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Police-Related Barriers to Harm Reduction Linked to Non-Fatal Overdose Amongst Sex Workers who use Drugs: Results of a Community-Based Cohort in Metro Vancouver, Canada

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Abstract

Background: High rates of overdose and overdose-related mortality in North America represent a pressing health and social concern. Women sex workers face severe health and social inequities, which have been linked to structural factors including negative police interactions; however, little is known regarding the burden of overdose or how policing impacts overdose risk amongst sex workers who use drugs. Given this, we aimed to explore the independent effects of experiencing police-related barriers to harm reduction on non-fatal overdose amongst women sex workers who use drugs in Metro Vancouver, Canada over a 7.5-year period.

Methods: Data were drawn from An Evaluation of Sex Workers Health Access (AESHA), a community-based open prospective cohort of women sex workers in Metro Vancouver, from 2010 to 2017. Using multivariate logistic regression with generalized estimating equations (GEE), we used a confounder modeling approach to identify the independent effect of experiencing police-related barriers to harm reduction strategies on non-fatal overdose amongst sex workers using drugs within the last six months at each study visit.

Results: Amongst 624 participants, 7.7% overdosed within the last six months at baseline and 27.6% overdosed during the study period, contributing 287 non-fatal overdose events over the 7.5-year period. 68.6% reported police-related barriers to harm reduction strategies during the study.

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Competing Interests

The authors have no competing interests to declare.

In a multivariate confounder model, exposure to police-related barriers to harm reduction strategies [AOR: 2.15, CI: 1.60 – 2.90] was independently associated with higher odds of non-fatal overdose after adjustment for key confounders.

Conclusions: Our findings suggest that in the context of the current overdose crisis, adversarial policing practices may undermine access to lifesaving overdose prevention services and exacerbate overdose risks for marginalized women. Findings underscore the urgent need to scale-up access and remove barriers to progressive harm reduction strategies for women sex workers.

Keywords

sex work; drug overdose; harm reduction; women; policing; criminalization

INTRODUCTION

The dramatic and sustained increase in rates of opioid-related overdose deaths seen in recent years across North America has been recognized as a pressing public health concern requiring an urgent response (Fairbairn, Coffin, & Walley, 2017; BC Gov News, 2016). Between 2012 and 2018 the rate of drug overdose deaths in British Columbia, Canada increased from 5.9 to 31.3 per 100,000 (BC Coroners Service, 2018b), prompting the declaration of the overdose crisis as a public health emergency in 2016 (BC Gov News, 2016). This increase has been driven largely by increased exposure to fentanyl or fentanyl analogues, both alone and in combination with other substances (e.g. other opioids or stimulants) largely resulting from a contaminated drug supply (Amlani et al., 2015; Baldwin et al., 2018; BC Coroners Service, 2018a; Tupper, McCrae, Garber, Lysyshyn, & Wood, 2018; Zoorob, 2019). The city of Vancouver, Canada has been particularly heavily impacted by the current overdose crisis, prompting the recent expansion and intensification of overdose prevention efforts such as increased naloxone distribution and drug checking programs (BC Coroners Service, 2018b; Government of British Columbia, n.d.; Tupper et al., 2018). Robust evidence is needed to better inform this response, particularly related to the gendered impacts of this crisis amongst marginalized women (BC Coroners Service, 2018b) (VanHouten, Rudd, Ballesteros, & Mack, 2019).

Previous studies across diverse global contexts have found that amongst people who use drugs, sex workers are disproportionately over-represented (Chettiar, Shannon, Wood, Zhang, & Kerr, 2010; Kerr et al., 2009) and have documented a high prevalence of drug use amongst women sex workers across diverse global contexts (Argento, Chettiar, Nguyen, Montaner, & Shannon, 2015; Azim, Bontell, & Strathdee, 2015; Odinokova, Rusakova, Urada, Silverman, & Raj, 2014; Shannon, Bright, Duddy, & Tyndall, 2005; Shannon et al., 2011). In a large, community-based cohort of women sex workers in Vancouver, Canada, 69.4% reported non-injection drug use and 40.0% used injection drugs within the last six months (Argento et al., 2015). The high prevalence of drug use amongst sex workers suggests that this population may be disproportionately burdened by the overdose crisis (Fairbairn, et al., 2008). Enhanced health and social inequities have been previously documented for sex workers who use drugs (Azim et al., 2015; Gjersing & Bretteville-Jensen, 2014; Spittal et al., 2006), including enhanced risk of HIV and other sexually transmitted and blood borne infections (STBBIs) (Azim et al., 2015; Shannon et al., 2018;

