

Shooting Gallery Attendance among IDUs in Tijuana and Ciudad Juarez, Mexico: Correlates, Prevention Opportunities, and the Role of the Environment

Morgan Philbin · Robin A. Pollini · Rebecca Ramos · Remedios Lozada ·
Kimberly C. Brouwer · Maria Elena Ramos · Michelle Firestone-Cruz ·
Patricia Case · Steffanie A. Strathdee

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Abstract We identified factors associated with shooting gallery attendance among injection drug users (IDUs) in two Mexico–US border cities. IDUs in Tijuana ($n = 222$) and Ciudad Juarez ($n = 205$), Mexico, who were ≥ 18 years and injected illicit drugs in the last month were recruited using respondent-driven sampling (RDS). An interviewer-administered survey collected sociodemographic and behavioral data. Logistic regression was used to examine correlates of shooting gallery attendance in each of the two cities. Homelessness and being arrested for syringe possession—both structural level factors—were associated with shooting gallery use in both cities. In Ciudad Juarez, younger age and having overdosed were also associated with shooting gallery use. Our study highlights the need for structural interventions that mitigate homelessness among IDUs and facilitate changes in law enforcement practices associated with shooting gallery use.

Harm reduction interventions based within shooting galleries should also be considered to prevent transmission of blood-borne pathogens among IDUs.

Keywords HIV/AIDS · IDU · Mexico · Shooting gallery

Introduction

Tijuana and Ciudad Juarez are located near the United States–Mexican border adjacent to San Diego, California and El Paso, Texas, respectively, and both are situated along major northbound drug trafficking routes (Brouwer et al. 2006a). In Tijuana, the percentage of the general population reporting having ever used an illegal drug is the highest in Mexico (14.7%) and almost three times the national average (5.3%); Ciudad Juarez has the second highest prevalence in the country (9.2%) (Consejo Nacional Contra las Adicciones 1998; Dantés 1999).

The prevalence of HIV in Mexico is 0.3%, but is substantially higher among some high risk subpopulations on Mexico's northern border. HIV prevalence among injection drug users (IDUs) has remained below 5% in Tijuana and Ciudad Juarez (Frost et al. 2006; Magis-Rodriguez et al. 2005) but prevalence is 12% in both cities among female sex workers who inject drugs (Strathdee et al. 2008). In 2005, up to one in 125 adults (0.8%) aged 15–49 was estimated to be HIV positive in Tijuana (Brouwer et al. 2006b).

Concern has been raised about the potential for HIV to spread rapidly through IDU populations in Tijuana and Ciudad Juarez because many IDUs in these cities report high risk injection behaviors, including injecting in shooting galleries. The term “shooting gallery” is used to describe a location where IDUs exchange drugs or money for a place to

M. Philbin · R. A. Pollini (✉) · K. C. Brouwer ·
M. Firestone-Cruz · S. A. Strathdee
Department of Family and Preventive Medicine, School
of Medicine, University of California, San Diego,
9500 Gilman Drive, La Jolla, CA 92093-0622, USA
e-mail: rpollini@ucsd.edu

R. Ramos
United States–Mexico Border Health Association, El Paso,
TX, USA

R. Lozada
Pro-COMUSIDA, Tijuana, Baja California, Mexico

M. E. Ramos
Programa Compañeros, Ciudad Juarez, Chihuahua, Mexico

P. Case
The Fenway Institute, Fenway Community Health,
Boston, MA, USA

inject. Syringes are often borrowed, rented, or purchased at these venues and other injection paraphernalia (e.g., cookers, cotton) are commonly shared among friends and strangers alike (Celentano et al. 1991; Fuller et al. 2003; Reyes et al. 1996; Strathdee et al. 2005). In cities where shooting galleries are part of the drug culture, they tend to be located in high drug use neighborhoods near points of drug purchase (Kimber and Dolan 2007; Reyes et al. 1996) but hidden from view of law enforcement and the general public.

