

Research paper

# Mapping violence and policing as an environmental–structural barrier to health service and syringe availability among substance-using women in street-level sex work

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## Abstract

**Background:** Within street-based sex work and substance-using populations, there is growing evidence to support the role of place, both physical setting and social meanings attached to place, in mediating the effectiveness and reach of health and harm reduction services.

**Methods:** Social mapping was used to explore how health service and syringe availability may be impacted at the geographic level by avoidance of physical settings due to violence and policing among women in street-level sex work. Through a community-based research partnership and extensive peer-led outreach over a 6-month period, women were invited to participate in interview-questionnaires and mapping of their community, working conditions, and access to resources. Results were compiled used ArcGIS software and GIS street maps. In secondary analysis, logistic regression was used to model the geographic association (using likelihood ratio and significance at  $p < 0.05$ ) and stratified models were run to assess differential patterns of avoidance based on age, ethnicity and drug use.

**Results:** The findings reveal a significant geographic relationship between a heavily concentrated core area of health and syringe availability and avoidance of physical settings due to violence and policing by 198 women in street-level sex work in Vancouver, Canada. Of particular concern, this correlation is significantly elevated among younger and Aboriginal women, active injection drug users, and daily crack cocaine smokers, suggesting significant environmental–structural barriers to interventions among these vulnerable populations.

**Conclusions:** The resultant displacement of sex work to primarily industrial settings and side streets pushes women further from health and social supports and reduces access to safer injection and drug use paraphernalia. This study offers important evidence for environmental–structural level prevention and safer environment interventions, supported by legal reforms, that facilitate safer sex work environments, including spatial programming, peer-based prevention, outreach and mobile resources, and peer-supervised safer sex work settings.

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**Keywords:** Sex work; Harm reduction; Violence; Policing; Syringe exchange access; Safer environment interventions

## Introduction

There has been an increasing focus in public health on the environmental–structural context of health care access and HIV prevention. Mapping is a tool traditionally applied to understanding the distribution and geographic characteristics of diseases such as Lyme disease and tuberculosis, or trends in infant mortality (Glass et al., 1995; Hightower & Klein, 1995;

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Latkin, Glass, & Duncan, 1998), however there has been growing support for its application and consideration of place and context in the HIV and harm reduction realm (Ferguson & Morris, 2007; Fulcher & Kaukinen, 2005; Kaulkinen & Fulcher, 2006; Weir et al., 2003). In North America, mapping has been used to explore the location of HIV services and clustering of neighbourhood level characteristics with findings suggesting significant correlation between inaccessible neighbourhoods and socioeconomic disadvantage, such as immigrant and visible minority populations (Fulcher & Kaukinen, 2005; Kaulkinen & Fulcher, 2006). Similarly, among a young African American male population, mapping of HIV prevention services revealed that areas where young Black men who have sex with men (MSM) both reside and report high rates of unprotected sex corresponded to low HIV service density areas (Pierce, Miller, Morales, & Forney, 2007). While in Cape Town, mapping was used to identify condom availability, as well as sites of new sexual partners for targeted HIV prevention (Weir et al., 2003).

Within sex work populations internationally, mapping of transactional truck spots along the Northern Corridor Highway in Kenya revealed several geographic “hotspots” where sex work transactions were concentrated that supported programming for “vulnerable places” as well as vulnerable groups (Ferguson & Morris, 2007). In South Africa, mapping identified significant heterogeneity of HIV prevalence among pregnant women in Hlabisa health district that correlated with proximity of homestead in each clinic catchment to primary and secondary roads (Tanser, Lesueur, Solarsh, & Wilkinson, 2000). This finding suggested that communities with better access to transport routes were at higher risk for HIV transmission, potentially due to increased mobility and concentration of transactional sex along transport routes. Research among sex work populations in Mexico examined the mobility and spatial concentration of commercial sex workers by municipalities in relation to HIV and STD vulnerability and found more vulnerable groups of illegal immigrant women from Central America working in cities along the international border, while women from Mexico were working in cities more centrally located (Uribe-Salas, Conde-Glez, Juarez-Figueroa, & Hernandez-Castellanos, 2003). In Estonia, although sex work was traditionally concentrated spatially in red light districts, mapping revealed commercial sex work to have dispersed across the city and residential neighbourhoods (Aral, St. Lawrence, & Uruskula, 2006).