World Health Organization, 2016), poorer mental health outcomes, and mortality (Gjersing & Bretteville-Jensen, 2014; Spittal et al., 2010; Puri et al., 2017) – yet surprisingly little is known regarding overdose risk. Several studies have specifically described the ways in which gender-based inequities shape health and safety amongst women who use drugs (Argento et al., 2014; Boyd et al., 2018; Shannon et al., 2008), suggesting the importance of gendered responses to drug use; for example, the threat of gender-based violence (e.g. harassment or sexual assault) within drug use environments may discourage women from utilizing harm reduction services or strategies such as using drugs in the presence of others, indicating the need for sex worker-tailored interventions (Boyd et al., 2018; Shannon et al., 2008). Despite serious concern regarding the health and social harms of North America's current overdose crisis and the strong potential for disproportionate impacts amongst sex workers who use drugs, few studies have examined overdose risks faced by women sex workers.

This study draws on theoretical descriptions of structural factors influencing the health of marginalized populations, including the 'risk environment' (Rhodes, 2002, 2009) and structural determinants of health inequities in the context of sex work (Shannon et al., 2015; Shannon, Goldenberg, Deering, & Strathdee, 2014). Criminalization, adversarial and punitive police interactions, and other forms of structural marginalization (e.g., stigma) threaten the health and safety of sex workers by constraining their access to health and social services, including harm reduction (Baratosy & Wendt, 2017; Blankenship, Koester, 2002; Landsberg et al., 2017; Platt et al., 2018; Shannon et al., 2009); enhancing vulnerability to physical and sexual violence (Baratosy & Wendt, 2017; Blankenship, Koester, 2002; Krüsi et al., 2014; Platt et al., 2018); and reducing ability to negotiate safer sexual practices (Azim et al., 2015; Shannon et al., 2009). For example, previous work in Canada and globally has drawn connections between criminalized law enforcement interactions (e.g., harassment, surveillance, arrest), displacement to unsafe neighbourhoods or away from areas where health or harm reduction services may be concentrated, and reduced engagement in HIV prevention and harm reduction - the effects of which disproportionately burden sex workers who use drugs (Platt et al., 2018; M. E. Socías et al., 2015; Shannon et al., 2015; Lazarus et al., 2012; Shannon et al., 2005; Socías et al., 2016). However, there remains a scarcity of evidence describing how policing practices influence overdose risk among sex workers in North America and elsewhere.

In light of the dearth of evidence regarding the ways in which policing practices access shape overdose among marginalized women in the context of British Columbia's current overdose crisis, this study aimed to describe the prevalence of non-fatal overdose and to explore the independent effect of exposure to police-related barriers on non-fatal overdose among cohort of women sex workers who use drugs in Metro Vancouver, Canada over a 7.5-year period.

METHODS

Study Design

Longitudinal data for this study were drawn from an open prospective cohort, *An Evaluation of Sex Workers Health Access* (AESHA), from January 2010 - August 2017. This study was

developed based on substantial community collaborations with sex work agencies since 2005 and continues to be monitored by a Community Advisory Board of representatives of >15 community agencies (Shannon et al, 2007). Current eligibility includes identifying as a woman (trans- and cis-gender identifying women), being 14 years old or older at enrolment, having exchanged sex for money within the last 30 days, and providing written informed consent. To address challenges of recruiting stigmatized and hidden populations such as sex workers, time-location sampling is used to recruit participants through daytime and late-night (9pm–2am) outreach to outdoor/public sex work locations (e.g., streets, alleys) and indoor sex work venues (e.g., massage parlours, micro-brothels, and out-call locations) across Metro Vancouver, BC. In addition, online recruitment is used to reach sex workers working through online solicitation spaces. Indoor sex work venues and outdoor solicitation spaces ('strolls') are identified through community mapping conducted together with current/former sex workers and are updated regularly by the outreach team.

