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Early sex work initiation independently elevates odds of HIV infection and police arrest among adult sex workers in a Canadian setting

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Abstract

Objectives—To explore factors associated with early sex work initiation, and model the independent effect of early initiation on HIV infection and prostitution arrests among adult sex workers (SWs).

Design—Baseline data (2010–2011) were drawn from a cohort of SWs who exchanged sex for money within the last month and were recruited through time-location sampling in Vancouver, Canada. Analyses were restricted to adults ≥ 18 years old.

Methods—SWs completed a questionnaire and HIV/STI testing. Using multivariate logistic regression, we identified associations with early sex work initiation (<18 years old) and constructed confounder models examining the independent effect of early initiation on HIV and prostitution arrests among adult SWs.

Results—Of 508 SWs, 193 (38.0%) reported early sex work initiation, with 78.53% primarily street-involved SWs and 21.46% off-street SWs. HIV prevalence was 11.22%, which was 19.69% among early initiates. Early initiates were more likely to be Canadian-born (Adjusted Odds Ratio (AOR): 6.8, 95% Confidence Interval (CI): 2.42–19.02), inject drugs (AOR: 1.6, 95%CI: 1.0–2.5), and to have worked for a manager (AOR: 2.22, 95%CI: 1.3–3.6) or been coerced into sex work (AOR: 2.3, 95%CI: 1.14–4.44). Early initiation retained an independent effect on increased risk of HIV infection (AOR: 2.5, 95% CI: 1.3–3.2) and prostitution arrests (AOR: 2.0, 95%CI: 1.3–3.2).

Conclusions—Adolescent sex work initiation is concentrated among marginalized, drug and street-involved SWs. Early initiation holds an independent increased effect on HIV infection and

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Conflicts of Interest

The authors declare no conflict of interest.

criminalization of adult SWs. Findings suggest the need for evidence-based approaches to reduce harm among adult and youth SWs.

Keywords

sex work; youth; adolescent; HIV; sexually transmitted infections; criminalization; policing

INTRODUCTION

Youth who exchange sex are vulnerable to HIV infection, sexually transmitted infections (STIs), physical and sexual violence, substance use, and mental health disorders.[1–8] The estimated prevalence of runaway and homeless youth who have been involved in sex work in North America ranges from 10–40%, [2] with up to 40% of individuals engaged in sex work reported to be under age 18.[7, 8]

Data from Canada, India, Nepal, and Thailand indicate that sex work entry prior to age 18 may relate to an higher risk of HIV infection.[9–11] Sex workers' (SWs) vulnerability to HIV and STIs is shaped by behavioral and interpersonal (e.g., sexual and drug use risk practices), biological (e.g., the synergistic relationship between HIV and STI infection), and social-structural factors (e.g., sex work regulatory policies and their enforcement, violence, barriers to care).[12] Among younger SWs, *individual biological factors* increase the risk of HIV/STI transmission, such as the larger areas of cervical ectopy and trauma to an immature genital tract experienced by younger women and girls during intercourse.[11, 13] *Individual behaviours* such as drug use – particularly injection drug use – have also been associated with youth sex work involvement in Canada and Mexico.[3, 5, 8, 14–16] For example, among street youth in Montreal, predictors of sex work entry included using heroin, using drugs more than twice per week, and injection drug use.[15] Further, *interpersonal factors* such as challenges negotiating condom use with clients have been linked to earlier age of sex work entry in South and South East Asia.[8, 11, 17]

Sex workers' health also depends on *social-structural* factors, such as laws and policies governing sex work and their enforcement; [1, 14, 18–21] exposure to new risk environments as a consequence of migration [22–25]; and work environment factors, including third party (e.g., manager, pimp) roles [7, 26, 27] and features of sex work solicitation spaces, whereby street-based venues are often associated with HIV risk and youth sex work entry.[26, 28–30] Among adult SWs, the impacts of such social-structural factors include HIV/STI infection [1, 20, 31–35], inconsistent condom use [21, 36–39], and workplace violence [1, 18]. For example, criminalization of adult SWs through police arrest, harassment and violence has been shown to exacerbate HIV risk by displacing women to isolated settings, posing barriers to health and support services, and increasing risk of HIV infection and client violence.[1, 14, 18–21, 34, 35, 40, 41] Yet, data regarding the health and drug-related harms of criminalization for females who enter sex work during adolescence is notably lacking.

Although interventions aimed at populations at greatest risk of HIV infection – such as adolescents in the sex industry – are globally recognized as critical to HIV prevention efforts, youth involved in sex work remain an under-recognized, poorly understood population.[7] Given the critical need for data regarding their experiences and health care

needs, we undertook this study to investigate the context and HIV-related health impacts of youth sex work, which are needed to inform public health interventions.[7]

Objectives were to (1) explore individual, interpersonal, and social-structural factors associated with early sex work initiation (<18 years), and (2) model the independent effect of early sex work initiation on HIV infection and prostitution arrests among adult sex workers (SWs) in Vancouver, Canada.