Within sex work and substance-using populations, understanding the role of place, both physical setting and social meanings attached to place, have important policy and intervention implications, with growing evidence suggesting the need to refocus harm reduction towards environmental–structural context and safer environment interventions, in addition to individual behavioural change (Kerrigan et al., 2006; Latkin & Knowlton, 2005; Parker, Easton, & Klein, 2000; Rhodes et al., 2006; Sherman, German, Cheng, Marks, & Bailey-Kloche, 2006; Zierler &

Krieger, 1997). In epidemiological analyses, among injection drug users (IDUs), unstable housing and homelessness have been shown to be associated with elevated rates of drug-related harms and vulnerability to HIV infection (Corneil et al., 2006). Within public injecting environments both in Vancouver and elsewhere, police presence has been associated with increased drug-related harms, including rushed injections and syringe sharing (Aitken, Moore, Higgs, Kelsall, & Kerger, 2002; Best, Strang, Beswick, & Gossop, 2001; Bluthenthal, Kral, Lorvick, & Watters, 1997; Csete & Cohen, 2003; Maher & Dixon, 1999; Small, Kerr, Charette, Schechter, & Spittal, 2005; Wood et al., 2003). In addition, enhanced surveillance and police crackdowns have been shown to deter access to syringe exchange programs and displace drug users to outlying areas, resulting in a redistribution of harms (Aitken et al., 2002; Bluthenthal et al., 1997; Maher & Dixon, 1999; Small et al., 2005; Wood et al., 2003). The adverse impacts of enforcement-based policies among IDUs have been consistently reported, including reports of unlawful harassment and confiscation of drug use paraphernalia, particularly among women (Cooper, Moore, Gruskin, & Krieger, 2004; Csete & Cohen, 2003). Furthermore, significant ethnographic work has focused on how the built environment is defined by both the social and physical meanings ascribed to place, such as the meaning a drug user attaches to a place due to previous adverse interactions with police (Rhodes et al., 2006).

In Canada and other settings with criminalised prostitution environments, substance-using women in street-level sex work experience multiple health and drug-related harms and are subject to heavy policing and high rates of violence and exploitation (Day & Ward, 2007; Goodyear & Cusick, 2007; Lowman, 2004) that likely mediate the impact of harm reduction and HIV prevention efforts through existing spatial relations. Similar to other prohibitive sex work environments, such as the United Kingdom (Hubbard & Sanders, 2003), while sex work itself is legal, enforcement strategies and prohibitive laws on communicating in public spaces for the purposes of sexual transaction have effectively concentrated sex work in defacto tolerance zones in outlying and industrial settings in Vancouver, Canada. These defacto tolerance zones operate under unwritten rules of engagement between police, sex workers, and clients, are exposed to periodic police crackdowns, high rates of violence, exploitation and harassment of sex workers (Day & Ward, 2007; Goodyear & Cusick, 2007; Lowman, 2004). Furthermore, the ‘bawdy house provisions’ (s210 and 211) and procuring provision (s212) prohibit operating a common bawdy house or living off the avails of prostitution thereby reducing the opportunities for sex workers to move indoors to supervised or cooperative settings (Goodyear, Lowman, Fischer, & Green, 2005; Lowman, 2004). Despite alarming rates of violence faced by women in street-level sex work in criminalised prostitution environments over the last decade, HIV prevention and harm reduction have largely focused on injection drug use, and current public health and policy responses both locally and

nationally have failed to develop targeted strategies aimed at reducing the harms faced by substance-using women in street-level sex work (Cler-Cunningham, 2001).