At enrolment and on a bi-annual basis, participants complete a questionnaire with a trained interviewer (both sex workers and non-sex workers). The questionnaire includes >200 detailed questions on topics related to individual socio-demographic characteristics (e.g. age, sexual and gender identity and orientation, ethnicity, physical and mental health, patterns of substance use), sex work history and patterns, social and community-level factors (e.g. social cohesion and support amongst sex workers), and structural factors. Questions on structural factors included physical and sexual workplace violence, work environment, criminalization, interactions with police (e.g., police harassment without arrest; police arrest; displacement by police; police-related barriers to harm reduction materials; rushed condom negotiations to avoid police; workplace inspections by police, immigration, or municipal inspections), and access to health and social services (e.g., unmet health needs; barriers to accessing diverse health and social services). The questionnaire is updated regularly in order to capture emerging and changing priorities and needs within the community. In addition, HIV/STI/HCV serology testing and treatment for STIs and active referrals to care and support are provided by a project nurse at each study visit.

All participants provide informed consent and receive an honorarium of $40 CAD at each bi-annual visit for their time, expertise and travel. The study holds ethical approval through the Providence Health Care/University of British Columbia and Simon Fraser University Research Ethics Boards.

Study Variables

Variables were selected a priori based on literature related to drug use and sex workers' health and safety, and variables for multivariable models were informed by findings of bivariate analyses. The primary exposure and outcome variables were time-updated variables measured as occurrences within the last six months at each bi-annual study visit. Additional variables of interest and potential confounders included in analysis were also time-updated, with the exception of Indigenous ancestry, gender identity, and sexual orientation, which were considered time-fixed variables.

Outcome variable: The outcome variable used in this analysis was “non-fatal overdose”, which was defined as responding “yes” to the question “In the last 6 months, have you overdosed by accident?”

Primary exposure variable: The primary exposure was a binary measure of whether or not a participant had experienced any barriers to harm reduction due to police presence. This was based on a single question, ‘in the last 6 months, have you experienced any barriers to harm reduction due to police presence?’ that was developed and piloted based on sex worker and community input regarding perceived concerns and reports of negative impacts of local policing practices on sex workers’ agency to engage in harm reduction strategies, including STBBI prevention and safer drug use. This exposure was of particular interest in this analysis since policing is an established determinant of sex workers’ sexual health and safety (Shannon et al, 2015; Platt et al, 2018), yet remains fairly poorly understood in the context of the current overdose crisis. Observations in which a participant selected one or more of the following response options provided were coded as ‘yes’: difficulty accessing drugs, syringes, or other harm reduction equipment; rushed smoke or injection; having new or used equipment taken away or broken by police; having money or drugs taken away by police (without arrest); being “jacked up”(e.g., harassed, targeted) by police; or ‘other’. Participants who responded that they had not experienced any police-related barriers to harm reduction were coded as ‘no’.

Potential confounders: Hypothesized individual and structural confounders were identified *a priori* based on previous literature and informed by bivariate analyses. These included the demographic variables age (continuous, in years), income (monthly income per $1,000 CAD), Indigenous ancestry (including First Nations, Metis, or Inuit), lifetime occurrence of mental health diagnosis by a health professional (e.g. anxiety, depression, post-traumatic stress disorder), minority gender identity (e.g. transgender, intersex, transsexual, two spirit, genderqueer, or other), and minority sexual orientation (e.g. gay, lesbian, bisexual, two spirit, queer, asexual, or other).

Types of drugs used, modes of administration, and frequency of drug use were considered as key confounders. These variables were selected based on documented associations between types of substances used (e.g., fentanyl, fentanyl analogues, and other opioids adulterated with fentanyl or its analogues), methods of use, and non-fatal overdose on drug-related harms (Fairbairn, Wood, et al., 2008; Kinner et al., 2012; Mayer et al., 2018) (Amlani et al., 2015; Baldwin et al., 2018). In light of serious concerns regarding a local drug supply contaminated with fentanyl/fentanyl analogues and high rates of poly-drug use in the current context, analyses focused on categories of drugs used, rather than individual substances. Analyses considered injection and non-injection use of opioids separately (e.g., heroin, diverted/nonmedical use of prescription opioids including fentanyl and street methadone)). We also considered injection and non-injection stimulant use separately (e.g., cocaine, crystal meth, crack cocaine, MDMA, diverted/nonmedical use of prescription stimulants). Factors related to drug use within intimate partnerships included use of drugs with intimate male partners and obtaining drugs for intimate male partners, and drug use with sex work clients was also examined. Factors related to drug use intensity included years of non-

injection and injection drug use and frequency of injection drug use (daily, weekly, less than weekly, none). Utilization of community-based (e.g. InSite, Vancouver's first supervised injection facility), women-specific (e.g. SisterSpace), and any overdose prevention services were also examined descriptively, as well as possession of take-home naloxone kits.

