For sex workers who only see regular (known) clients, previous encounters without incident may have functioned as a similar safety screening procedure.

Our results indicate that daily heroin users were more likely to report workplace violence, while daily stimulant users were less likely to do so. This finding had not been previously identified either. Alcohol, a known depressant, has been positively associated with sexual workplace violence among sex workers [30]. Among men who inject drugs, frequent heroin injection was positively associated with being a victim of violence [31]. To avoid the painful symptoms of heroin withdrawal, there may be increased incentives to rush through pre-screening procedures that are known to protect sex workers from workplace violence [3]. Ensuring the availability and accessibility of opioid agonist therapy or prescription heroin/diacetylmorphine may potentially serve to reduce workplace violence among this vulnerable sub-population. In the province of British Columbia, opioid agonist therapies using methadone or buprenorphine–naloxone are generally made available with a low threshold. Still issues of access and adherence remain [32–34].

Female sex workers who reported inability to access community health or social programs likely represent some of the most vulnerable and marginalized people in the community. They may lack support service connections and a social safety net, a situation that has been previously associated with increased workplace violence [35]. This group of female sex workers will likely benefit the most from service provider policy changes to improve connections and remove barriers for vulnerable sex workers. To aid our study participants, interviewers were trained to identify those in need of services/support during each 6-month follow-up and to provide information on available resources in the community. Even so, our findings indicate a gap still exists in reaching those in need of services.

Consistent with previous studies [12, 25], we identified a positive and independent association between sex workers having serviced clients in public and having reported workplace violence. Police confrontations may encourage moving away from main streets and locations to ones with less pedestrian and vehicle traffic, where social safety networks of other sex workers is disrupted due to working in areas without other sex workers nearby. This may limit the effectiveness of the peer networks to keep a close watch over each other. Disruption of social safety networks has been shown to be associated with an increase in workplace violence [25]. Also, of great concern, sex workers who sought and serviced clients away from main streets due to policing have been more likely to be pressured into having unprotected sexual intercourse, exacerbating HIV risk [5]. In line with previous research that has shown the use of safer workspaces is critical to reducing

risks of violence; the results from this study reinforce this need [4, 5, 18]. A recent study demonstrated improvements in safety behaviors among female sex workers who used a brief 'trauma-informed intervention' [36], which included conversations around violence and HIV risk, harm reduction techniques, and normalization of violence support services. Provision of a safe indoor work environment (e.g., supportive private housing, brothels) may reduce vulnerabilities to workplace violence in this population [18].

This study has several limitations. First, the VIDUS, ACCESS, and ARYS cohorts are not random samples and therefore may not generalize to other populations of female sex workers who use drugs. These cohorts are comprised solely of those who use drugs and likely will not generalize to other populations of female sex workers. Second, data collection was based on self-report and thus could be subject to reporting bias, including socially desirable responses. Still, self-reported data have been shown to be largely accurate among adult drug-using populations [37]. Third, as with any observational research, unmeasured confounders may exist that we did not account for in our analyses. Fourth, while our study sample included only those residing in the VPD jurisdiction, some participants may have worked in other municipalities where police officers continue to target sex workers. This limitation may have masked a decrease in workplace violence within the VPD jurisdiction. We do note that our results were consistent with a previous study [21].

Conclusion

In summary, despite the 2013 guideline change by the VPD intended to increase safety for sex workers, our findings indicate that there was no statistically significant decrease in workplace violence reports after the change. Our findings also indicate that some sub-populations of female sex workers are more likely to report workplace violence, including those suffering from intense substance dependence. Given that full decriminalization of sex work has been recommended to reduce workplace violence and improve safety concerns for sex workers, this study adds further weight to calls for Canada to change federal laws in line with existing evidence.

Acknowledgements The authors thank the study participants for their contribution to the research, as well as current and past researchers and staff.

