

Structural and Environmental Barriers to Condom Use Negotiation With Clients Among Female Sex Workers: Implications for HIV-Prevention Strategies and Policy

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Women account for an increasingly disproportionate number of HIV infections worldwide.¹ United Nations' agencies use the term the "feminization" of the HIV pandemic to refer both to the highly gendered nature of the vulnerability to HIV infection and to women's increased biological susceptibility through sexual transmission. Women's risk of HIV infection is hypothesized to be mediated by macro- and micro-level factors exogenous to the individual that interact to increase vulnerability to HIV infection, factors such as gender, cultural and economic inequities, prohibitive government policies, and institutionalized racism and poverty.^{2–5}

Recent public health calls highlight the need to move beyond a sole focus on individual-level risk to an understanding of risk as negotiated interactions,⁶ embedded in contextual factors, gendered power dynamics, and access to resources.^{5,7} As such, a conceptual shift from individual-focused HIV prevention, such as behavior change communication, to environmental–structural HIV prevention emerged in the 1990s, particularly among female sex workers and their male clients.²

Environmental–structural interventions aim to mediate macro- and microlevel factors that facilitate "enabling environments" for individual HIV risk reduction.^{2,8} Although several environmental–structural interventions targeting female sex workers and clients have shown significant promise in improving condom use in sex work establishments,^{2,9,10} most notably the Songachi model in West Bengal, India,¹¹ these interventions have proven difficult to translate to other settings¹² and, to date, have almost exclusively targeted indoor female sex workers in resource-poor settings. Furthermore, although some interventions, such as the 100% condom campaign, were initially heralded as model HIV prevention programs in Thailand,¹³ subsequent evidence suggests that not all sex workers may have experienced the same reductions in HIV

Objectives. We investigated the relationship between environmental–structural factors and condom-use negotiation with clients among female sex workers.

Methods. We used baseline data from a 2006 Vancouver, British Columbia, community-based cohort of female sex workers, to map the clustering of "hot spots" for being pressured into unprotected sexual intercourse by a client and assess sexual HIV risk. We used multivariate logistic modeling to estimate the relationship between environmental–structural factors and being pressured by a client into unprotected sexual intercourse.

Results. In multivariate analyses, being pressured into having unprotected sexual intercourse was independently associated with having an individual zoning restriction (odds ratio [OR]=3.39; 95% confidence interval [CI]=1.00, 9.36), working away from main streets because of policing (OR=3.01; 95% CI=1.39, 7.44), borrowing a used crack pipe (OR=2.51; 95% CI=1.06, 2.49), client-perpetrated violence (OR=2.08; 95% CI=1.06, 4.49), and servicing clients in cars or in public spaces (OR=2.00; 95% CI=1.65, 5.73).

Conclusions. Given growing global concern surrounding the failings of prohibitive sex-work legislation on sex workers' health and safety, there is urgent need for environmental–structural HIV-prevention efforts that facilitate sex workers' ability to negotiate condom use in safer sex-work environments and criminalize abuse by clients and third parties. (*Am J Public Health.* 2009;99:659–665. doi:10.2105/AJPH.2007.129858)

prevalence.¹⁴ In fact, the policy may have adversely impacted marginalized sex workers through increased corruption, police raids, and mandatory HIV testing. These challenges and limitations may reflect the inability of interventions to adequately address the dynamic ways in which environmental and structural factors interact with microlevel factors in producing individual HIV risk.¹⁵

Among street-level sex work markets both in Canada and worldwide, women have been subjected to alarming rates of violence and victimization over the past decades^{16–18} and to enhanced rates of health- and drug-related harms, including increased rates of HIV infection among women who smoke and inject drugs.^{19,20} A significant amount of research has identified individual-level factors that predict consistent condom use; however, there remains a paucity of evidence surrounding the role of prostitution

policies and work environment on sexual HIV risk in street-level sex work.

Government policies that prohibit solicitation in public spaces, including those in North America, the United Kingdom, and parts of Australia, have been shown to increase police presence and crackdowns and to displace street-based sex-work markets to outlying areas.^{16,17,21} As a direct result of displacement and legal restrictions on working indoors in managed or supported settings, more marginalized sex workers are pushed to work in dark and deserted alleys and isolated spaces with limited lighting, poor sanitation, lack of protections from violence and exploitation, and reduced access to health and social support services.

Given growing human rights and public health calls globally to address the failings of criminalized or quasi-criminalized prostitution on the health and safety of sex

workers,^{16–18,22,23} and recent charter challenges to Canada's federal prostitution laws, we aimed to examine the association between environmental–structural factors and the negotiation of condom use with clients among street-level sex workers.