Potential structural confounder variables were selected based on previous literature and included unstable housing (e.g. single room occupancy housing, living with family or friends); primary place of service (outdoor/public spaces (e.g. street, public washroom, car, tent), informal indoor space (e.g. crack/drug house, sauna/steam bath, bar/nightclub, own or client's place of residence), or formal in-call space (e.g. massage/beauty parlor, micro-brothel); physical and/or sexual workplace violence (e.g. abduction, sexual assault, attempted sexual assault, rape, physical assault, trapped in car or room/hotel by aggressor posing as client); rushed drug use in an outdoor space ('always', 'usually', 'sometimes' or 'occasionally' rushing drug use in an outdoor space for any reason); and unmet needs for health services ('sometimes', 'occasionally' or 'never' having access to health services when needed).

In light of reported changes in the drug market (e.g., Fentanyl) and overdose patterns in BC during the study period and the potential confounding effect that this may have on the association of interest, 'interview year' (continuous, 2010–2017) was also considered as a confounder.

Statistical Analyses

Analyses were restricted to study visits where participants reported using non-injection (excluding alcohol and cannabis) or injection drugs within the last six months. Baseline individual and structural characteristics were stratified by the outcome variable and compared using Pearson's chi-squared test for categorical variables (in the case of small cell counts, Fisher's exact test was used in place of Pearson's chi-squared test) and the Wilcoxon rank-sum test for continuous variables. We began with bivariate logistic regression using generalized estimating equations (GEE) with an exchangeable correlation matrix (Diggle, Heagerty, Liang, & Zeger, 2013) to examine associations between the independent variable of interest, hypothesized confounders and non-fatal overdose over the study period. GEE was used to account for repeated measurements amongst participants over time.

Based on bivariate findings and a priori literature, we developed a multivariate confounder model using logistic regression with GEE to identify the independent effect of experiencing police-related barriers to harm reduction on the odds of non-fatal overdose. Hypothesized confounders that were significantly associated with the outcome at $p<0.10$ in bivariate analysis were included in the full model and included interview year, income, sexual orientation, workplace violence, mental health diagnosis, use of injection opioids, use of non-injection opioids, place of service, and use of injection stimulants. Using the process described by Maldonado and Greenland (Maldonado & Greenland, 1993), potential confounders were removed in a stepwise manner, and variables that altered the association of interest by <5% were systematically removed from the model. All statistical analyses were performed in SAS version 9.4 (SAS, Cary, NC), 95% confidence intervals are presented and all p-values are two-sided.

RESULTS

Analyses were restricted to 624 participants who reported using injection or non-injection drugs during the study, who contributed 3703 observations and a median of 5 study visits (IQR 2 – 9) where they used drugs in the last six months. Amongst this sample, 7.7% reported non-fatal overdose within the last six months at baseline and over one-quarter (27.6%) experienced at least one non-fatal overdose over the 7.5-year study period, contributing a total of 287 non-fatal overdose events reported.

At baseline (Table 1), participants' median age was 34 (IQR 27–42) and 52.7% were of Indigenous ancestry. 7.9% of participants identified as a gender minority (e.g. transgender, intersex, transsexual, two spirit, genderqueer, or other) and 43.4% identified as a minority sexual orientation. Almost two-thirds (62.3%) had previously been diagnosed with a mental health issue (e.g. depression, anxiety, schizophrenia, post-traumatic stress disorder). Over half serviced clients in outdoor/public spaces, and almost one-quarter (22.6%) reported workplace physical/sexual violence by aggressors posing as clients in the last 6 months.

Over the 7.5-year study period, almost two-thirds of participants had used non-injection opioids (Table 2), primarily non-injection diverted prescription opioids and heroin. Almost all participants (96.3%) had used non-injection stimulants, primarily crack cocaine use, cocaine use, and crystal meth. Approximately two-thirds had used injection opioids, including heroin and diverted prescription opioids; and just over half reported using injection stimulants, primarily cocaine and crystal meth.