Funding The study was supported by the US National Institutes of Health (NIH) (U01DA038886, R01DA021525). This research was undertaken, in part, thanks to funding from the Canada Research Chairs program through a Tier 1 Canada Research Chair in Inner City Medicine which supports Dr. Evan Wood (Director, BC Centre on Substance Use, BC Centre for Excellence in HIV/AIDS and Professor, Department of Medicine, University of British Columbia), as well as a Canadian Institutes of Health Research (CIHR) Foundation Grant that supports Dr. Thomas Kerr (20R74326). Dr. Kanna Hayashi is supported by a CIHR New Investigator Award (MSH-141971) and a Michael Smith Foundation for Health Research (MSFHR) Scholar Award. Dr. Kate Shannon is partially supported by a Canada Research Chair in Global Sexual Health and HIV/AIDS and NIH (R0120R64007). Dr. M-J Milloy is supported by a CIHR New Investigator award, a MSFHR Scholar Award, and the US NIH (R01-

DA0251525). Dr. Kora DeBeck is supported by a MSFHR / St. Paul's Hospital Foundation–Providence Health Care Career Scholar Award and a CIHR New Investigator Award.

References

1. Potterat JJ, Brewer DD, Muth SQ, Rothenberg RB, Woodhouse DE, Muth JB, et al. Mortality in a long-term open cohort of prostitute women. Am J Epidemiol. 2004;159(8):778–85.
2. Moayedi-Nia S, Bayat Jozani Z, Esmaeeli Djavid G, Entekhabi F, Bayanolhagh S, Saatian M, et al. HIV, HCV, HBV, HSV, and syphilis prevalence among female sex workers in Tehran, Iran, by using respondent-driven sampling. AIDS Care. 2016;28(4):487–90.
3. Rekart ML. Sex-work harm reduction. Lancet. 2005;366(9503):2123–34.
4. Shannon K, Strathdee SA, Goldenberg SM, Duff P, Mwangi P, Rusakova M, et al. Global epidemiology of HIV among female sex workers: influence of structural determinants. Lancet. 2015;385(9962):55–71.
5. Shannon K, Strathdee SA, Shoveller J, Rusch M, Kerr T, Tyndall MW. Structural and environmental barriers to condom use negotiation with clients among female sex workers: implications for HIV-prevention strategies and policy. Am J Public Health. 2009;99(4):659–65.
6. World Health Organization. Prevention and Treatment of HIV and other Sexually Transmitted Infections for Sex Workers in Low- and Middle-income Countries. Recommendations for a public health approach. 2012. Available at: http://apps.who.int/iris/bitstream/10665/77745/1/9789241504744_eng.pdf. Accessed April 27, 2017.
7. Lutnick A, Cohan D. Criminalization, legalization or decriminalization of sex work: what female sex workers say in San Francisco, USA. Reprod Health Matters. 2009;17(34):38–46.
8. Armstrong L. Screening clients in a decriminalised street-based sex industry: insights into the experiences of New Zealand sex workers. Aust N Z J Criminol. 2014;47(2):207–22.
9. Abel G, Fitzgerald L, Brunton C. The impact of the Prostitution Reform Act on the health and safety practices of sex workers. Report to the Prostitution Law Review Committee, University of Otago, Christchurch. 2007. http://www.otago.ac.nz/christchurch/otago018607.pdf Accessed September 25, 2017.
10. Shannon K, Csete J. Violence, condom negotiation, and HIV/STI risk among sex workers. JAMA. 2010;304(5):573–4.
11. Choi SY, Chen KL, Jiang ZQ. Client-perpetuated violence and condom failure among female sex workers in southwestern China. Sex Transm Dis. 2008;35(2):141–6.
12. Schwitters A, Swaminathan M, Serwadda D, Muyonga M, Shiraishi RW, Benech I, et al. Prevalence of rape and client-initiated gender-based violence among female sex workers: Kampala, Uganda, 2012. AIDS Behav. 2015;19(Suppl 1):S68–76.
13. Deering KN, Amin A, Shoveller J, Nesbitt A, Garcia-Moreno C, Duff P, et al. A systematic review of the correlates of violence against sex workers. Am J Public Health. 2014;104(5):e42–54.
14. Prakash R, Manthri S, Tayyaba S, Joy A, Raj SS, Singh D, et al. Effect of physical violence on sexually transmitted infections and treatment seeking behaviour among female sex workers in Thane District, Maharashtra, India. PLoS ONE. 2016;11(3):e0150347.
15. Sherwood JA, Grosso A, Decker MR, Peitzmeier S, Papworth E, Diouf D, et al. Sexual violence against female sex workers in The Gambia: a cross-sectional examination of the associations between victimization and reproductive, sexual and mental health. BMC Public Health. 2015;15:270.
16. Jeal N, Salisbury C. Self-reported experiences of health services among female street-based prostitutes: a cross-sectional survey. Br J Gen Pract. 2004;54(504):515–9.
17. Patel SK, Ganju D, Prabhakar P, Adhikary R. Relationship between mobility, violence and major depression among female sex workers: a cross-sectional study in southern India. BMJ Open. 2016;6(9):e011439.
18. Krusi A, Chettiar J, Ridgway A, Abbott J, Strathdee SA, Shannon K. Negotiating safety and sexual risk reduction with clients in unsanctioned safer indoor sex work environments: a qualitative study. Am J Public Health. 2012;102(6):1154–9.
19. Canadian Public Health Association. Sex Work in Canada. 2014. http://www.cpha.ca/uploads/policy/sex-work_e.pdf Accessed February 10, 2017.