In northern Mexico, shooting galleries are referred to as *picaderos* (derived from the Spanish verb *picar*—to prick or puncture) and are described as dilapidated buildings, vacant lots, or alleyways where IDUs are required to pay the shooting gallery operator a *sica* [fee]—commonly a few pesos or drops of drug from a syringe—to gain access (Firestone-Cruz et al. 2007; Strathdee et al. 2005). In 2004, there were approximately 200 *picaderos* in Tijuana and 185 in Ciudad Juarez (Cravioto 2003; Strathdee et al. 2005).

Because sharing injection equipment is common in these settings, shooting gallery use has been identified as a risk factor for HIV infection in several cities in the US, Puerto Rico and Canada (Chitwood et al. 1990; Corneil et al. 2006; Craib et al. 2003; Deren et al. 2004; Freeman et al. 1999; Robles et al. 1992; Strathdee et al. 1997). Despite its potentially important role in furthering HIV epidemics, few studies have examined correlates of shooting gallery use and no published papers have done so in the Mexican context. A study of IDUs in Baltimore, Maryland, (Celentano et al. 1991) found that shooting gallery use was significantly associated with heavier drug use and being male, homosexual/bisexual, of low socioeconomic status, or black race. Homelessness was also associated with recent shooting gallery use in Philadelphia, Pennsylvania (Metraux et al. 2004) and Puerto Rico (Reyes et al. 1996).

Findings that factors like homelessness and socioeconomic status are associated with shooting gallery use are consistent with research showing that factors above the level of the individual—referred to as “structural level factors”—can influence IDU risk behaviors by shaping the environment in which injection occurs (Rhodes et al. 2003). For example, although sterile syringes can be legally purchased and possessed in Mexico, qualitative interviews of IDUs conducted by our group in Tijuana and Ciudad Juarez showed that fear of detection by police discourages the carrying of syringes for personal use and is an important factor in an IDU’s decision to use shooting galleries, where syringes can be readily obtained (Miller et al. in press; Strathdee et al. 2005). A more recent study by our group showed a quantitative association between arrests for syringe possession and receptive syringe sharing (Pollini et al. 2008). Similar associations between fear of police detection and syringe sharing have been demonstrated in other countries as well (Cooper et al. 2005; Rhodes et al. 2003),

and at least two studies have linked the need to avoid police detection with shooting gallery use (Celentano et al. 1991; Kimber and Dolan 2007). The current study sought to identify individual and structural level factors associated with shooting gallery use in Tijuana and Ciudad Juarez in order to guide interventions to reduce transmission of blood-borne infections in these cities.

Methods

Participants

We conducted a cross sectional study of behavioral and contextual factors associated with HIV, HCV, and syphilis infection among IDUs in Tijuana and Ciudad Juarez, Mexico. Recruitment of IDUs occurred between February and April 2005, and eligibility criteria included having injected illicit drugs within the past thirty days, confirmed by inspection of injection stigmata (“track marks”); age ≥ 18 years; ability to speak Spanish or English; and being willing and able to provide written informed consent.

Participants were recruited using respondent-driven sampling (RDS) methods. A diverse group of “seeds” (selected for heterogeneity by age, gender, drug of choice, and recruitment venue) were given three uniquely coded coupons to refer their peers to the study (Heckathorn 1997). This study population was comprised of 15 seeds and 207 recruits in Tijuana and 9 seeds and 197 recruits in Ciudad Juarez, as previously described (Frost et al. 2006). Waves of recruitment continued as subjects referred to the study were each given three coupons to further recruit members of their own social networks. Participants received \$5 in compensation for each individual recruited. In Ciudad Juarez, recruitment was based at a clinic run by a trusted non-governmental organization (NGO), Programa Compañeros, which has provided outreach, prevention, and treatment services to injection drug users and conducted studies with this population since 1986. In Tijuana, an NGO called *Centro de Integración y Recuperación para Enfermos de Alcoholismo y Drogadicción “Mario Camacho Espiritu”, A.C.* (CIRAD), which began working with drug users over 15 years ago, based recruitment from a mobile van that made weekly trips to three geographically diverse *colonias* (neighborhoods): Zona Norte, Grupo Mexico, and Sepanal.