Over the study period, over two-thirds (68.6%) reported police-related barriers to harm reduction strategies (e.g., syringe confiscation), contributing 1248 events (Table 3). Among participants who reported exposure to policing practices that were perceived to pose barriers to engagement in harm reduction strategies, the most commonly reported barriers included difficulty accessing drugs, rushed smoke or injection, police confiscation of used or new harm reduction equipment, being 'jacked up' (e.g., searched, harassed) by police, or reporting that policing activity resulted in difficulty accessing sterile harm reduction equipment.

In a sub-analysis of descriptive data amongst participants who responded to questions on new/emerging overdose prevention services between March and August 2017 (n=217), 129 (58.5%) recently used any overdose prevention services over the 6-month follow-up period (e.g., supervised injection, naloxone); nearly half accessed community-based overdose prevention services (e.g. InSite) and 80.2% (n=174) reported possession of take-home naloxone.

In bivariate analysis (Table 4), variables significantly associated with increased odds of non-fatal overdose over the study period included having a mental health diagnosis and identifying as a minority gender/sexual orientation. Patterns of drug use associated with increased odds of non-fatal overdose were use of injection opioids, injection stimulants, and non-injection opioids; injecting drugs daily, weekly, or less than weekly, compared to no injection drug use; and providing drugs for an intimate male partner. Use of non-injection stimulants was associated with lower odds of non-fatal overdose. Experiencing police-

related barriers to harm reduction strategies was significantly associated with non-fatal overdose (OR: 1.72; CI: 1.34 – 2.20), as were other structural variables including experiencing unmet needs for health services; exposure to physical and/or sexual workplace violence; and having to rush one's drug use in an outdoor space. Interview year (i.e., a proxy for time) was also associated with elevated odds of non-fatal overdose.

In a multivariate GEE confounder model, exposure to police-related barriers to harm reduction strategies (Table 5) was independently associated with increased odds of non-fatal overdose (AOR: 2.15; CI: 1.60 – 2.90), after adjustment for key confounders (e.g., interview year, frequency of injection drug use, non-injection opioid use, workplace violence).

DISCUSSION

Amidst BC's ongoing overdose crisis (BC Coroners Service, 2018a), our study found that sex workers in Metro Vancouver, Canada face a high burden of non-fatal overdose, with almost one in three sex workers who use drugs in this study experiencing at least one non-fatal overdose over a 7.5-year period. Experiencing police-related barriers to harm reduction strategies was linked to an over two-fold increased odds of non-fatal overdose after adjustment for time and other key confounders. The association between police-related barriers to harm reduction and overdose among women sex workers suggests that even in a setting of progressive harm reduction and overdose prevention interventions, persistent inequities related to policing and its impact on marginalized women's agency to engage in harm reduction may continue to limit the reach and impact of such interventions. This study provides new evidence regarding the impacts of the current overdose crisis among sex workers, and adds to growing evidence documenting severe structural barriers to critically needed health and harm reduction services for sex workers (Bodkin et al., 2015; King et al., 2013; Lazarus et al., 2012; Shannon et al., 2005; E. M. Socías et al., 2016), particularly those who use drugs (Azim et al., 2015; Bodkin et al., 2015; King et al., 2013; Vancouver Coastal Health, 2016).

Previous literature has documented deleterious effects of criminalization and policing on HIV/STI risk, violence, and ability to engage in harm reduction strategies (e.g. client screening and condom negotiation) amongst sex workers, resulting in pronounced health inequities (Baratosy & Wendt, 2017; Blankenship & Koester, 2002; Krüsi et al., 2014; Landsberg et al., 2017; Shannon et al., 2009). Sex workers who use drugs may face enhanced targeting, harassment, surveillance, and arrest by law enforcement, in part due to their overlapping engagement in both sex work and drug use, both of which are highly criminalized and stigmatized; the threat of criminalization has been shown to undermine ability to adequately screen clients, negotiate safer sex practices, access health and social services, or access safer workspaces (Baratosy & Wendt, 2017; Blankenship & Koester, 2002; Krüsi et al., 2014; Landsberg et al., 2017; Shannon et al., 2009; Shannon et al, 2015). Our findings build on this evidence base and provide unique evidence regarding the ways in which law enforcement interactions shape nonfatal overdose risk among sex workers who use drugs in Metro Vancouver.