20. Vancouver Police Department. Sex work enforcement guidelines. 2013. http://vancouver.ca/police/assets/pdf/reports-policies/sex-enforcement-guidelines.pdf Accessed December 10, 2016.
21. Krusi A, Pacey K, Bird L, Taylor C, Chettiar J, Allan S, et al. Criminalisation of clients: reproducing vulnerabilities for violence and poor health among street-based sex workers in Canada-a qualitative study. BMJ Open. 2014;4(6):e005191.
22. Tyndall MW, Currie S, Spittal P, Li K, Wood E, O'Shaughnessy MV, et al. Intensive injection cocaine use as the primary risk factor in the Vancouver HIV-1 epidemic. AIDS. 2003;17(6):887–93.
23. Wood E, Stoltz JA, Montaner JS, Kerr T. Evaluating methamphetamine use and risks of injection initiation among street youth: the ARYS study. Harm Reduct J. 2006;3:18.
24. Semple SJ, Stockman JK, Pitpitan EV, Strathdee SA, Chavarin CV, Mendoza DV, et al. Prevalence and Correlates of client-perpetrated violence against female sex workers in 13 Mexican Cities. PLoS ONE. 2015;10(11):e0143317.
25. Shannon K, Kerr T, Strathdee SA, Shoveller J, Montaner JS, Tyndall MW. Prevalence and structural correlates of gender based violence among a prospective cohort of female sex workers. BMJ. 2009;339:b2939.
26. Miller CL, Kerr T, Frankish JC, Spittal PM, Li K, Schechter MT, et al. Binge drug use independently predicts HIV seroconversion among injection drug users: implications for public health strategies. Subst Use Misuse. 2006;41(2):199–210.
27. National Institute on Alcohol Abuse and Alcoholism. Rethinking Drinking: Alcohol and your health. https://www.rethinkingdrinking.niaaa.nih.gov/How-much-is-too-much/Is-your-drinking-pattern-risky/Whats-At-Risk-Or-Heavy-Drinking.aspx. Accessed March 17, 2017.
28. Pan W. Akaike's information criterion in generalized estimating equations. Biometrics. 2001;57(1):120–5.
29. Lim S, Peitzmeier S, Cange C, Papworth E, LeBreton M, Tamoufe U, et al. Violence against female sex workers in Cameroon: accounts of violence, harm reduction, and potential solutions. J Acquir Immune Defic Syndr. 2015;68(Suppl 2):S241–7.
30. Li Q, Li X, Stanton B. Alcohol use among female sex workers and male clients: an integrative review of global literature. Alcohol Alcohol. 2010;45(2):188–99.
31. Marshall BD, Fairbairn N, Li K, Wood E, Kerr T. Physical violence among a prospective cohort of injection drug users: a gender-focused approach. Drug Alcohol Depend. 2008;97(3):237–46.
32. Ahamad K, Hayashi K, Nguyen P, Dobrer S, Kerr T, Schutz CG, et al. Effect of low-threshold methadone maintenance therapy for people who inject drugs on HIV incidence in Vancouver, BC, Canada: an observational cohort study. Lancet HIV. 2015;2(10):e445–50.
33. Nosyk B, Marsh DC, Sun H, Schechter MT, Anis AH. Trends in methadone maintenance treatment participation, retention, and compliance to dosing guidelines in British Columbia, Canada: 1996–2006. J Subst Abuse Treat. 2010;39(1):22–31.
34. Damon W, Small W, Anderson S, Maher L, Wood E, Kerr T, et al. 'Crisis' and 'everyday' initiators: a qualitative study of coercion and agency in the context of methadone maintenance treatment initiation. Drug Alcohol Rev. 2017;36(2):253–60.
35. Hail-Jares K, Chang RC, Choi S, Zheng H, He N, Huang ZJ. Intimate-partner and client-initiated violence among female street-based sex workers in China: does a support network help? PLoS ONE. 2015;10(9):e0139161.
36. Decker MR, Tomko C, Wingo E, et al. A brief, trauma-informed intervention increases safety behavior and reduces HIV risk for drug-involved women who trade sex. BMC Public Health. 2017;18(1):75.
37. Darke S. Self-report among injecting drug users: a review. Drug Alcohol Depend. 1998;51(3):253–63 **discussion 67–8**.