Measures

Participants received up to \$20 USD compensation for completing the survey, which was administered by trained staff. Questions were informed by prior qualitative interviews conducted by our study team in both Tijuana and Ciudad Juarez (Strathdee et al. 2005) as well as research

experience from several of our co-investigators regarding policing practices and other structural level factors in different countries (e.g., the United States, Canada, Russia). Questions on individual risk behaviors were based on the last author's 15 years of experience with the ALIVE and VIDUS IDU cohort studies in Baltimore and Vancouver, respectively. The survey instruments from these two studies have been used as models for IDU studies in several countries. In this study, the survey elicited information on background characteristics, drug use history, risk behaviors, and knowledge and utilization of health services. This included socio-economic and demographic profiles, drug use practices, information on syringe sharing and acquisition, arrest history, medical history, and HIV/STI knowledge. Participants were asked specifically about their lifetime drug use histories and more recent (past 6 months) drug use, including routes of administration, types of drugs used, and location of injection (e.g., at their home, at a friend's home, on the street, at a bar, shooting gallery, alleyway, construction site, or other location). Shooting gallery use was coded as a dichotomous variable based on their response to the question: "In the past 6 months, tell me if you injected drugs in a *picadero*?"

Participants were screened on-site for HIV antibody with the Determine Rapid Test (Abbott Laboratories, Abbott Park, IL). We obtained blood samples through venipuncture and serum was stored at the municipal health clinic before being shipped to the New Mexico State Laboratory (for Ciudad Juarez samples) or San Diego County public health laboratory (for Tijuana samples) for further testing. A western blot, HIV enzyme immunoassay (EIA), and/or HIV immunofluorescence assay was used to confirm HIV-seropositive and indeterminate results. All samples were tested for anti-HCV antibodies using an EIA test (Ortho Diagnostic Systems EIA 3.0, Raritan, NJ) and for syphilis antibody with the rapid plasma reagin (RPR) test (Macro-Vue, Becton Dickinson, Franklin Lakes, NJ). Reactive HCV samples were retested with an EIA to confirm, and reactive syphilis samples were confirmed using a *Treponema pallidum* particle agglutination assay (TPPA) (Serodia, Fujirebio Diagnostics, Malvern, PA). In the absence of clinical information, those with syphilis titers $\geq 1:8$ were considered suggestive, but not conclusive, of incident syphilis infection. All participants were provided pre- and post-test counseling and those testing positive for HIV, Hepatitis C or syphilis were referred to local municipal health clinics for free medical care.

Data Analysis

We used descriptive statistics to characterize the study population, and compared participants enrolled in Tijuana and Ciudad Juarez to identify any significant differences by

site using Chi-square or Fisher's exact test for categorical variables and *t*-tests and the Wilcoxon rank sum test for normally and non-normally distributed continuous variables, respectively. Univariate analyses comparing IDUs who reported shooting gallery attendance in the last 6 months to those who did not were conducted using the same statistical tests. Variables associated with shooting gallery attendance at a level of $P < .10$ were entered into a multiple logistic regression model in a manual stepwise fashion, starting with those with the lowest *P*-value and proceeding through those with the highest value, to identify factors independently associated with shooting gallery use in each city. The likelihood ratio test was used to compare nested models to determine which variables should be retained in multivariable models at a $P < .05$.