METHODS

Setting

This study took place in Vancouver, Canada, where SWs are highly criminalized and experience multiple health-related harms, including HIV, STIs, and physical and sexual violence.[1, 9, 14, 18] Substantial overlap exists between open street-based sex work and drug use in Vancouver, which hosts the largest and most heavily concentrated open illicit drug use scene in North America.[42] In Canada, the buying and selling of sex is only legal among adults 18 years of age or older, and as such, many services and drop-in spaces for sex workers do not serve SWs under 18 years of age. Moreover, laws and provisions prohibiting communication in public spaces for purposes of sex exchange, operation of a bawdy house, or living off the avails of prostitution create a criminalized sex work environment. Consequently, SWs are often displaced to work in more dangerous and deserted settings (e.g., alleys, side streets and industrial areas) where they lack protection from violence and exploitation, and experience reduced access to health and social services.[21]

Data collection

Baseline data was drawn from an open prospective cohort, An Evaluation of Sex Workers Health Access (AESHA) between January 2010 and October 2011. This study was developed based on community collaborations with sex work agencies since 2005[43] and is monitored by a Community Advisory Board encompassing 15+ agencies. Eligibility criteria included self-identified as female (including transgender (male-to-female)), exchanged sex for money within the last 30 days and able to provide written informed consent. Given that adults and youth (< 18 years old) are differentially treated by Canada's criminal justice system and in order to evaluate the relationship between early sex work entry and future prostitution arrests during adulthood, analyses were restricted to 508 adult SWs (18 years of age or older) at baseline.

Given the challenges of recruiting SWs in isolated and hidden locations [44], time-location sampling was used to recruit SWs through outreach to outdoor/public (e.g., streets, alleys), off-street (e.g., online, newspaper advertisements) and indoor sex work locations (e.g., massage parlours, micro-brothels, and in-call locations) across Metro Vancouver. As previously described, indoor sex work venues and outdoor solicitation spaces ('strolls') were identified through community mapping [43] and updated by the outreach team on an ongoing basis. SWs were given the option of completing questionnaires at study offices in Metro Vancouver or at their work or home location. Participants received \$40CAD at each visit for their time, expertise and travel. All SWs provided informed consent prior to

participating in the study. Study procedures were approved by the Providence Health Care/University of British Columbia Research Ethics Board, and were conducted in accordance with the principles of the Declaration of Helsinki.

Dependent Variable—Our primary dependent variable was early age of sex work initiation, defined as the exchange of sex for money before 18 years of age (vs. 18+ years of age).

Covariates of Interest—SWs completed interviewer-administered questionnaires and received HIV/STI testing by a project nurse (as described below). The questionnaire covered **socio-demographic characteristics** (e.g., age, education, ethnicity), and **sexual** (e.g., average number of clients per night/shift, week, and month and inconsistent condom use during vaginal, oral, or anal sex with clients, in past 6 months) and **drug** (e.g., injection and non-injection drug use, past 6 months and lifetime) risk patterns. Information was collected on SWs' **work environment**, including primary places of solicitation and servicing clients in the past 6 months, physical conditions of street and indoor venues, establishment policies, interactions with managers (or pimps), police, security, city licensing, and occupational violence. **Sex work solicitation spaces** were measured based on primary place reported in response to “ways you solicited/hooked up with your clients?” in the last six months, and coded as *street/public space* (e.g. street, park, alley); *indoor* (e.g. in-call/home, bar/club, massage parlour/health enhancement spa, home/micro-brothel or other managed indoor venue); or *off-street independent* (e.g. escort agency, newspaper ads, online/newspaper self-advertizing, 1–800, phone/text). Worked for a **manager/pimp** was based on a “yes” response to “Have you ever paid someone like a manager, administrator, or pimp, or had to share with someone a percentage of your income from clients?” **Self-reported police harassment without arrest** were based on a “yes” response to any of ever told to move on, police raid (indoor venue), threatened with arrest/detainment/fine, searched without arrest, followed, picked up and driven elsewhere, verbally harassed, detained, drugs/drug use equipment taken, other property taken), and **self-reported police abuse** was based on a “yes” response to any of ever physically assaulted, propositioned to exchange sex, or coerced into providing sexual favours. **Self-reported police arrest on sex work-related charges** were based on lifetime arrest for any of the following criminal sanctions targeting adult sex workers: prohibitions on a) ‘communicating for purposes of prostitution public spaces’; b) ‘working or operating a common bawdy house’; or c) ‘living off the avails of prostitution’. **Migration-related** measures included birthplace, current place of residence, and recent migration, defined as having moved to Metro Vancouver from another country or city 5 years ago (vs. moved to Metro Vancouver > 5 years ago or lived in Vancouver entire life). Questions on **past experiences of coercion/exploitation** included being “turned out”/coerced at time of sex work entry, which was defined as a response of “Turned out (coerced into work)” to the question, “How did you first get into sex work?”