METHODS

The Maka Project was developed as a community-based HIV prevention research partnership with the aim to examine the impact of current programs and policies on the health and safety of survival sex workers in Vancouver, British Columbia. The term *survival sex work* is used to refer to the exchange of sexual services for money, drugs, or shelter as a means of basic subsistence. A detailed description of the Maka Project methodology has been published elsewhere.²⁴ Briefly, between April and September 2006, 205 female sex workers were recruited and consented to participate in a prospective cohort (response rate of 93%), which included an interview questionnaire and voluntary HIV screening. Given the known difficulties in accessing a representative sample of sex workers because of the unknown size and boundaries of this population, initial mapping of working areas with more than 60 female sex workers was used to identify sex work strolls for targeted outreach and recruitment. Time–space sampling²⁵ was used to systematically sample all women (inclusive of transgender women) working at staggered times and locations along these strolls. Based on previous research that identified 100% substance use among street-based female sex workers in Vancouver,²⁶ eligibility criteria was defined as being a woman aged 18 years and older who smoked or injected illicit drugs (excluding marijuana) and actively engaged in street-level sex work.

Study Instruments

At baseline, trained peer researchers (former or current female sex workers) administered a detailed semistructured questionnaire to elicit responses from the participants related to demographics, health service use, working conditions, violence and safety, and sexual and drug-related harms. In addition, voluntary HIV screening with the new point-of-care rapid INSTI test (Biolytical, Vancouver, BC; specificity = 99.3%; sensitivity = 99.6%) was conducted by the project nurse and was supported

by extensive pretest and posttest counseling. Finally, at the time of the baseline visit, women were provided with a map of Vancouver and asked to indicate (using the past 6 months as a reference point) areas in which they (1) worked and lived, (2) considered high and low risk to their personal safety, (3) avoided because of violence and policing, and (4) accessed syringes and accessed health services. Results were compiled with ArcGIS version 8 (ESRI, Redlands, CA) software and Geographic Information System street maps were provided by the City of Vancouver.

The dependent variable for all analyses was reporting being pressured by a client into unprotected vaginal or anal intercourse in the past 6 months.

Explanatory Variables

The risk environment framework,⁸ which postulates that macro- and meso-level factors exogenous to the individual mediate negotiation of individual HIV risk, formed the theoretical basis for the selection of independent variables for all analyses. We considered specific environmental–structural factors based on literature about female sex workers and qualitative documentation of street-based sex workers' risk environment, as well as a priori hypothesized relationships.

Environmental–structural factors derived from questionnaires included harassment by security guards and place of servicing client (i.e., car or outdoor public space [park or alley] and indoor settings [hourly room, sauna, hotel]). In addition, environmental–structural factors derived from individual mapping variables for each woman included (1) type of working area (main street, residential setting, alley or side street, industrial setting), (2) having a “red zone restriction” (individual zoning restriction) prohibiting working in the Downtown Eastside core because of previous solicitation or drug charges, and (3) having moved working areas away from Downtown Eastside core or main street because of policing or police harassment. The Downtown Eastside core, considered among the poorest postal codes in North America, has become known for a highly concentrated open drug market, socioeconomic disadvantage, and health inequities, as well as extensive community and health resources. Importantly, the Downtown Eastside

core is bordered to the east by industrial areas and to the north by loading docks along waterfront that have become synonymous with “skid row.”

Based on qualitative evidence of intimate partners (noncommercial partners) limiting sex workers' ability to negotiate HIV risk reduction through reduced access to resources,^{27,28} we examined the microlevel practice of “having a male intimate partner who scores drugs for you” in bivariate analysis. Additionally, we examined the safety initiative of working with other women or having a “spotter” (i.e., another worker who takes down clients' information or license plates). Other microlevel drug practices previously shown to enhance sexual risk of HIV included borrowing a used crack pipe and exchanging sexual services while high on drugs. Finally, we defined client-perpetrated violence (i.e., a “bad date”) as emotional, physical, or sexual violence by a client. Respondents who answered yes to having experienced a bad date in the past 6 months were asked which of the following they had experienced from a client: verbal harassment, abduction or kidnapping, sexual assault, rape, strangulation, physical assault or beating, assault with a weapon, or being thrown out of a moving car.