Amy Prangnell B.Sc. is a Research Assistant with the BC Centre on Substance Use at the BC Centre for Excellence in HIV/AIDS and an MSc student at the University of British Columbia in the School of Population and Public Health.

Kate Shannon Ph.D. is Director of the Gender and Sexual Health Initiative at the BC Centre for Excellence in HIV/AIDS and an Associate Professor of Medicine and Associate Faculty in the School of

Population and Public Health at the University of British Columbia. She is Principal Investigator of longitudinal cohorts of street and off-street sex workers.

Ekaterina Nosova Ph.D. is Senior Statistician with the BC Centre on Substance Use at the BC Centre for Excellence in HIV/AIDS.

Kora DeBeck Ph.D. is a Research Scientist with the BC Centre on Substance Use at the BC Centre for Excellence in HIV/AIDS and Assistant Professor in the School of Public Policy at Simon Fraser University. She is Principal Investigator of the At-Risk Youth Study.

M.-J. Milloy Ph.D. is a Research Scientist with the BC Centre on Substance Use at the BC Centre for Excellence in HIV/AIDS and Associate Professor in the Department of Medicine at the University of British Columbia (Division of AIDS). He is Principal Investigator of the AIDS Care Cohort to Evaluate Exposure to Survival Services.

Thomas Kerr Ph.D. is the Associate Director of the BC Centre on Substance Use at the BC Centre for Excellence in HIV/AIDS, Director of Research at the BCCSU, and Associate Professor in the Department of Medicine at the University of British Columbia (Division of AIDS). He is Principal Investigator of V-DUS, a network study including the Vancouver Injection Drug Users Study and At-Risk Youth Study.

Kanna Hayashi Ph.D. is a Research Scientist with the BC Centre on Substance Use at the BC Centre for Excellence in HIV/AIDS, the St. Paul's Hospital Chair in Substance Use Research, and Assistant Professor in the Faculty of Health Sciences at Simon Fraser University. She is Principal Investigator of the Vancouver Injection Drug Users Study.

Reproduced with permission of copyright owner.
Further reproduction prohibited without permission.