To determine whether these multivariable models were both generalizable and valid, we undertook two additional analyses to explore potential effects of the RDS recruitment process on our estimates. First, to identify bias that might arise from the RDS sampling process, we generated overall sampling weights based on recruitment weights and degree weights (Heckathorn 1997) using the RDS Analysis Tool (RDSAT) Version 5.6.0 developed by Heckathorn and Volz (2006) and applied these weights to the logistic regression models. Second, to identify effects that might arise from correlation between recruiters and recruitees, we developed a random effects logistic regression model in which covariates of interest were used as fixed effects and where the design matrix of the random effects indicated who recruited whom. This model was fit using WinBUGS and results were obtained using two Markov chains. In one chain, initial values of the parameter estimates were taken from the ordinary logistic regression models and in the other chain, the initial values were set to zero. Odds ratios and 95% confidence intervals produced by the RDS analyses were compared to the estimates from our multiple logistic regression models to identify any significant differences.

Results

We interviewed a total of 428 IDUs (222 and 206 in Tijuana and Ciudad Juarez, respectively). One individual in Ciudad Juarez did not respond to the shooting gallery attendance question and was excluded from analyses, leaving 427 respondents. Table 1 presents the sociodemographic and drug use characteristics of the study population. Overall, the median age was 34 years (interquartile range [IQR]: 28–40), 92% were male, median age of first injection was 19.5 years (IQR: 16–25) and median time since first injection was 12.5 years (IQR: 8–19).

Among the 427 IDUs, 60% reported attending a shooting gallery in the last 6 months and 38% reported that a shooting

Table 1 Sociodemographic and drug use characteristics of IDUs in Tijuana and Ciudad Juarez, Mexico

	Total (n = 427) %	Tijuana (n = 222) %	Ciudad Juarez (n = 205) %	Chi-square
<i>Sociodemographics</i>				
Median age (IQR)	34 (28, 40)	34 (29, 40)	33 (28, 42)	2.94 ^a
Male	91.8	91.4	92.2	.09
Completed high school	29.7	32.1	27.2	1.25
Married/common law	59.0	65.8	51.7	8.71**
Homeless ^b	42.8	50.5	34.5	11.15**
Crossed US border ^b	13.7	10.3	17.4	4.45*
Lived/worked outside Mexico (past 10 years)	35.1	39.8	30.1	4.42*
Illegal source of main income	18.7	22.5	14.6	4.45*
<i>Injection locations^b</i>				
Home	51.3	34.7	69.3	51.02**
Shooting gallery	60.4	69.4	50.7	15.48**
In a bar	9.6	10.4	8.8	.31
On the street	37.0	39.6	34.2	1.38
<i>Drug use history^b</i>				
Heroin alone	97.4	97.3	97.6	.01
Cocaine and heroin	49.4	31.1	58.5	45.03**
Crystal meth alone	23.2	44.1	0.49	114.54**
Crystal meth and heroin	34.5	64.9	0.49	265.66**
Cocaine alone	30.7	13.5	49.0	57.64**
Injected daily (any drugs)	85.2	73.5	97.6	48.33**
<i>Risk behavior</i>				
Often/always reported receptive syringe sharing ^b	27.2	31.7	22.5	4.58*
Often/always reporting receptive sharing paraphernalia ^b	40.1	46.5	33.8	6.76**
Often/always distributive paraphernalia sharing ^b	41.8	48.5	35.1	6.76**
Ever been arrested	93.4	96.0	90.3	5.41*
Ever arrested for carrying a sterile syringe	47.8	56.6	38.4	14.17**
Ever arrested for carrying a used syringe	57.0	71.2	41.2	37.77**

* Significant at $P < .05$ ** Significant at $P < .01$ ^a t -test^b Last 6 months

gallery was their primary place of injection. Additional risky behaviors included reporting often or always engaging in distributive sharing of syringes and injection equipment (70% and 75%, respectively), and often or always receptive sharing of syringes and injection equipment (71% and 76%, respectively), in the prior 6 months.

Table 1 also compares the demographic characteristics of IDUs in Tijuana and Ciudad Juarez. Those in Tijuana were more likely than those in Ciudad Juarez to have never married, be homeless, to have lived or worked in the United States in the past 10 years, and to report an illegal main source of income. IDUs in Tijuana were also more likely to report using a shooting gallery in the past 6 months (69 vs. 51%) but were less likely than those in Ciudad Juarez to report their home, someone else's home or a construction site as a place of injection.