HIV/STI Outcomes of Interest—Following extensive pre-test counselling, Biolytical INSTI [Biolytical Laboratories Inc, Richmond, BC] rapid tests were used for HIV screening, with reactive tests confirmed by blood draw for western blot at the BC Centre for Disease Control. Urine samples were collected for gonorrhea and chlamydia, and blood was drawn

for syphilis, HCV-2 antibody and HCV testing. Syphilis was tested using the rapid plasma reagin (RPR) (97.2% Se and 94.1% Sp) and the *Treponema pallidum* hemagglutinin assay (TPHA) for all samples with positive RPRs. RPR titers 1:8 was considered indicative of active infection in the absence of treatment. All participants received post-test counselling. Treatment was provided by a project nurse onsite for symptomatic STIs, and free serology and Papanicolaou testing were made available, regardless of study enrolment. STI/HIV infection was defined as positive for any STI (syphilis, gonorrhea, or Chlamydia) or HIV infection.

Statistical Analyses

We fit an explanatory model to identify associations with early sex work initiation (<18 years vs. 18+). To evaluate differences in individual, interpersonal, and social-structural factors and HIV/STIs between SWs who reported early vs. later sex work entry, we used T-tests or Wilcoxon rank sum tests for continuous outcomes and Pearson's Chi-squared or Fisher's exact test for binary outcomes. Univariate and multivariate logistic regressions were performed to identify individual, interpersonal, and social-structural correlates of early sex work entry. Variables hypothesized *a priori* to be related to early sex work entry and with a significance level of <10% in univariate regressions were considered for inclusion in multivariate models. Model selection was constructed using a backward process. Akaike's Information Criteria (AIC) was used to determine the most parsimonious model.

Next, we constructed confounder models to examine the independent effect of early sex work entry on (1) HIV infection and (2) police arrests for prostitution charges (any of 'communicating in public spaces', 'working in a common bawdy house', 'living off the avails of prostitution'). Models were adjusted for key variables based on the results of our explanatory model. Sensitivity analyses were also conducted to explore the potential confounding effect of younger age of early sex work initiation (<16 years vs. 16+) on HIV infection and police arrests for prostitution charges.

RESULTS

Of 508 adult SWs, 193 (38.0%) reported early sex work entry (< 18 years old) (Table 1); of these, 133 (68.91%) initiated sex work prior to age 16. The median age at sex work entry was 20 years old (IQR: 15–30), which was 14 among those who began sex work as adolescents (vs. 27 among those who began as adults). Across the sample, median duration of sex work was 11 years (IQR: 4–19). Among early initiates, in the last 6 months, 78.53% solicited clients in primarily street-based settings, and 21.46% in off-street (i.e., indoor/independent) settings. HIV prevalence was 11.22%, which was 19.69% among early initiates (Odds Ratio (OR): 3.82, 95% Confidence Interval (CI): 2.13–6.85). The combined prevalence of any STI/HIV was 20.87% (n=106), which was 33.16% among SWs who entered sex work during adolescence (OR: 3.32, 95% CI: 2.07–5.02).

In comparison with participants who entered sex work as adults, those who reported early initiation were more likely to report using injection (54.92% vs. 28.89%, $p<0.001$) and non-injection drugs (90.16% vs. 57.14%, $p<0.001$), and inconsistent condom use with clients (21.24% vs. 12.70%, $p<0.011$). Among participants with a history of injection drug use

(n=257), 84 (32.68%) initiated injection drug use prior to age 18. Compared to later initiates, women who began sex work during adolescence were less likely to be foreign-born (2.59% vs. 62.22%, $p<0.001$) or recent migrants to Vancouver (16.06% vs. 32.38%, $p<0.001$). These women were more likely to report prior homelessness (89.64% vs. 54.60%, $p<0.001$) and to currently work on the street (78.53%), rather than in indoor (6.28%) venues ($p<0.001$). Early initiates also reported greater exposure to self-reported police harassment (74.61% vs. 49.21%, $p<0.001$), self-reported police abuse (27.98% vs. 12.06%, $p<0.001$), and self-reported arrest on prostitution charges (43.52% vs. 15.87%, $p<0.001$) than women who reported later sex work entry. Those who began sex work as youth were also more likely to have worked for a manager or pimp (37.82% vs. 15.56%, $p<0.001$) or to report having been “turned out” or coerced into sex work (20.73% vs. 5.40%, $p<0.001$).

In unadjusted analysis, individual and interpersonal factors positively associated with early sex work entry included recent injection and non-injection drug use and inconsistent condom use with clients. Social-structural factors negatively associated with early initiation included recent migration to Vancouver and working indoors. Prior homelessness, being Canadian-born, self-reported police harassment without arrest, police abuse, and arrest on prostitution charges, and having worked for a manager or been “turned out” or coerced into sex work were positively associated with early sex work entry. Early initiation was also associated with increased risk of HIV infection and STIs.

In a multivariate explanatory model, after adjusting for other factors, injection drug use (AOR: 1.59, 95%CI: 1.03–2.46), being Canadian-born (AOR: 6.79, 95%CI: 2.42–19.02), and having worked for a manager or pimp (AOR: 2.22, 95%CI: 1.35–3.63) or been “turned out” or coerced into sex work (AOR: 2.25, 95%CI: 1.14–4.44) were positively associated with early sex work entry (Table 2). In separate confounder models (Table 3), early sex work entry (<18 years) retained an increased independent effect on HIV infection (AOR: 2.49, 95% CI: 1.35–4.64) and self-reported arrest on prostitution charges (AOR: 2.07, 95%CI: 1.32–3.25). Sensitivity analysis using a younger age cut-off (<16 years) indicated that earlier age of adolescent sex work entry (defined as <16 years) retained an independent increased effect on HIV infection (AOR: 1.88, 95%CI: 1.03–3.42) and arrest on prostitution charges (AOR: 2.75, 95%CI: 1.73–4.36).