Individual variables considered as potential confounders because of their known or a priori hypothesized relationship with negotiation of condom use and at least 1 or more independent variables included HIV status, type and frequency of drug use, pregnancy history, and early sexual and physical abuse. In light of recent evidence of enhanced rates of HIV seroconversion among Aboriginal people in this setting,²⁹ we examined Aboriginal ethnicity (e.g., First Nations, Metis, or Inuit) compared with non-Aboriginal ethnicity. Similar to previous analyses,²⁶ drug use patterns included any cocaine, heroin, or crystal methamphetamine injection in the past 6 months. Because all respondents reported smoking crack cocaine, we examined daily versus less-than-daily use. Finally, we adjusted all models for age because of previous evidence suggesting potential confounding with sexual HIV risk and 1 or more police enforcement strategies.²⁷

Statistical Analyses

We inputted mapping data into ArcGIS to provide a geographic representation of

women's working areas by clustering of "hot spots" for being pressured by clients into unprotected sexual intercourse. Specifically, we calculated hot spots by using the Getis-Ord G_i^* statistic and z scores (with standard deviations from the mean) and mapped them by the variable, women's working areas. To elucidate specific environmental-structural factors associated with the negotiation of sexual HIV risk, we used descriptive and univariate analyses to examine associations with being pressured by a client into unprotected sexual intercourse.

We analyzed categorical and explanatory variables with the Pearson χ^2 test, we analyzed normally distributed continuous variables with the t test for independent variables, and we analyzed skewed continuous variables with the Mann-Whitney U test. We used bivariate analysis to examine associations between each of the explanatory variables and to test for collinearity and effect modification. Given significant collinearity between displacement because of policing and working in industrial areas, we only entered displacement into the multivariate model. Similarly, exchanging sexual services while high on crack, and borrowing a used crack pipe were highly collinear, and thus, we only entered borrowing a used crack pipe into the model based on significance ($P < .05$) and likelihood ratio test.

We used the Pearson χ^2 test to verify associations between each independent variable and the outcome measure. Variables found at the univariate level ($P < .01$) to be associated with being pressured by a client into sexual intercourse without a condom were entered into the logistic regression model to obtain adjusted effects by using forward conditional procedures and the likelihood ratio test. We set $\alpha < .01$ because of the relatively small sample size. All reported P values are 2-sided and odds ratios (ORs) are reported with 95% confidence intervals (CIs).

RESULTS

As indicated in Table 1, of the 205 women eligible for analysis, 81 (40%) self-identified as Aboriginal, with no statistical differences in likelihood of being pressured into unprotected sexual intercourse by ethnicity ($P = .716$). The median age at the time of interview was 37 years (interquartile range [IQR] = 27–42 years)

and the median age of sex work initiation was 16 years (IQR = 14–22 years). A total of 68% of women had been pregnant in their lifetime with a median of 4 pregnancies (IQR = 2–5), and 31 (22%) had at least 1 child living with them, with no differences in likelihood of being pressured into unprotected sexual intercourse by number of pregnancies ($P = .131$) or support of a child ($P = .138$). Seventy-four women (36%) had been homeless in the past 6 months, with similar prevalence of homelessness among both groups ($P = .227$). One hundred fifty-two women (77%) reported ever having injected drugs, and the primary drug of choice was crack cocaine (81%). Importantly, no associations were observed between drug use practices and being pressured by a client into unprotected sexual intercourse.

Among 205 women who reported sexual transactions with clients, 25% reported having been pressured by a client into not using a condom for sexual intercourse in the past 6 months. Figure 1 provides a map of women's

working areas, by clustering of hot spots for being pressured into unprotected sexual intercourse, with standardized z scores of 1.96 or more. The positive z scores show an increased probability (or hot spot) of being pressured by a client into unprotected sexual intercourse among women working in areas both outside the Downtown Eastside core and in industrial public spaces along the northeast and south.

Table 2 shows the unadjusted and adjusted associations for being pressured by a client into unprotected intercourse. In the final multivariate logistic regression model, adjusted for age, being pressured by a client into sexual intercourse without a condom was associated with having a zoning restriction because of previous solicitation or drug charges (OR = 3.39; 95% CI = 1.00, 9.36), moving working areas away from the Downtown Eastside core or main streets because of policing (OR = 3.01; 95% CI = 1.39, 7.44), borrowing a used crack pipe (OR = 2.51; 95% CI = 1.06, 2.49), client-perpetrated violence (OR = 2.08;

TABLE 1—Characteristics of Female Street-Based Sex Workers, by Whether They Were Pressured by a Client Into Unprotected Sexual Intercourse: The Maka Project, Vancouver, British Columbia, 2006