In terms of drug use and risk characteristics, IDUs in Tijuana were more likely than those in Ciudad Juarez to have injected methamphetamine alone or in combination with heroin, to report receptive sharing of syringes and injection equipment in the last 6 months, to have noticed blood from another person on their equipment while injecting, and to report still using these tools even in these situations. IDUs in Tijuana were also significantly more likely to have ever been arrested for carrying syringes, whether sterile or unused.

Correlates of Shooting Gallery Attendance

Table 2 presents factors significantly associated with shooting gallery attendance, stratified by city. In both cities, IDUs who reported shooting gallery attendance in the

Table 2 Associations with shooting gallery attendance in Tijuana and Ciudad Juarez ($n = 427$)

	Tijuana ($n = 222$)			Ciudad Juarez ($n = 205$)		
	Attended shooting galleries ^a n (%)	OR	95% CI	Attended shooting galleries ^a n (%)	OR	95% CI
<i>Sociodemographics</i>						
Median age (IQR)	34 (29, 40)	0.96*	.93–1.00	33 (28, 41)	0.94**	.91–.97
Male	203 (91.4)	2.20	.85–5.68	190 (92.7)	1.19	.42–3.42
Highest year of school completed (IQR)	7 (6,9)	0.91*	.83–1.00	7 (6,9)	1.08	.98–1.18
Homeless ^a	112 (50.5)	3.93**	2.11–7.31	71 (34.6)	5.96**	3.09–11.52
Illegal main source of income	50 (22.5)	2.04	.95–4.36	30 (14.6)	3.12**	1.32–7.38
<i>Drug use history</i>						
Age at first injection (IQR)	19 (15, 24)	0.97	.94–1.01	20 (16, 25)	0.96*	.92–.99
Inject daily ^a	158 (73.5)	1.74	.92–3.29	199 (97.5)	4.29	.47–39.08
Average number of people injected with ^a (IQR)	2 (1, 4)	1.12	1.03–1.22	2 (1, 4)	1.09**	1.02–1.17
<i>Risk behaviors</i>						
Ever noticed blood on tools while injecting heroin	76 (34.2)	1.37	.74–2.54	77 (38.1)	2.75**	1.52–4.97
Ever still used tool with visible blood while injecting heroin	72 (32.4)	1.50	.80–2.82	71 (35.1)	2.39**	1.31–4.34
Ever had sex with a male (males only)	91 (46.9)	1.52	.82–2.84	24 (13.1)	2.52*	.99–6.41
Ever gotten or acquired a used syringe	160 (73.1)	2.21	1.19–4.13	113 (55.7)	11.34**	5.85–22.00
Ever overdosed	96 (43.2)	1.23	.69–2.20	99 (48.8)	2.57**	1.46–4.54
Overdosed in last 6 months	18 (8.1)	1.17	.40–3.42	24 (11.8)	5.78**	1.90–17.60
Median number of years injecting (IQR)	13 (9, 20)	0.99	.95–1.02	12 (7, 17)	0.96*	0.93–1.00
Ever arrested for carrying sterile syringes	93 (60.8)	1.74	.98–3.10	52 (50.0)	2.74**	1.53–4.92
Ever arrested for carrying used syringes	120 (77.9)	2.79*	1.51–5.14	56 (53.8)	2.82**	1.58–5.03
Number of times arrested for carrying a syringe (IQR)	6 (0, 20)	1.00	1.00–1.01	0 (0, 6)	1.04*	1.01–1.07

* Significant at $P < .05$ ** Significant at $P < .01$ ^a Last 6 months

last 6 months were more likely than those who did not to be younger, homeless in the last 6 months, and ever been arrested for carrying a used syringe. In Ciudad Juarez, IDUs who attended shooting galleries were more likely to have ever noticed blood on equipment while injecting heroin, and to still use that equipment despite the visible blood. Those who attended shooting galleries were also more likely to report injecting for a longer period of time, being arrested for carrying sterile syringes, acquiring a used syringe, and overdosing. Additional correlates associated with injecting in a shooting gallery included receptive and distributive syringe sharing, and sharing injection equipment.