DISCUSSION

In this study, 38% of sex workers reported early sex work entry before 18 years of age – a proportion that is consistent with estimates from diverse settings suggesting that between 20–40% of sex workers initiate sex work as adolescents.[7, 8, 18, 45, 46] The vast majority were among street-based sex workers. In the current study, these participants were more likely to be Canadian-born (vs. foreign-born), inject drugs, and to have worked for a manager during their lifetime. Initiation of sex work during adolescence was further shown to independently increase the odds of HIV infection and self-reported prostitution arrests.

Contrary to public concerns around the exploitation and trafficking of young migrants,[47] adolescent sex workers were significantly less likely to be migrants from other countries or provinces. Instead, these findings suggest that youth sex work is concentrated among

Canadian-born, marginalized, drug and street-involved sex workers. These participants were more likely to have had a manager and to report prior coercion into the sex industry, which is supported by prior studies indicating the potential for increased vulnerability to exploitation and trafficking among street-involved youth [7, 48, 49]. However, in this study, prior coercion was only reported by a minority of participants who began sex work as adolescents (20.73%), indicating the importance of distinguishing between youth sex work and coercion or trafficking into the sex industry [48].

Whereas prior studies investigating the relationship between HIV and early sex work entry in Asia have postulated that sexual risks such as difficulties negotiating condom use with clients may explain increased HIV prevalence among this population,[11, 13, 17] our multivariate results emphasized the dominant role of injection drug use in potentially explaining these differences. Our study adds to a growing body of North American evidence regarding the key role of injection drug use in shaping youth sex work involvement.[5, 8, 15] Among SWs along the Mexico-U.S. border, those who began sex work during adolescence were more likely than their adult counterparts to begin drug use after sex work, and early sex work entry was associated with forced injection drug use initiation, inhalant use (a common marker for homelessness and street entrenchment), and HIV risk behaviors, including receptive syringe sharing.[8] Although drug dependent individuals may enter sex work to support drug and subsistence needs,[3, 15, 16, 30, 50] sex work may also lead to drug use, especially during adolescence [8].

In this study, early sex work entry was shown to increase the likelihood of HIV infection among sex workers. Alarming high HIV prevalence (19.69%) was found among participants who reported entry prior to age 18, a figure that is approximately three times greater than those who entered sex work as adults. This observation is supported by research from South and South East Asia demonstrating that early sex work entry confers a two to four-fold increase in the odds of HIV infection.[11, 13] However, these prior studies have largely linked increased HIV risk among this population to reduced condom negotiation abilities or coercion into sex work,[11] whereas our findings uniquely situate drug use and criminalization as potential pathways to HIV infection among younger sex workers.

Early sex work initiation was also independently associated with greater criminalization during adulthood. These results suggest that adolescent sex workers are highly criminalized, and that current prohibitive sex work laws may exacerbate the long-term health and social impacts of adolescent sex work. In Mexico, early initiates also reported greater exposure to police violence, including sexual abuse to avoid arrest and syringe confiscation by police.[8] Globally, police arrest, harassment and violence have been shown to increase risk of HIV infection and client violence, and to pose barriers to health and social services.[1, 14, 18–21, 35, 40] In addition to the fact that criminalization of adult sex work has been linked to these negative outcomes, this evidence suggests that the current law enforcement approach may also be inadvertently criminalizing and further marginalizing younger populations in the sex industry.

Strengths and limitations

Given our limited ability to infer causality due to the cross-sectional nature of our analysis, longitudinal and mixed methods studies are recommended to strengthen our understanding of the health impacts of adolescent sex work. To develop evidence-based interventions, future observational and intervention studies engaging adolescents currently within the sex industry are needed. Given the self-reported nature of our policing variables, studies triangulating epidemiologic and law enforcement data would further strengthen our understanding of how criminalization shapes young sex workers' health. Given that the buying and selling of sex is only legal among adults 18 years of age or older in Canada, and as such many services and drop-in spaces for sex workers do not serve SWs under 18 years of age, our analysis employed a cut-off of age 18 to define early sex work initiation, which also allowed us to compare our findings with other studies conducted internationally, which have typically employed this cut-off. However, our sensitivity analyses suggested a stronger relationship between an even earlier age of initiation (<16 years) and police arrest, indicating the inadvertent negative impact of criminalization on younger ages of youth and the need to consider this in public health and social interventions.