Characteristic	Pressured by a Client Into Unprotected Sexual Intercourse		<i>P</i>
	Yes, No. (%) or Median (IQR)	No, No. (%) or Median (IQR)	
Total	51 (100)	154 (100)	
Median age, y	35 (28–41)	37 (27–42)	.759
Median age first exchanged sex for money or drugs, y	16 (15–22)	17 (14–23)	.592
Self-identify as Aboriginal	21 (41)	59 (38)	.716
Ever pregnant	39 (77)	100 (65)	.126
Median number of pregnancies	4 (2–7)	3 (2–5)	.131
Currently have at least 1 child living with them	11 (22)	20 (13)	.138
Homeless, past 6 mo	22 (43)	52 (34)	.227
Incarcerated, past 6 mo	10 (30)	24 (16)	.503
Screened and HIV-positive	15 (29)	30 (20)	.138
Self-reported HCV-positive	29 (57)	91 (59)	.780
Ever injected drugs	34 (67)	118 (77)	.159
Experienced childhood or adolescent abuse			
Sexual abuse ^a	41 (80)	112 (76)	.537
Physical abuse ^a	44 (86)	128 (83)	.595

Note. IQR = interquartile range. Total number of women reporting transactions with clients was 205.

^aSelf-reported abuse before age 18 years, excluding that associated with sex work.

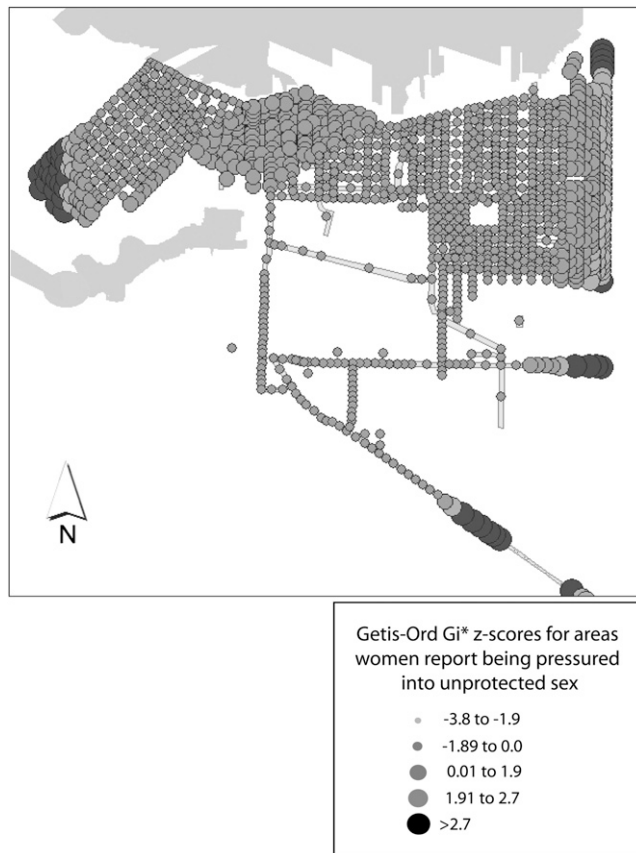


FIGURE 1—Working areas of female street-based sex workers and geographic clustering of “hot spots” for being pressured into unprotected sexual intercourse by clients: The Maka Project, Vancouver, British Columbia, 2006.

95% CI=1.06, 4.49), and servicing clients in cars or in public spaces (OR=2.00; 95% CI=1.65, 5.73).

DISCUSSION

Our results demonstrate several structural and environmental barriers that significantly elevate women’s sexual HIV risk through being pressured by a client into unprotected sexual intercourse. Importantly, the mapping of hot spots for being pressured into unprotected sexual intercourse by working areas highlights the role of work conditions in shaping women’s sexual HIV risk. At the macro- and microlevels, women who moved working areas away from main streets because of local policing and those with zoning restrictions (because of previous solicitation or drug charges) experienced a 3-fold increase in odds of being

pressured into unprotected sexual intercourse, and those servicing clients in cars or public spaces experienced a 2-fold increase in odds. Among microlevel practices, borrowing a used crack pipe and client-perpetrated violence both doubled the odds of being pressured by a client into unprotected sexual intercourse.