Elucidating the environmental–structural factors that act as barriers and facilitators to health and syringe availability is crucial in developing targeted interventions and policies that reduce the harms faced by sex workers. We therefore sought to explore the relationship between health service and syringe availability and avoidance of physical settings due to recent violence and policing at the geographic level.

## Methods

The Maka Project is a community-based HIV prevention research partnership that has been described in detail elsewhere (Shannon et al., 2007). Both the community partner and peer research team (women with a lived experience of survival sex work) were involved in the conception, design and implementation of the research. Survival sex work refers to the exchange of sex for money, drugs, or shelter as a means of basic subsistence. Based on initial pilot mapping sessions, approximately 200 women were invited in 2006 to participate in interview-administered questionnaires and mapping through targeted outreach to sex work strolls and time-space sampling strategies (93% response rate). All women who use substances within the last 6 months (not including Cannabis) and were actively engaged in survival sex work were invited to participate. Interview-questionnaires, administered by trained peer researchers elicited responses related to demographics, health and addiction service use, violence and safety concerns, local policing and sexual and drug-related harms. All mapping and geographic analyses are based on data from 198 women who participated in both mapping and baseline interview-questionnaires.

Social mapping has been previously shown to be a successful participatory-action research tool that facilitates community access and highlights local expertise among young injection drug users in Australia (Coupland & Maher, 2005). At the time of interview visit, women were asked to map their community and access to resources, with the last 6 months as a reference point. Using a street map of Vancouver, women were asked to mark places where they: (a) lived and worked; (b) considered to be high and low risk to their personal safety; (c) avoided when working due to recent violence; (d) avoided when working due to local policing (inclusive of police presence and harassment); (e) accessed and disposed of syringes; (f) accessed health/support resources. In order to map health service and syringe exchange availability, women were asked to mark all services they were aware of and had used within the last 6 months. Results were compiled used ArcGIS software and GIS street maps provided by the City of Vancouver. Given significant overlap in mapping of avoidance areas due to violence and avoidance due to policing, avoidance areas were combined for the purposes of geographic analysis. Subse-

quent analysis at the individual level will help to elucidate the differential impact of avoidance of physical settings due to policing and violence on women's individual utilisation of health and syringe exchange programs.

The primary model for this analysis focused on geographical units defined by streets or blocks, rather than on individual participants. In order to elucidate environmental–structural level barriers, the outcome variable was areas of avoidance of a physical place due to recent violence and policing, measured by proportion of women identifying any one geographical unit as an area. The key explanatory variable of interest was a geographic region, operationalized as health and syringe availability core, compared to the inner/outer perimeter area, in addition to working areas mapped by women. The boundaries of the core area were derived based on concentration of reported health and syringe exchange availability and correspond to the high density area of Vancouver's Downtown Eastside (DTES) core encompassing 16 street sections and corners, running approximately 6 blocks by 2–3 blocks, although not in a defined rectangle. The DTES is an inner-city community that has become notorious for a highly concentrated area of low cost housing, poverty, health inequities, substance use and mental illness, as well as extensive prevention and harm reduction programming. The health and syringe availability core area encompasses the main health clinics, fixed site syringe exchange programs, pharmacies and methadone dispensation, a medically supervised injection facility, heroin maintenance trail, a drop-in centre for sex workers and a women's centre. The inner/outer perimeter area corresponds to primarily industrial settings to the north and east, loading docks along the waterfront to the north, and bordering residential areas.

In a secondary analysis, demographic and drug use variables from the interview-questionnaire were used to stratify models analysing the geographic relationship between health and syringe availability and avoidance of physical area due to violence and policing. Variables of interest included age (coded as younger ( $\leq 29$  years) vs. older ( $\geq 30$  years)), ethnicity (coded as Aboriginal, inclusive of First Nations, Metis and Inuit ancestry, vs. non-aboriginal) and drug use patterns (any and daily use of injection drugs, crystal methamphetamine and crack cocaine smoking).