Conclusion

The strikingly high prevalence of HIV and its associations with adolescent sex work initiation suggest an urgent need to reduce exploitation and improve the HIV prevention capacities of younger sex workers, especially those who inject drugs. Although multi-level interventions incorporating interpersonal (e.g., increasing condom use) and social-structural (e.g., policy change, sex work collectivization) factors among adult SWs have proven to be successful in reducing risk of HIV/STI infection [51–55], interventions tailored to the needs of adolescent SWs have yet to be developed.[7] The development and scale-up of such interventions are urgently needed given that youth in the sex industry may be less likely to have access to conventional HIV prevention services; in many settings, HIV-related services for this population are absent, which also poses an ethical barrier to their recruitment and retention in epidemiological studies.

These data contribute to a growing evidence base suggesting that the health impacts of sex work strongly depend on its *social-structural context*. [26, 28–30, 56] In Canada and other settings where sex work overlaps with drug markets (e.g., Mexico, United Kingdom), criminalization by police and drug use may disproportionately shape the risks experienced by younger women in sex work.[30] These data underscore the importance of legal reforms and social supports to strengthen adolescent and adult sex workers' rights. Findings suggest the need to move away from a law enforcement approach to an evidence-based public health approach to reducing harm among younger sex workers.

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SG and KS conceptualized the study. SG led the analyses and drafted the manuscript. KS had full access to all of the data in the study and takes full responsibility for the integrity of the data and the accuracy of the data analysis. JC coordinated field data collection. AS conducted the statistical analyses and all authors interpreted the results. AS, JC, JS, SS, JM, and KS critically revised and edited the manuscript and participated in interpretation of the findings.

References

1. Shannon K, Kerr T, Allinott S, Chettiar J, Shoveller J, Tyndall MW. Social and structural violence and power relations in mitigating HIV risk of drug-using women in survival sex work. *Social Science & Medicine*. 2008; 66:911–921. [PubMed: 18155336]
2. Haley N, Leclerc P, Lemire N, Boivin J, Frappier J, Claessens C. Prevalence of HIV infection and risk behaviours among Montreal street youth. *International Journal of STD & AIDS*. 2000; 11:241–247. [PubMed: 10772087]
3. Chettiar J, Shannon K, Wood E, Zhang R, Kerr T. Survival sex work involvement among street-involved youth who use drugs in a Canadian setting. *Journal of Public Health*. 2010; 32:322–327. [PubMed: 20061578]
4. Stoltz JAM, Shannon K, Kerr T, Zhang R, Montaner JS, Wood E. Associations between childhood maltreatment and sex work in a cohort of drug-using youth. *Social Science & Medicine*. 2007; 65:1214–1221. [PubMed: 17576029]
5. Weber AE, Boivin JF, Blais L, Haley N, Roy É. HIV risk profile and prostitution among female street youths. *Journal of Urban Health*. 2002; 79:525–535. [PubMed: 12468672]
6. Miller CL, Spittal PM, LaLiberte N, Li K, Tyndall MW, O'Shaughnessy MV, et al. Females experiencing sexual and drug vulnerabilities are at elevated risk for HIV infection among youth who use injection drugs. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2002; 30:335–341.
7. Silverman J. Adolescent female sex workers: invisibility, violence and HIV. *Archives of Disease in Childhood*. 2011; 96:478–481. [PubMed: 21357241]
8. Goldenberg SM, Rangel G, Vera A, Patterson TL, Abramovitz D, Silverman JG, et al. Exploring the impact of underage sex work among female sex workers in two Mexico-US border cities. *AIDS Behav*. 2012; 16:969–981. [PubMed: 22012147]
9. Shannon K, Bright V, Gibson K, Tyndall MW. Sexual and drug-related vulnerabilities for HIV infection among women engaged in survival sex work in Vancouver, Canada. *Canadian Journal of Public Health*. 2007; 98:465–469. [PubMed: 19039884]
10. Silverman JG, Decker M, Gupta J, Maheshwari A, Patel V, Raj A. HIV prevalence and predictors among rescued sex-trafficked women and girls in Mumbai, India. *Journal of Acquired Immune Deficiency Syndromes*. 2006; 43:588–593. [PubMed: 17019369]
11. Silverman JG, Decker M, Gupta J, Maheshwari A, Willis B, Raj A. HIV Prevalence and Predictors of Infection in Sex-Trafficked Nepalese Girls and Women. *Journal of the American Medical Association*. 2007; 298:536–542. [PubMed: 17666674]
12. Baral S, Beyrer C, Muessig K, Poteat T, Wirtz AL, Decker MR, et al. Burden of HIV among female sex workers in low-income and middle-income countries: a systematic review and meta-analysis. *The Lancet infectious diseases*. 2012; 12:538–549. [PubMed: 22424777]
13. Sarkar K, Bal B, Mukherjee R, Saha M, Chakraborty S, Niyogi S, et al. Young age is a risk factor for HIV among female sex workers--An experience from India. *Journal of Infection*. 2006; 53:255–259. [PubMed: 16386307]
14. Shannon K, Rusch M, Shoveller J, Alexson D, Gibson K, Tyndall MW. Mapping violence and policing as an environmental-structural barrier to health service and syringe availability among substance-using women in street-level sex work. *International Journal of Drug Policy*. 2008; 19:140–147. [PubMed: 18207725]
15. Weber AE, Boivin JF, Blais L, Haley N, Roy É. Predictors of initiation into prostitution among female street youths. *Journal of Urban Health*. 2004; 81:584–595. [PubMed: 15466840]