Sociolegal Policy Reform and Enforcement-Based Strategies

Our findings support the urgent need for structural- and environmental-level HIV-prevention efforts in street-level sex-work markets, including legal and policy reforms that facilitate sex workers’ abilities to negotiate condom use in safer sex-work environments. The adverse impact of enforcement-based drug policies in facilitating drug-related HIV risk in open drug scenes have been well documented and include an increased

likelihood of risky injection practices (such as syringe sharing), confiscation of drug-use paraphernalia without arrest, and disruption of social networks.^{30–32}

Our findings further suggest that enforcement of prohibitive sex-work policies, alongside prohibitive drug policies, promote sexual risk of HIV infection in open street-level sex-work markets. These findings offer empirical evidence to support qualitative and ethnographic work, as well as legal policy analyses^{17,18,22} in both Vancouver and other criminalized or quasi-criminalized prostitution settings that document increased harms, including violence, exploitation, and drug-related HIV risk, in street-level sex work as a result of enforcement of prohibitive sex-work legislation.

Although the buying and selling of sexual services has never been illegal in Canada, the contradictory laws governing prostitution mean that sex work continues to operate in a highly prohibitive environment. In an effort to remove the visible presence of street prostitution, the federal government enacted the “communicating” provision in 1985²² that made it illegal to communicate in public spaces for the purposes of sexual transaction. In light of current legal challenges to the communicating code (s.13) in Canada, it is noteworthy that our findings suggest that enforcement of this provision may be increasing women’s sexual risk of HIV infection.

Furthermore, the increased risk of being pressured into unprotected sexual intercourse among women servicing clients in public spaces and cars compared with those servicing clients in indoor settings highlights the public health imperative of reversing laws that restrict sex workers’ ability to legally work indoors in managed or cooperative settings. The current “bawdy house” provisions (s.210 and s.211) in Canada broadly prohibit “keeping or transporting a person to a common bawdy-house,” and section 212 prohibits “procuring” or “living off the avails of prostitution” making it illegal for sex workers to work together indoors (e.g., in brothels) and extends “living off of the avails” of sex work to partners, family members, friends, and coworkers.²²

The Joint United Nations Programme on HIV/AIDS supports the decriminalization of sex work in situations in which there is no exploitation as necessary to effective HIV

TABLE 2—Unadjusted and Adjusted Odds Ratios (ORs) for Associations Between Being Pressured by a Client Into Unprotected Sexual Intercourse and Individual and Contextual Factors Among Female Street-Based Sex Workers: The Maka Project, Vancouver, British Columbia, 2006

Characteristic	Pressured by a Client Into Unprotected Sexual Intercourse		Unadjusted OR (95% CI)	Adjusted OR ^a (95% CI)
	Yes (n = 51), No. (%)	No (n = 154), No. (%)		
Individual factors				
Cocaine injection	16 (31)	48 (31)	1.01 (0.51, 2.00)	...
Heroin injection	5 (49)	66 (43)	1.28 (0.70, 2.42)	...
Crystal methamphetamine injection	9 (18)	17 (11)	1.73 (0.72, 4.20)	...
Daily crack cocaine smoking	28 (55)	93 (63)	0.71 (0.37, 1.35)	...
Drug bingeing	18 (35)	43 (28)	1.41 (0.72, 2.76)	...
Microlevel factors				
Having an intimate male partner	17 (33)	54 (35)	0.93 (0.47, 1.81)	...
Having an intimate partner who obtains drugs for you	12 (24)	33 (21)	1.13 (0.53, 2.40)	...
Exchanging sexual intercourse while high ^b	35 (69)	80 (52)	2.02 (1.04, 4.00)	...
Borrowing a used crack pipe from a client	25 (49)	41 (27)	2.65 (1.38, 5.10)	2.51 (1.20, 4.98)
Working with other women or using a “spotter” ^c	10 (20)	21 (14)	1.55 (0.67, 3.55)	...
Experiencing client-perpetrated violence	14 (28)	23 (15)	2.16 (1.01, 4.60)	2.08 (1.06, 4.49)
Environmental-structural factors				
Having a zoning restriction because of previous solicitation or drug charges	9 (18)	9 (6)	3.45 (1.29, 9.25)	3.39 (1.20, 9.36)
Having moved working areas away from DTES or main streets because of policing	35 (69)	56 (36)	3.29 (1.42, 7.63)	3.10 (1.39, 7.44)
Experiencing harassment by security guards	21 (41)	44 (29)	1.75 (0.91, 3.38)	1.56 (0.85, 3.10)
Working on main, well-lit streets	15 (29)	48 (31)	0.90 (0.46, 1.84)	...
Working in industrial areas ^b	36 (77)	91 (59)	2.25 (1.10, 4.63)	...
Servicing clients in cars and in public spaces (alleys, parks)	39 (76)	91 (59)	3.03 (1.67, 6.14)	2.98 (1.59, 5.93)
Servicing clients in indoor settings (saunas, hourly rooms, hotels)	11 (21)	50 (32)	0.59 (0.23, 2.64)	...