Our findings indicate the urgent need to scale-up sex worker-friendly harm reduction and overdose prevention supports to mitigate overdose risk. There remains a critical need for sex worker-friendly harm reduction services that are gender-sensitive, trauma-informed, and peer-led. A best practice example that could be adapted to other settings is the San Francisco-based St. James Infirmary – a unique peer-based occupational health and safety clinic that supports trauma-informed and gender-sensitive care, advocacy, and social justice for sex workers (St. James Infirmary, 2017). A 2016 report exploring gendered barriers to health services in Vancouver's Downtown Eastside identified critical gaps in harm reduction and other services for women and sexual/gender minorities. Indeed, global research suggests that women tend to be under-represented and less visible within harm reduction and overdose prevention services (Boyd et al., 2018; Iversen, Page, Madden, & Maher, 2015). Addressing barriers to these services is necessary to mitigate immediate harms such as overdose or infection risk, and provide sanctuary from violence that women often face within street-based drug use environments (Boyd et al., 2018; Fairbairn, Small, Shannon, Wood, & Kerr, 2008). In the context of British Columbia's persistent overdose crisis, current overdose prevention services such as naloxone distribution and drug-checking (Laing, Tupper, & Fairbairn, 2018; Tupper et al., 2018) could be tailored towards sex workers' needs through peer-based approaches or delivery by sex work support organizations. Innovative, sex worker-led approaches to harm reduction supplies (e.g. peer-delivered equipment, drug testing kits, naloxone), information, and referrals should also be explored. Anti-stigma and peer-led approaches, drop-in hours, mobile service delivery, harm reduction, and violence supports are particularly promising strategies for overcoming barriers to existing services (Bodkin et al., 2015; Janssen et al., 2009; Kim et al., 2015; The Women's Coalition, 2014). Encouragingly, over half of participants in sub-analysis accessed overdose prevention services and over three-quarters possessed take-home naloxone. In Vancouver, a unique women-only overdose prevention site opened in 2017, representing the first facility of its kind in Vancouver and one of few worldwide (Centre for Excellence in Women's Health, n.d.); future evaluation efforts are needed to evaluate impacts over time. In addition, initiatives that offer safe, non-judgmental, destigmatizing, peer-based supports have proven successful at improving service access and safety amongst sex workers and people who use drugs (Argento et al., 2016; Bardwell, Kerr, Boyd, & McNeil, 2018; Febres-Cordero et al., 2018; Kerrigan et al., 2015; St. James Infirmary, 2017).

To sustainably address the 'upstream' determinants of barriers to health and harm reduction services faced by sex workers, broader structural reforms are needed - including decriminalization of all aspects of sex work and more progressive policing practices related to sex work and drug use (e.g., non-harassment policies, shifting policing practices away from areas where health and social supports for marginalized populations are located). Sex workers across Metro Vancouver continue to report high rates of police harassment and surveillance – particularly in adjacent municipalities (e.g., Surrey) where progressive sex work and harm reduction programmes (e.g., overdose and HIV/STI prevention outreach services, sex worker drop-in spaces) been slower to roll out than in the city of Vancouver. Enforcement of criminalized sex work laws has been shown to displace sex workers from harm reduction services and supports, provide police with broad latitude to surveil, target, and harass sex workers on various charges (e.g., drug-related, loitering) and reinforce sex

work-related stigma and marginalization, and disproportionately impacts sex workers who use drugs (Shannon et al, 2015; Shannon et al, 2007; Platt et al, 2018). As such, leading global health organizations (e.g., UNAIDS, Amnesty International) support decriminalization as a best practice for enabling the realization of sex workers' human and labour rights (Amnesty International, 2016; World Health Organization, 2012).