16. Kerr T, Marshall B, Miller C, Shannon K, Zhang R, Montaner J, et al. Injection drug use among street-involved youth in a Canadian setting. *BMC Public Health*. 2009; 9:171. [PubMed: 19493353]
17. Urada LA, Malow RM, Santos NC, Morisky DE. Age Differences among Female Sex Workers in the Philippines: Sexual Risk Negotiations and Perceived Manager Advice. *AIDS Research and Treatment*. 2012
18. Shannon K, Kerr T, Strathdee SA, Shoveller J, Montaner JS, Tyndall MW. Prevalence and structural correlates of gender based violence among a prospective cohort of female sex workers. *BMJ: British Medical Journal*. 2009:339.
19. Simic M, Rhodes T. Violence, dignity and HIV vulnerability: street sex work in Serbia. *Sociol Health Illn*. 2009; 31:1–16. [PubMed: 19144087]
20. Strathdee SA, Lozada R, Martinez G, Vera A, Rusch M, Nguyen L, et al. Social and Structural Factors Associated with HIV Infection among Female Sex Workers Who Inject Drugs in the Mexico-US Border Region. *PLoS One*. 2011; 6:e19048. [PubMed: 21541349]
21. Shannon K, Strathdee SA, Shoveller J, Rusch M, Kerr T, Tyndall MW. Structural and environmental barriers to condom use negotiation with clients among female sex workers: implications for HIV-prevention strategies and policy. *American Journal of Public Health*. 2009; 99:659–665. [PubMed: 19197086]
22. Yi HS, Mantell JE, Wu RR, Lu Z, Zeng J, Wan YH. A profile of HIV risk factors in the context of sex work environments among migrant female sex workers in Beijing, China. *Psychology Health & Medicine*. 2010; 15:172–187.
23. Goldenberg S, Strathdee S, Gallardo M, Patterson T. “People Here Are Alone, Using Drugs, Selling their Body”: Deportation and HIV Vulnerability among Clients of Female Sex Workers in Tijuana. *Field Actions Science Reports*. 2010:1–7.
24. Bautista C, Mosquera C, Serra M, Gianella A, Avila M, Laguna-Torres V, et al. Immigration Status and HIV-risk Related Behaviors among Female Sex Workers in South America. *AIDS and Behavior*. 2008; 12:195–201. [PubMed: 17587171]
25. Ferguson AG, Morris CN. Mapping transactional sex on the Northern Corridor highway in Kenya. *Health Place*. 2007; 13:504–519. [PubMed: 16815730]
26. Harcourt C, Donovan B. The many faces of sex work. *Sexually Transmitted Infections*. 2005; 81:201–206. [PubMed: 15923285]
27. Decker M, McCauley H, Phuengsamran D, Janyam S, Silverman J. Sex trafficking, sexual risk, sexually transmitted infection and reproductive health among female sex workers in Thailand. *Journal of epidemiology and community health*. 2011; 65:334–339. [PubMed: 20515895]
28. Dandona R, Dandona L, Gutierrez J, Kumar A, McPherson S, Samuels F, et al. High risk of HIV in non-brothel based female sex workers in India. *BMC Public Health*. 2005; 5:87. [PubMed: 16111497]
29. Weitzer R. Sociology of sex work. *Annual Review of Sociology*. 2009; 35:213–234.
30. Cusick L. Widening the harm reduction agenda: From drug use to sex work. *International Journal of Drug Policy*. 2006; 17:3–11.
31. Ramesh S, Ganju D, Mahapatra B, Mishra RM, Saggurti N. Relationship between mobility, violence and HIV/STI among female sex workers in Andhra Pradesh, India. *BMC Public Health*. 2012; 12:764. [PubMed: 22967276]
32. Wirth KE, Tchetgen Tchetgen EJ, Silverman JG, Murray MB. How Does Sex Trafficking Increase the Risk of HIV Infection? An Observational Study From Southern India. *Am J Epidemiol*. 2013
33. Wong ML, Chan R, Tan HH, Yong E, Lee L, Cutter J, et al. Sex Work and Risky Sexual Behaviors among Foreign Entertainment Workers in Urban Singapore: Findings from Mystery Client Survey. *Journal of Urban Health-Bulletin of the New York Academy of Medicine*. 2012; 89:1031–1044. [PubMed: 22707309]
34. Shannon K, Csete J. Violence, condom negotiation, and HIV/STI risk among sex workers. *JAMA: the journal of the American Medical Association*. 2010; 304:573–574. [PubMed: 20682941]
35. Strathdee SA, Lozada R, Pollini RA, Brouwer KC, Mantsios A, Abramovitz DA, et al. Individual, social, and environmental influences associated with HIV infection among injection drug users in Tijuana, Mexico. *J Acquir Immune Defic Syndr*. 2008; 47:369–376. [PubMed: 18176320]