The aim of the analysis was to map the geographic relationship between health service and syringe availability and the avoidance of a physical setting due to violence and policing using ArcGIS. In a secondary analysis, logistic regression was used to model this geographic association and obtain an adjusted effect. In order to minimize potential confounding due to overlap of working areas with the core area, the logistic regression model was adjusted for the proportion of women working in a given area. Stratified models were then run to assess different patterns of avoidance based on age, ethnicity and drug use. The generalised model was therefore adjusted for age and subsequent stratified models are presented. All models were adjusted for clustering within grid map regions so that streets within a given region were not

Table 1  
Socio-demographic characteristics and syringe exchange services use among female survival sex workers

Characteristic	n (%)
Median age [IQ range]	37 (27–42 years)
Median age first exchange sex for money or drugs [IQ range]	16 (14–22 years)
Self-identified ethnicity	
Aboriginal (First Nations, Metis, Inuit, non-status)	80 (40)
Drug use patterns (last 6 months)	
Any injection use	116 (59)
Any crystal meth use	40 (20)
Any crack cocaine smoking	166 (81)
Daily crack cocaine smoking	121 (59)
Syringe exchange (n = 116 current IDU)	
Fixed NEP use (needle exchange, hotel exchange, clinics, pharmacies)	65 (56)
Medically supervised injection site	53 (47)
Mobile NEP use (core)	50 (43)
Mobile NEP use (core/perimeter)	20 (17)
Outreach workers	13 (11)
Family/friend/street	9 (8)

considered independent. ArcGIS (ESRI) and STATA statistical software (Statacorp, version 8.2, TX, USA) were used for analyses.

## Results

The socio-demographic characteristics and use of fixed and mobile syringe exchange programs are reported for the 198 women (n = 116 for subset of IDU) who participated in social mapping sessions (Table 1). The median age of women was 37 years (27–42 years) and median age of sex work initiation was 16 years (14–22 years). Of the total, 80 (40%) self-identified as being of Aboriginal ancestry, and 56 (27%)

were less than 29 years of age. A total of 116 (50%) were active IDUs, while the vast majority smoked crack cocaine (81%), with 121 (59%) reporting daily crack cocaine smoking. Approximately half of current female IDUs (56%) had accessed syringes from a fixed site (56%) (including hotel exchange, pharmacy and clinic) and the medically supervised injection facility (47%). In terms of mobile resources, 50 (43%) had accessed syringes from a mobile van in the core area, 20 (17%) from a mobile van in either of core or perimeter areas, and 13 (11%) from outreach workers, while 59 (29%) had accessed a mobile van for other harm reduction resources and referral in either of core or perimeter areas.

In analyses of the mapping data, a total of 1105 observations were included from 198 women, representing geographical units of street sections or corners. As illustrated in Fig. 1, there is a significant geographic correlation between the health service and syringe availability core (compared to inner/outer perimeter) and physical settings avoided due to violence and policing. In a generalised logistic regression model (Table 2), adjusted for clustering of working streets within regions, the odds ratio (OR) for association between the health and syringe availability core and avoidance due to violence and policing was 6.53 (95% confidence interval (CI): 4.04–10.56). In a stratified model, the odds ratio for avoidance of the health and syringe availability core due to violence and policing increased for Aboriginal women (OR = 9.90, 95%CI: 5.46–17.96), daily crack cocaine smokers (OR = 9.23, 95%CI: 5.44–15.64), younger women ( $\leq 29$  years of age) (OR = 7.60, 95%CI: 4.36–13.24) and injection drug users (OR = 6.8, 95%CI: 4.0–11.76), when compared to non-aboriginal women, less than daily crack smokers, older women, and non-injection drug users. In addition, when examining the relationship of working areas by age, working areas of older women ( $\geq 30$  years) were significantly associated with the health and syringe availability core (OR = 1.31, 95%CI: 1.07–1.61), while among younger women ( $\leq 29$  years), the odds ratio was reversed but non-significant (OR = 0.96, 95%CI: 0.87–1.62). When examining