Strengths/Limitations

Several potential limitations should be noted when interpreting results of this study. Although observational research designs do not permit causal inferences, this study examined unique data from a prospective, 7.5-year cohort to understand the links between police related barriers to harm reduction and non-fatal overdose amongst women sex workers who use drugs – a population at high risk of overdose, yet frequently overlooked in research on drug use (Boyd et al., 2018; Iversen et al., 2015). As in many other settings, given the stigmatized and criminalized nature of sex work, there are no official registries of sex workers in Vancouver against which to assess the representativeness of our sample, our open cohort is recruited using time-location sampling, a probability-based recruitment approach for reaching hard-to-reach populations, in conjunction with ongoing community-based outreach and strong community partnerships, resulting in a large cohort of sex workers representing diverse work environments, neighbourhoods, and drug use contexts. Future mixed-methods studies on this topic are recommended to provide deeper insight into how sex workers' experiences of criminalization and policing relate to overdose risks and engagement with harm reduction and overdose prevention services over time. In light of the stigma associated with sex work and with drug use, it is possible that findings could be influenced by social desirability bias. Our community-based research approach, including trained experiential (sex workers) and community-based interviewers with experience with building rapport and asking questions in a non-judgmental fashion, and ongoing outreach and semi-annual follow-up with participants, is designed to maintain community connections and rapport, address stigma, and ensure that research topics and questions are reflective of sex workers' needs and priorities.

CONCLUSION

The current findings suggest that sex workers in Metro Vancouver are heavily impacted by the persistent overdose crisis in North America; nearly a third of sex workers who use drugs experienced a non-fatal overdose over the study period, and policing practices perceived to impede access to harm reduction strategies were linked to enhanced non-fatal overdose risk. Findings suggest an urgent need to address criminalized police interactions, implement progressive policing practices that create enabling environments for harm reduction and overdose prevention, and scale-up sex worker and women-friendly progressive harm reduction and overdose prevention services to mitigate drug-related harms and promote health among sex workers who use drugs.

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TABLE 1.

Baseline sample characteristics of a community-based cohort of women sex workers who use drugs in Metro Vancouver, Canada, 2010–2017 (n = 624)

Characteristic	Total (%) (n = 624)	Non-Fatal Overdose*		p - value
		Yes (%) (n = 48)	No (%) (n = 576)	
Age, *years* (med, IQR)	34 (27 – 42)	31 (23 – 40)	34 (28 – 42)	0.029
Monthly income, *per $1000 CAD* (med, IQR) *‡	2.9 (1.7 – 5.5)	4.9 (2.3 – 8.8)	2.8 (1.7 – 5.1)	0.005
Indigenous ancestry	329 (52.7)	29 (60.4)	300 (52.1)	0.267
Minority gender identity	49 (7.9)	7 (14.6)	42 (7.3)	0.089
Minority sexual orientation	271 (43.4)	22 (45.8)	249 (43.2)	0.734
Mental health diagnosis †	389 (62.3)	38 (79.2)	351 (60.9)	0.012
Primary place of service *				
Outdoor/public space	328 (52.6)	27 (56.3)	301 (52.3)	
Informal indoor	238 (38.1)	18 (37.5)	220 (38.2)	
Brothel/quasi-brothel	36 (5.8)	1 (2.1)	35 (6.1)	
N/A no recent sex work	7 (1.1)	0 (0.0)	7 (1.2)	0.580
Workplace physical/sexual violence *	141 (22.6)	20 (41.7)	121 (21.0)	<0.001

All data refer to n (%) of participants unless otherwise specified

* In the last 6 months

† In lifetime

‡ Income from all sources, including government allowances

TABLE 2.

Drug use practices across the study period amongst women sex workers who use drugs in Metro Vancouver, Canada, 2010–2017 (n = 624)

Type of drug use	Total participants* (%) (n = 624)	Total events (n = 3703)
Non-injection opioids	378 (60.6)	904
Non-injection diverted prescription opioids	273 (43.8)	505
Non-injection heroin	249 (39.9)	571
Non-injection stimulants	601 (96.3)	3155
Non-injection crack cocaine	535 (85.7)	2758
Non-injection cocaine	301 (48.2)	589
Non-injection crystal methamphetamine	285 (45.7)	757
Injection opioids	394 (63.1)	1913
Injection diverted prescription opioids	173 (27.7)	343
Injection heroin	385 (61.7)	1878
Injection stimulants	339 (54.3)	1397
Injection crack cocaine	80 (12.8)	113
Injection cocaine	258 (41.4)	819
Injection crystal methamphetamine	251 (40.2)	895

*Total # of participants who reported the type of drug use at least once in the last 6 months at baseline or any follow-up visit during the study period (2010–2017)

TABLE 3.