36. Zhang C, Li X, Hong Y, Zhou Y, Liu W, Stanton B. Unprotected sex with their clients among low-paying female sex workers in southwest China. *AIDS Care*. 2012
37. Pando MA, Coloccini RS, Reynaga E, Rodriguez Fermepin M, Gallo Vaulet L, Kochel TJ, et al. Violence as a Barrier for HIV Prevention among Female Sex Workers in Argentina. *PLoS One*. 2013; 8:e54147. [PubMed: 23342092]
38. Erausquin JT, Reed E, Blankenship KM. Police-related experiences and HIV risk among female sex workers in Andhra Pradesh, India. *J Infect Dis*. 2011; 204 (Suppl 5):S1223–1228. [PubMed: 22043036]
39. Braunstein SL, Ingabire CM, Geubbels E, Vyankandondera J, Umulisa M-M, Gahiro E, et al. High Burden of Prevalent and Recently Acquired HIV among Female Sex Workers and Female HIV Voluntary Testing Center Clients in Kigali, Rwanda. *PLoS One*. 2011; 6:e24321. [PubMed: 21949704]
40. Rhodes T, Singer M, Bourgois P, Friedman SR, Strathdee SA. The social structural production of HIV risk among injecting drug users. *Soc Sci Med*. 2005; 61:1026–1044. [PubMed: 15955404]
41. Rhodes T, Simi M, Baroš S, Platt L, Žiki B. Police violence and sexual risk among female and transvestite sex workers in Serbia: qualitative study. *BMJ: British Medical Journal*. 2008;337.
42. Strathdee SA, Patrick DM, Currie SL, Cornelisse PGA, Rekart ML, Montaner JSG, et al. Needle exchange is not enough: lessons from the Vancouver injecting drug use study. *AIDS*. 1997
43. Shannon K, Bright V, Allinott S, Alexson D, Gibson K, Tyndall MW. Community-based HIV prevention among substance-using women in survival sex work: the Maka Project Partnership. *Harm Reduction Journal*. 2007
44. 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. [PubMed: 11392935]
45. Sarkar K, Bal B, Mukherjee R, Chakraborty S, Saha S, Ghosh A, et al. Sex-trafficking, violence, negotiating skill, and HIV infection in brothel-based sex workers of eastern India, adjoining Nepal, Bhutan, and Bangladesh. *Journal of health, population, and nutrition*. 2008; 26:223–231.
46. Wechsberg WM, Luseno WK, Lam WKK, Parry CDH, Morojele NK. Substance use, sexual risk, and violence: HIV prevention intervention with sex workers in Pretoria. *AIDS and Behavior*. 2006; 10:131–137. [PubMed: 16482408]
47. U.S. State Department. Trafficking in Persons Report. 2012.
48. Goldenberg S, Silverman J, Bojorquez-Chapela I, Engstrom D, Usita P, Rolon M, et al. Exploring the context of involuntary and adolescent sex industry involvement in Tijuana, Mexico: Consequences for HIV risk and prevention. *Violence Against Women*. In Press.
49. Goldenberg S, Silverman J, Engstrom D, Bojorquez-Chapela I, Strathdee S. “Right here is the gateway”: Mobility, sex work entry and HIV risk along the Mexico-U.S. border. *International Migration*. In Press.
50. DeBeck K, Shannon K, Wood E, Li K, Montaner J, Kerr T. Income generating activities of people who inject drugs. *Drug and Alcohol Dependence*. 2007; 91:50–56. [PubMed: 17561355]
51. Kerrigan D, Moreno L, Rosario S, Gomez B, Jerez H, Barrington C, et al. Environmental-structural interventions to reduce HIV/STI risk among female sex workers in the Dominican Republic. *American Journal of Public Health*. 2006; 96:120–125. [PubMed: 16317215]
52. Lippman SA, Donini A, Diaz J, Chinaglia M, Reingold A, Kerrigan D. Social-environmental factors and protective sexual behavior among sex workers: the Encontros intervention in Brazil. *American Journal of Public Health*. 2010; 100:S216–223. [PubMed: 19762673]
53. Kerrigan D, Ellen JA, Moreno L, Rosario S, Katz J, Celentano DD, et al. Environmental-structural factors significantly associated with consistent condom use among female sex workers in the Dominican Republic. *AIDS*. 2003; 17:415–423. [PubMed: 12556696]
54. Jana S, Basu I, Rotheram-Borus MJ, Newman PA. The Sonagachi Project: a sustainable community intervention program. *Aids Education and Prevention*. 2004; 16:405–414. [PubMed: 15491952]
55. Cohen J. Sonagachi sex workers stymie HIV. *Science*. 2004; 304:506–506. [PubMed: 15105470]

56. Church S, Henderson M, Barnard M, Hart G. Violence by clients towards female prostitutes in different work settings: questionnaire survey. *British Medical Journal*. 2001; 322:524–525. [PubMed: 11230067]

Table 1

Characteristics and unadjusted factors associated with early sex work initiation (<18 years old vs. 18+years) among adult sex workers (n=508) in Vancouver, Canada