Note. CI = confidence interval; DTES = Downtown Eastside Vancouver, BC.

^aVariables that were significant in bivariate analysis at $P < .01$ were entered into the multivariate model; adjusted ORs refer to variables significant at $P < .05$. Ellipses mean the bivariate variables were not significant.

^bVariable not entered into logistic model because of high collinearity with another variable.

^cA spotter is another worker who takes down clients' information or license plates.

prevention.¹⁶ In several countries in Europe, as well as most recently in New Zealand and parts of Australia, sex work is decriminalized with evidence suggesting that such policy efforts increase access to health services, autonomy, and personal safety, and reduce violence and exploitation. Health and safety strategies adopted in indoor sex-work establishments in decriminalized or regulated settings, such as occupational health and safety standards, have been suggested

to facilitate sex workers' ability to manage their environment and risk-reduction strategies including negotiation of positive sexual health practices.^{33,34}

Managed Sex-Work Zones as an HIV-Prevention Strategy

The significant public health implications of enforced displacement of sex work to outlying areas and individual red-zone restrictions on

HIV-transmission risk should also be considered in the context of current policy discussions surrounding “prostitution-free zones” in several urban settings,^{33,35} including Vancouver. Prostitution-free zones operate under a similar premise at the municipal level of removing the “visibility” of sex work (often advocated by business owners and residential communities) by making it illegal for sex workers to work in specific zones of public space and have been previously shown to lead to increased street policing and displacement of sex work to hidden and underground settings.

By contrast, managed sex-work zones as in several European settings³³ have been suggested to facilitate enabling environments for risk reduction and protection against violence and exploitation, although further research is needed both at the individual and ecological level of policies governing these zones. Unlike managed sex-work zones operating elsewhere that adopt a zero-tolerance drug policy, the significant overlap of sexual-exchange and drug-use partners in street-level sex work in this setting highlights the need for zones to be supported by harm-reduction policies, similarly documented in recent consultations in the United Kingdom.³⁶ Also, to ensure that policing in managed sex-work zones supports criminalizing exploitation by clients and third parties rather than further harming sex workers, policies should be developed with the direct involvement of sex workers.

Gender-Specific HIV-Prevention Strategies

In addition, gender-specific prevention and harm-reduction interventions are needed that consider power dynamics in the negotiation of HIV risk and the intersection of sexual- and drug-transmission risk in settings in which open drug use and sex-work markets coexist.^{37–39}

Our findings suggest that the process of female sex workers borrowing used drug-use paraphernalia from clients is associated with elevated odds of sexual HIV risk through being pressured into unprotected sexual intercourse. The synergistic relationship between crack cocaine and survival sex work has been extensively documented and shown to elevate the likelihood of exploitation and violence for female sex workers.¹⁹ Although surveillance data suggest that injection drug use remains the primary route of HIV transmission

among substance users in Canada, a quarter of female sex workers in this setting were pressured into unprotected sexual intercourse within the past 6 months, suggesting increased potential for sexual transmission of HIV, which deserves attention.

The importance of elucidating microlevel negotiation of sexual HIV risk in epidemiological analysis, rather than individual-level practice of unprotected sexual intercourse, was further evidenced by an event analysis of female substance users' most recent sexual exchange transaction in which the male client's motivation to use condoms and worker–client discussions were key predictors of consistent condom use.⁴⁰ Similarly, the practice of clients offering more money to not use a condom and of female sex workers charging more money for unprotected intercourse has been documented in several settings with evidence suggesting that both drug use and poverty are driving these practices.^{26,41}

Limitations

There are several limitations that should be considered when one interprets these findings. First, this study is cross-sectional in nature, and therefore, causal relationships cannot be drawn. However, the direction of the association between enforcement of prohibitive sex-work policies and women's sexual HIV risk is supported by extensive legal policy analyses and qualitative and ethnographic work.^{17,18,22} Second, the relatively small sample size may have compromised power. Third, self-reported practices may be subject to social desirability bias, although it is likely that this would have served to underestimate associations toward the null.