Table 3 presents the final model of factors independently associated with attending a shooting gallery among IDUs in both Tijuana and Ciudad Juarez. In both cities, IDUs who reported attending a shooting gallery in the last 6 months were more likely to be homeless in the last

6 months. IDUs who attended shooting galleries in Tijuana were more likely than those who did not to report being arrested for carrying used syringes. Those reporting shooting gallery attendance in Ciudad Juarez were more likely to be younger, have been arrested for carrying a sterile syringe, and have ever overdosed. Results of Pearson's chi-square tests for goodness-of-fit were $P = 0.85$ and $P = 0.22$ for Tijuana and Ciudad Juarez, respectively. Odds ratios and point estimates generated by analyses to account for the potential effects of the RDS recruiting process (data not shown) did not appreciably differ.

Discussion

This study found that more than two-thirds of IDUs in Tijuana and half of IDUs in Ciudad Juarez reported using a shooting gallery in the past 6 months. Of interest, IDUs who

Table 3 Factors independently associated with shooting gallery use among IDUs

	Tijuana		Ciudad Juarez	
	AOR	95% CI	AOR	95% CI
Ever arrested for carrying used syringes	2.62**	1.38–4.97	–	
Ever arrested for carrying sterile syringes	–		1.96*	1.01–3.79
Homeless ^a	3.77**	2.01–7.11	4.43**	2.2–8.93
Age	–		.95**	.91–.98
Ever overdosed ^a	–		4.45*	1.36–14.61

* Significant at $P < .05$ ** Significant at $P < .01$ ^a Last 6 months

reported shooting gallery attendance had different sociodemographic and risk characteristics than IDUs who injected elsewhere. Shooting gallery attendees in both cities were more likely to be homeless and to have been arrested for syringe possession. IDUs in Ciudad Juarez who used shooting galleries were also younger and more likely to have ever overdosed.

Notably, two of the correlates of shooting gallery attendance that we identified in this study—homelessness and arrest for syringe possession—were structural level factors, which are increasingly viewed as having a substantial impact on HIV risk behaviors among IDUs (Kalichman et al. 2000; Rhodes et al. 2005). These findings provide additional insight into the role of the risk environment in shaping behaviors at the individual level and emphasize the need for structural level interventions to facilitate safer injection practices among IDUs.

The finding that recent homelessness was the factor most strongly associated with shooting gallery use suggests that shooting galleries play the role of stable injection locations for IDUs who lack stable living arrangements. A substantial percentage of the IDUs in our study were homeless; while homelessness is common in IDU populations, the situation in northern Mexico border cities is exacerbated by the fact that many IDUs reside in these cities as the result of deportation from the United States and thus lack local familial and financial support. Studies in the US and Puerto Rico have also found homelessness to be significantly associated with attending shooting galleries (Coady et al. 2007; Metraux et al. 2004; Reyes et al. 1996), with one New York study among homeless IDUs showing two-thirds reporting syringe sharing and shooting gallery use (Susser et al. 1996). Other studies have demonstrated an increased likelihood of both HIV risk behaviors and HIV prevalence among unstably housed individuals (Aidala et al. 2005; Corneil et al. 2006; Klinkenberg et al. 2003; Kilbourne et al. 2002; Strathdee et al. 1997; Zolopa et al. 1994). The increasing evidence regarding associations between homelessness and HIV suggest that reducing housing instability among IDUs should be a goal of HIV prevention programs.