Experiences of police-related barriers to harm reduction across the study period amongst women sex workers who use drugs in Metro Vancouver, Canada, 2010 – 2017 (n = 624)

Type of barrier	Total participants* (%) (n = 624)	Total events (n = 3703)
Any police-reported barrier to harm reduction	428 (68.6%)	1248
Difficulty accessing drugs	347 (55.6)	831
Rushed smoke	271 (43.4)	529
Rushed injection	189 (30.3)	358
Police took away/broke used equipment	172 (27.6)	260
Jacked up by police	163 (26.1)	246
Police took away money or drugs	128 (20.5)	174
Police took away/broke new equipment	118 (18.9)	164
Difficulty accessing other drug equipment	95 (15.2)	136
Difficulty accessing clean rigs	59 (9.5)	84
Other barriers	16 (2.6)	16

*Total # of participants who reported the type of barrier at least once in the last 6 months at baseline or any follow-up visit during the study period (2010–2017)

TABLE 4.

Bivariate logistic regression analysis using generalized estimating equations (GEE) for associations between individual and structural factors and non-fatal overdose amongst women sex workers who use drugs in Metro Vancouver, Canada, 2010–2017 (n = 624)

Characteristic	Odds Ratio (95% CI)	p - value
Primary exposure of interest		
Police-related barriers to harm reduction strategies *	1.72 (1.34 – 2.20)	<0.001
Other individual and structural variables		
Demographics		
Age, per year older	0.99 (0.97 – 1.01)	0.375
Average monthly income, per $1000 Canadian Dollars (CAD) *‡	1.02 (1.00 – 1.05)	0.066
Indigenous ancestry	1.22 (0.87 – 1.70)	0.256
Minority gender/sexual orientation †	1.36 (0.98 – 1.89)	0.068
Mental Health Diagnosis °	2.39 (1.63 – 3.51)	<0.001
Interview year	1.22 (1.14 – 1.31)	<0.001
Substance Use Patterns		
Injection opioid use *	2.87 (2.13 – 3.88)	<0.001
Non-injection opioid use *	1.54 (1.17 – 2.02)	0.002
Injection stimulant use *	2.26 (1.69 – 3.02)	<0.001
Non-injection stimulant use *	0.73 (0.51 – 1.06)	0.095
Frequency of injection drug use *		
None	-	-
Less than weekly	2.45 (1.54 – 3.89)	<0.001
Weekly	2.20 (1.38 – 3.51)	<0.001
Daily	3.89 (2.70 – 5.60)	<0.001
Years of non-injection drug use	1.00 (0.98 – 1.02)	0.880
Years of injection drug use	1.01 (0.99 – 1.02)	0.513
Provide drugs for intimate male partner *	1.39 (1.03 – 1.87)	0.030
Use drugs with intimate male partner *	1.13 (0.87 – 1.47)	0.350
Use drugs with client *	1.18 (0.90 – 1.54)	0.228
Structural factors		
Primary place of service *		
Outdoor/public space (ref)	-	-
Informal indoor	0.94 (0.73 – 1.22)	0.653
Brothel/quasi-brothel	0.17 (0.03 – 1.13)	0.067
N/A no recent sex work	0.87 (0.59 – 1.27)	0.470
Physical and/or sexual workplace violence *	2.08 (1.47 – 2.94)	<0.001
Rushed drug use in outdoor space *	1.29 (1.01 – 1.64)	0.040
Current unstable housing	1.24 (0.93 – 1.65)	0.140

Characteristic	Odds Ratio (95% CI)	*p* - value
Unmet needs for health services *	1.66 (1.18 – 2.34)	0.004

* Time updated measure using the last six months as a reference

† Combined variable capturing minority gender identity and sexual orientation

° Time updated lifetime measure

ǂ Income from all sources, including government allowances

TABLE 5.

Multivariate GEE confounder model for the independent association between police-related barriers to harm reduction strategies and non-fatal overdose amongst women sex workers who use drugs in Metro Vancouver, Canada, 2010–2017 (N=624)

	Adjusted Odds Ratio (95% CI)	*p* - value
Police-related barriers to harm reduction strategies [*†]	2.15 (1.60 – 2.90)	<0.001

[*] Time updated measure using the last six months as a reference

[†] Adjusted for physical/sexual workplace violence*, frequency of injection drug use*, use of non-injection opioids*, and interview year. Other variables considered, but which fell out of the multivariable model, included place of service, mental health diagnoses, injection opioid use, and injection stimulant use.