Table 2  
Logistic regression modelling of the geographic relationship between health and syringe exchange availability and avoidance due to violence and policing

Health/syringe availability core (vs. outer, inner perimeter)*	Avoidance due to violence and policing	
	Adjusted odds ratio	95% confidence interval
General model for all women	6.53	4.04–10.56
Stratified by Age		
Youth ( $\leq 29$ years)	7.60	4.36–13.24
Stratified by ethnicity		
Aboriginal women	9.90	5.46–17.96
Stratified by crack use frequency		
Daily crack cocaine smokers	9.23	5.44–15.64
Stratified by injection drug use		
Any injection drug use	6.86	4.00–11.76
Crystal methamphetamine users		
Any crystal meth use	3.09	1.50–6.34

\*Reference category is health and syringe exchange availability. \*\*All models controlled for working street sections.

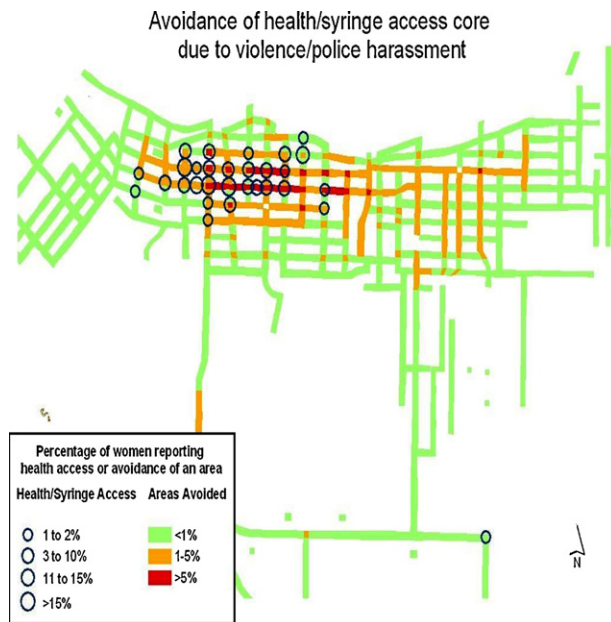


Fig. 1. Mapping the geographic relationship between avoidance of physical settings due to violence and policing and availability of health services and syringe exchange programs among women engaged in survival sex work.

the relationship of working areas by ethnicity, an association was only observed among non-aboriginal women (OR = 1.21, 95%CI: 1.13–1.31) with no association observed between the health and syringe availability core and working areas of Aboriginal women (OR = 1.12, 95%CI: 0.99–1.25).

## Discussion

The findings reveal a significant geographic correlation between a heavily concentrated area of health and syringe availability and avoidance due to violence and policing by sex workers that requires immediate attention. Of particular concern, stratified models showed increased likelihood of this geographic correlation among younger and Aboriginal women, injection drug users and daily crack cocaine smokers, suggesting these populations may be particularly vulnerable to avoidance of the health and syringe availability core due to violence and policing. Furthermore, the lack of relationship observed between working areas and the health and syringe availability core among younger and Aboriginal women suggests displacement of working areas away from health and syringe exchange programs.