Fourth, our findings may not be generalizable to indoor sex-work venues or other outdoor sex-work markets that do not operate under a similar legal framework. Additionally, this was not a random sample, and thus, generalizations to other sex-work settings may be limited. However, the mapping of working areas and time–space sampling strategies likely helped to ensure a representative sample and to minimize selection bias. Fifth, the mapping of hot spots for clustering of sexual HIV risk by working areas does not describe the environmental–structural characteristics of these areas. However, the multivariate logistic modeling

helps to disentangle the specific environmental and structural barriers to condom-use negotiation with clients that could be subsequently explored in further spatial analyses.

Conclusions

Given high rates of violence, murder, and adverse health-related outcomes among women in street-level sex work in Canadian cities over the past 2 decades²² and global calls to address the failings of legislation that criminalizes sex work on the health and safety of sex workers, our findings offer important empirical evidence to suggest that the current sex-work laws and enforcement-based policies may be directly increasing women's sexual HIV risk. In particular, our findings support the urgent need to move beyond a solely individual-level HIV-prevention approach, such as condom distribution, to structural–environmental HIV prevention that facilitates female sex workers' ability to negotiate their risk environment in safer sex-work settings and more actively criminalizes abuse and harassment by clients and third parties. ■

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Contributors

K. Shannon conceptualized and drafted the original article, integrated the coauthors' comments, and responded to the reviewer concerns. S. A. Strathdee, J. Shoveller, M. Rusch, T. Kerr, and M. W. Tyndall contributed to the writing and revision of the article. M. Rusch provided support with the Geographic Information System mapping analyses.

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References

1. *Women and HIV/AIDS: Confronting the Crisis*. Geneva, Switzerland and New York, NY: Joint United Nations Programme on HIV/AIDS, United Nations Population Fund, and United Nations Development Fund for Women; 2004.
2. Parker RG, Easton D, Klein CH. Structural barriers and facilitators in HIV prevention: a review of international research. *AIDS*. 2000;14:S22–S32.
3. Kerr T, Small W, Wood E. The public health and social impacts of drug market enforcement: a review of the evidence. *Int J Drug Policy*. 2005;16(4):210–220.
4. Aggleton P, O'Reilly K, Slutkin G, Davies P. Risk everything? Risk behaviour, behaviour change and AIDS. *Science*. 1994;265:341–345.
5. Farmer P, Connors M, Simmons J. *Women, Poverty and AIDS: Sex, Drugs and Structural Violence*. Monroe, ME: Common Courage Press; 1996.
6. Amaro HR. R. On the margin: power and women's HIV risk reduction strategies. *Sex Roles*. 2000;42:723–749.
7. Zierler S, Krieger N. Reframing women's risk: social inequalities and HIV infection. Review. *Annu Rev Public Health*. 1997;18:401–436.
8. Rhodes T. The 'risk environment': a framework for understanding and reducing drug-related harm. *Int J Drug Policy*. 2002;13:85–94.
9. Kerrigan D, Moreno L, Rosario S, et al. Environmental-structural interventions to reduce HIV/STI risk among female sex workers in the Dominican Republic. *Am J Public Health*. 2005;96:120–125.
10. Withers M, Dornig K, Morisky DE. Predictors of workplace sexual health policy at sex work establishments in the Philippines. *AIDS Care*. 2007;19:1020–1025.
11. Basu I, Jana S, Rotheram-Borus MJ, et al. HIV prevention among sex workers in India. *J Acquir Immune Defic Syndr*. 2004;36:845–852.