Characteristic	Yes n (%) n = 193	No n (%) n = 315	Odds Ratio (95% CI)
Individual factors			
Age (median, IQR)	32 (27–41)	37 (30–43)	0.97 (0.95–0.99)
Education level			
High School	53 (27.46%)	114 (36.19%)	4.66 (3.15–6.88)
< High School	140 (72.54%)	201 (63.81%)	
Aboriginal ancestry			
yes	107 (55.44%)	94 (29.84%)	2.93 (2.02–4.25)
no	86 (44.56%)	221 (70.16%)	
Injection drug use *			
yes	106 (54.92%)	91 (28.89%)	3.0 (2.06–4.36)
no	87 (45.08%)	224 (71.11%)	
Non-injection drug use *			
yes	174 (90.16%)	180 (57.14%)	6.87 (4.07–11.59)
no	19 (9.84%)	135 (42.86%)	
Interpersonal factors			
Inconsistent condom use with clients *			
yes	41 (21.24%)	40 (12.70%)	1.85 (1.15–2.99)
no	152 (78.76%)	275 (87.30%)	
Number of clients, last month (median, IQR)	48 (20–90)	45 (24–80)	1.00 (1.00–1.01)
Anal sex with clients *			
yes	35 (18.13%)	31 (9.84%)	2.03 (1.21–3.42)
no	158 (79.27%)	284 (90.16%)	
Social-structural factors			
Ever been homeless			
yes	173 (89.64%)	172 (54.60%)	7.19 (4.30–12.02)
no	20 (10.36%)	143 (45.40%)	
Birth country			
Born in Canada	188 (97.41%)	119 (37.78%)	22.83 (9.13–57.10)
Foreign-born	5 (2.59%)	196 (62.22%)	
Migrated to Vancouver in past 5 years			
yes	31 (16.06%)	102 (32.38%)	0.40 (0.26–0.63)
no	162 (83.94%)	213 (67.62%)	
Primary sex work solicitation venue *			
Street (ref)	150 (78.53%)	143 (45.40%)	
Indoor	12 (6.28%)	128 (40.63%)	0.09 (0.05–0.17)
Independent	29 (15.18%)	44 (13.97%)	0.63 (0.37–1.06)

Characteristic	Yes n (%) n = 193	No n (%) n = 315	Odds Ratio (95% CI)
Self-reported police harassment [†]			
yes	144 (74.61%)	155 (49.21%)	3.03 (2.05–4.49)
no	49 (25.39%)	160 (50.79%)	
Self-reported police abuse [†]			
yes	54 (27.98%)	38 (12.06%)	2.83 (1.78–4.50)
no	139 (72.02%)	277 (87.94%)	
Self-reported police arrest on prostitution charges [†]			
yes	84 (43.52%)	50 (15.87%)	4.08 (2.70–6.18)
no	109 (56.48%)	265 (84.13%)	
Worked for a manager/pimp [†]			
yes	73 (37.82%)	49 (15.56%)	3.30 (2.17–5.03)
no	120 (62.18%)	266 (84.44%)	
“Turned out”/coerced into sex work [†]			
yes	40 (20.73%)	17 (5.40%)	4.58 (2.52–8.35)
no	153 (79.27%)	298 (94.60%)	
HIV/STI outcomes			
Positive for HIV			
yes	38 (19.69%)	19 (6.03%)	3.82 (2.13–6.85)
no	155 (80.31%)	296 (93.97%)	
Positive for any STI			
yes	30 (15.54%)	27 (8.57%)	1.96 (1.13–4.42)
no	163 (84.46%)	288 (91.43%)	
Positive for any STI/HIV			
yes	64 (33.16%)	42 (13.33%)	3.32 (2.07–5.02)
no	129 (66.84%)	273 (86.67%)	

* In the last 6 months

[†] Lifetime

Table 2

Explanatory model of factors associated with early sex work initiation among adult sex workers (n=506) in Vancouver, Canada

Early sex work entry <18 years (vs. 18+ years)		
Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval (CI)
Age, years	0.97	0.94–0.99
< High School Level Education		
(yes vs. no)	2.81	1.79–4.41
Injection drug use*		
(yes vs. no)	1.59	1.03–2.46
Canadian Born		
(yes vs. no)	6.79	2.42–19.02
Primary sex work solicitation venue*		
Street (ref)		
Indoor	0.41	0.19–0.92
Independent	0.68	0.38–1.21
“Turned out”/coerced into sex work		
(yes vs. no)	2.25	1.14–4.44
Worked for a manager/pimp [†]		
(yes vs. no)	2.22	1.35–3.63

* In the last 6 months

[†] Lifetime

Table 3

Separate confounder models examining the independent effect of early sex work initiation on HIV infection and police arrest on prostitution charges among adult sex workers (n=506)

Exposure	Outcomes	
	HIV Infection	Police Arrest on Prostitution Charges
	Adjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95%CI)
Early sex work entry <18 years (vs. 18+ years)	2.49 (1.35–4.64)	2.07 (1.32–3.25)
Early sex work entry <16 years (vs. 16+ years)	1.88 (1.03–3.42)	2.75 (1.73–4.36)

* Confounder models adjusted for Canadian born (vs. migrant/new immigrant worker), injection drug use history, and worked for a manager/pimp (lifetime)