Previous research among women in sex work and drug-using populations has identified violence as a significant structural barrier to HIV prevention efforts (El-Bassel, Gilbert, Rajah, Foleno, & Frye, 2000; Pyett & Warr, 1997; Wojcicki & Malala, 2001), however far less is known about the avoidance physical settings due to violence that may mediate the availability of health and syringe exchange services. Given the extensive harm reduction and HIV prevention strategies currently operating in Vancou-

ver, and ample evidence of the positive impacts of needle exchange programs and medically supervised injection facility in reducing localized syringe sharing (Kerr, Tyndall, Li, Montaner, & Wood, 2005; Strathdee et al., 1997), the high concentration of avoidance of health service and syringe exchange availability core among women who inject drugs due to violence and policing is of major concern. Interruption of health service use among IDU due to heavily policed open drug markets and displacement have been shown to severely compromise prevention and outreach efforts (Aitken et al., 2002; Bluthenthal et al., 1997; Curtis et al., 1995; Kerr, Small, & Wood, 2005), with mapping supporting a significant environmental–structural gap in prevention efforts where open drug use and sex work markets coexist. In addition, evidence suggests that heavy policing and crackdowns, characterized by heightened surveillance and searches, are associated with increased risky injections, syringe sharing, reduced access to needle exchange and redistribution of harm both in Vancouver and elsewhere (Aitken et al., 2002; Best et al., 2001; Bluthenthal et al., 1997; Csete & Cohen, 2003; Maher & Dixon, 1999; Small et al., 2005; Wood et al., 2003). Given that previous research has identified adequate access to sterile syringes as one of, if not the single most, important factor in reversing an HIV epidemic among IDU, our findings suggest a major gap in service provision that requires immediate address. While outreach-led prevention efforts have consistently been shown to be effective in reducing syringe sharing and other drug-related harms (Coyle, Needle, & Normand, 1998), the highly displaced sex work environment in Vancouver and low reported availability of sterile syringes through mobile exchange and outreach in perimeter areas is of major concern. In addition, the increased vulnerability among young and Aboriginal women to avoidance of the health and syringe availability core due to recent violence and policing supports ongoing evidence of the immediate need for Aboriginal-led public health and prevention efforts (BC Aboriginal HIV/AIDS Task Force, 1999; Culhane, 2003; Farley, Lynne, & Cotton, 2005). In the past decade, young women and those of Aboriginal ancestry have experienced particularly elevated rates of new HIV infections and health-related harms (Craib et al., 2003; Miller et al., 2005), and are highly overrepresented in visible street-level sex work across Canada (BC Aboriginal HIV/AIDS Task Force, 1999; Culhane, 2003; Farley et al., 2005).

While further analyses at the individual level will help to determine the specific environmental and structural mechanisms at play, mapping the spatial relations of violence and policing that likely mediate harm reduction efforts can help to inform spatial programming and policy reforms aimed at promoting safer sex work environments. The findings offer evidence to support increasing calls for ‘safer environment interventions’ among drug users embedded within existing spatial relations, such as peer-based interventions and outreach that increase access to and disposal of drug use paraphernalia, evidence-based drug consumption rooms, and ‘peer-supervised’ places for injecting (Rhodes et al.,

2006). Of particular importance, in settings such as Vancouver where open sex work and drug use markets coexist, environmental–structural prevention and ‘safer environment interventions’ are desperately needed that aim to facilitate safer sex work environments within existing spatial relations, including peer-based prevention efforts, outreach and mobile resources and policy reforms to support peer-supervised safer sex work environments (such as sex work cooperatives). A key example of a ‘safer environment intervention’ currently being piloted in Vancouver for street-level sex workers is the mobile access project (MAP), a mobile outreach van that connects with sex workers in both the DTES and outlying areas and has been in operation for 3 years. While the MAP van has shown positive impacts in reducing harm and violence among women through provision of harm reduction and prevention resources (Gibson, Bowen, Janseen, & Spittal, 2006), our findings suggest that less than half of women engaged in street-level sex work had accessed a mobile resource (including the MAP van) within the last 6 months. The findings therefore suggest the need for long-term resources to help to sustain the capacity of MAP and expand mobile resources for sex workers, including mobile health services, to outlying areas. As well, the avoidance of a concentrated area of health and syringe availability due to violence and policing suggests a growing need for women specific-health and wellness in this setting, as well as a 24-h safe-space for sex workers.