12. Kerrigan D, Telles P, Torres H, Overs C, Castle C. Community development and HIV/STI-related vulnerability among female sex workers in Rio de Janeiro, Brazil. *Health Educ Res.* 2008;23:137–145.
13. Rojanapithayakorn W, Hanenberg R. The 100% condom program in Thailand. *AIDS.* 1996;10:1–7.
14. Kilmarx PH, Palanuvej T, Limpakarnjanarat K, Chitvarakorn A, St Louis ME, Mastro TD. Seroprevalence of HIV among female sex workers in Bangkok: evidence of ongoing infection risk after the “100% condom program” was implemented. *J Acquir Immune Defic Syndr.* 1999;21:313–316.
15. Miller M, Neaigus A. An economy of risk: resource acquisition strategies of inner city women who use drugs. *Int J Drug Policy.* 2002;13:409–418.
16. *Sex Work and HIV/AIDS.* Geneva, Switzerland: Joint United Nations Programme on HIV/AIDS; 2002.
17. Day SE, Ward H. British policy makes sex workers vulnerable. *BMJ.* 2007;334:187.
18. Goodyear MD, Cusick L. Protection of sex workers. *BMJ.* 2007;334:52–53.
19. Edlin BR, Irwin KL, Faruque S, et al. Intersecting epidemics—crack cocaine use and HIV infection among inner-city young adults. Multicenter Crack Cocaine and HIV Infection Study Team. *N Engl J Med.* 1994;331:1422–1427.
20. Ward H, Pallearos A, Green A, Day S. Health issues associated with increasing use of “crack” cocaine among female sex workers in London. *Sex Transm Infect.* 2000;76:292–293.
21. Blankenship KM, Koester S. Criminal law, policing policy and HIV risk in female street sex workers and injection drug users. *J Law Med Ethics.* 2002;30:548–559.
22. Lowman J. Reconvening the federal committee on prostitution law reform. *CMAJ.* 2004;171:147–148.
23. Ramaiah S. Sex workers to pay the price: prostitution strategy is a missed opportunity. *BMJ.* 2006;332:362.
24. Shannon K, Bright V, Allinott S, et al. Community-based HIV prevention research among substance-using women in survival sex work: the Maka Project. *Harm Reduct J.* 2007;4:20.
25. Stueve A, O'Donnell LN, Duran R, San Doval A, Blome J. Time-space sampling in minority communities: results with young Latino men who have sex with men. *Am J Public Health.* 2001;91:922–926.
26. Shannon K, Kerr T, Bright V, Gibson K, Tyndall MW. Drug sharing with clients as a risk marker for increased violence and sexual and drug-related harms among survival sex workers. *AIDS Care.* 2008;20:228–234.
27. Shannon K, Kerr T, Allinott S, Chettiar J, Shoveller JS, Tyndall MW. Social and structural violence and power relations in mitigating HIV risk of drug-using women in survival sex work. *Soc Sci Med.* 2008;66:911–921.
28. Maher L. *Sexed Work: Gender, Race and Resistance in a Brooklyn Drug Market.* Oxford, England: Clarendon Press; 1997.
29. Wood E, Montaner JS, Li K, et al. Burden of HIV infection among Aboriginal injection drug users in Canada. *Am J Public Health.* 2008;98:515–519.
30. Wood E, Kerr T, Small W, Jones J, Schechter MT, Tyndall MW. The impact of a police presence on access to needle exchange programs. *J Acquir Immune Defic Syndr.* 2003;34:116–118.
31. Aitken C, Moore D, Higgs P, Kelsall J, Kerger M. The impact of a police crackdown on a street drug scene: evidence from the street. *Int J Drug Policy.* 2002;13:193–198.
32. Maher L, Dixon D. Policing and public health: law enforcement and harm minimization in a street-level drug market. *Br J Criminol.* 1999;39:488–512.
33. Sanders T, Campbell R. Designing out vulnerability, building in respect: violence, safety and sex work policy. *Br J Sociol.* 2007;58:1–20.
34. Harcourt C, McNulty A, Holden J, Moylan M, Donovan B. Sustained health promotion success for migrant sex workers in Sydney. *Int J STD AIDS.* 2006;17:857–858.
35. Sanchez R. The global erotic subject, the ban, and the prostitution free-zone: sex work and the theory of exclusion. *Environ Plann D Soc Space.* 2004;22:861–883.
36. Bellis MA, Watson FL, Hughes S, et al. Comparative views of the public, sex workers, businesses and residents on establishing managed zones for prostitution: analysis of a consultation in Liverpool. *Health Place.* 2007;13:603–616.
37. Cusick L. Widening the harm reduction agenda: from drug use to sex work. *Int J Drug Policy.* 2006;17:3–11.
38. Strathdee SA, Sherman SG. The role of sexual transmission of HIV infection among injection and non-injection drug users. *J Urban Health.* 2003;80;4 suppl 3:iii7–14.
39. Strathdee SA, Philbin MM, Semple SJ, et al. Correlates of injection drug use among female sex workers in two Mexico-US border cities. *Drug Alcohol Depend.* 2008;92:132–140.
40. McMahon JM, Tortu S, Pouget ER, Hamid R, Neaigus A. Contextual determinants of condom use among female sex exchangers in East Harlem, NYC: an event analysis. *AIDS Behav.* 2006;10:731–741.
41. Ntumbanzondo M, Dubrow R, Niccolai LM, Mwandagairwa K, Merson MH. Unprotected intercourse for extra money among commercial sex workers in Kinshasa, Democratic Republic of Congo. *AIDS Care.* 2006;18:777–785.