Among sex work markets internationally, particularly establishment-based sex work environments (Kerrigan et al., 2006), environmental–structural interventions that combined peer-based sex work initiatives (such as sex work unions and cooperatives) and socio-legal policy reforms have increasingly shown to be effective in promoting safe sex work environments through the mediation of macro- and meso-level barriers. Of particular importance, evidence suggests that environmental–structural interventions that are supported by the decriminalisation of sex work facilitate reduced violence and harassment of sex workers by clients, police and third parties and increased access to health and support resources (Doorninck & Jacqueline, 1998; Jordan, 2005; West, 2000).

In a street-level sex work context, the production of sex work space has been discussed in urban planning and crime prevention literature, and yet spatial programming, supported by legal reforms, as a safer environment intervention for sex workers has received comparably less attention as a harm reduction strategy (Sanders & Campbell, 2007). In contrast to informal tolerance zones currently operating in criminalised prostitution environments such as Vancouver, emerging evidence suggests managed sex work zones, such as those operating in several European settings reduce violence and police harassment, promote sex worker’s ability to manage their risk environment and increase access and availability of health and support resources (Doorninck & Jacqueline, 1998). Furthermore, recent consultations on managed sex work zones in Liverpool, UK have highlighted the need for managed sex work zones that promote harm

reduction rather than enforcement-based drug strategies, are community rather than police patrolled, and work to support improved relationships between sex workers and police (Bellis et al., 2007).

Finally, harm reduction strategies and safer environment interventions among sex workers need to be tailored towards widespread crack cocaine smoking in this setting. High rates of violence, harassment and exploitation of women who use crack cocaine and engage in survival sex work have been extensively documented (Edlin et al., 1994). As well, increased confiscation of drug use paraphernalia without arrest has been reported among women who smoke crack and inject drugs in this setting (Shannon et al., 2008). Drug consumption rooms that accommodate non-injection use are currently operating in several European cities (Hendrich, 2004; Wolf, Linseen, & Graaf, 2003). However current reluctance for safer inhalation rooms persists in this setting, despite continued public drug use among crack and crystal meth users and recent feasibility studies demonstrating the potential community and public health impacts of drug consumption rooms that accommodate crack cocaine smokers (Collins et al., 2005; Shannon et al., 2006). In addition, peer-based outreach and mobile prevention efforts need to include widespread provision of safer crack use kits and mouth-piece exchange, not currently available in Canada (Haydon & Fischer, 2005).

It is important to interpret the results of mapping as evidence of a strong geographic relationship between health and syringe availability and avoidance of physical settings due to violence and policing that does not consider individual level associations. As mentioned, our findings support the need for more extensive analyses of the role of specific environmental–structural factors that mediate harm reduction and prevention efforts among women in survival sex work at the individual level. In particular, our findings map the displacement of sex work away from the health and syringe availability core that may be related to avoidance due to violence and policing. However, further analysis is clearly needed at the individual level to help elucidate the full range of factors that may impact displacement of sex work, such as increased client availability in outlying areas. Secondly, the low sample size across a large geographic area resulted in wide confidence intervals around some coefficients. However despite the wide confidence intervals, there was sufficient power to detect associations with results providing important exploratory findings not previously reported elsewhere. Finally, the results may not be generalisable to other venues of sex work, including male sex workers, or other sex work settings not operating under a prohibitive prostitution environment.

In summary, mapping of sex workers’ working environments highlighted how the avoidance of physical settings due to violence and policing may mediate health and syringe exchange availability at the environmental–structural level. This finding is further supported by the mapped displacement of sex work to outlying and industrial settings away

from health and harm reduction resources. Collectively these findings support the need for environmental–structural level prevention efforts and safer environment interventions, supported by legal reforms, that are embedded within existing spatial relations and facilitate safer sex work environments, including peer-based prevention, outreach and mobile resources, peer-supervised sex work environments (e.g. sex work cooperatives) and spatial programming.

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