We also found that arrests for syringe possession were commonplace in these two cities, despite the fact that purchase and possession of sterile syringes without a

prescription is legal in Mexico. This is cause for significant concern and corroborates findings from prior qualitative interviews by our study team that indicated syringe possession arrests are common among IDUs in Tijuana and Ciudad Juarez and drive them to seek out shooting galleries to avoid detection by police (Miller et al. in press; Strathdee et al. 2005). Beyond providing a less visible location for injection, shooting galleries also provide a place where syringes can be easily obtained, thus eliminating the need for users to carry their own syringe but increasing the likelihood of syringe sharing. Other studies (Cooper et al. 2005; Kerr et al. 2005; Rhodes et al. 2003; Wood et al. 2003) have similarly demonstrated that policing activities can have an adverse effect on IDUs' abilities to adhere to safe injection practices by discouraging sterile syringe seeking, promoting syringe sharing, and rushing injection to avoid detection. In this context, shooting gallery use may be viewed as a practical response to structural level barriers to possession and safe usage of sterile syringes (Celentano et al. 1991; Vlahov et al. 1990).

Notably, the proportion of IDUs reporting lifetime history of arrest for syringe possession was significantly lower in Ciudad Juarez than in Tijuana and the associations between syringe possession arrests and shooting gallery use differed in the two cities; arrests for sterile syringe possession were associated with shooting gallery use in Ciudad Juarez, while arrests for used syringes were associated in Tijuana. Programa Compañeros has undertaken efforts to educate police officers in Ciudad Juarez about harm reduction and the potential for policing practices to influence risky injection behaviors, leading some officers to avoid confiscating syringes from IDUs (Miller et al. in press). This may help explain the site-specific differences in proportions of syringe possession arrests and the relationship between shooting gallery use and the less justified practice of arresting IDUs for sterile syringe possession, which drives IDUs out of sight to inject. Arrest for possession of used syringes can be justified under Mexican law if there is residual drug in the syringe chamber; however, it's not clear why these arrests emerged as independently associated with shooting gallery use in Tijuana instead of arrests for sterile syringes. More research is needed to elucidate policing practices regarding syringe possession

and their impact, and interventions to change policing practices should be tailored to the specific needs of each of these two Mexican border cities to most effectively reduce the need for shooting gallery attendance and the risk of syringe sharing and HIV transmission.

While facilitating more stable housing arrangements and addressing policing practices would likely contribute to reductions in shooting gallery use and syringe sharing among IDUs, these structural interventions require funding and the participation and endorsement of key government decision makers, and thus may take substantial time to implement. In the interim, interventions conducted within shooting galleries to reduce the harm associated with their use may be advisable. Provision of HIV prevention information, bleach and water for syringe cleaning, syringe distribution and exchange, and other interventions could mitigate the risky injection behaviors associated with use of these venues (Page and Llanusa-Cester 2007; Reyes et al. 1996). Programa Compañeros in Ciudad Juarez has been providing syringe exchange and bleach and water to IDUs and shooting galleries on an informal basis as part of their outreach activities, which are limited due to scarcity of funds.

We also found that ever having overdosed was significantly associated with recent shooting gallery attendance, suggesting that IDUs with risk factors beyond syringe sharing are likely to utilize these injection sites. Although drug overdoses are largely preventable, overdose prevention education programs remain in their infancy and inappropriate witness responses to overdose are common (Pollini et al. 2006; Sergeev et al. 2003; Tobin et al. 2005; Tracy et al. 2005). Programs in the US cities of New York, San Francisco, Chicago, Baltimore, and elsewhere have provided overdose prevention education and provision of naloxone—an injectable opiate antagonist that can immediately reverse an opiate overdose and prevent overdose death—to IDUs in an effort to prevent overdose morbidity and mortality (Maxwell et al. 2006; Piper et al. 2007; Seal et al. 2005). Targeting shooting galleries as locations for overdose prevention programs may be an efficient way to prevent overdoses among those at high risk.

Shooting gallery attendance was also independently associated with younger age in our study. Fuller et al. (2003) found that young IDUs in Baltimore who attended shooting galleries tended to be initiated by older, high-risk IDUs who then share their knowledge and practice, promoting a culture of syringe sharing. The relationship of youth and shooting gallery use is especially important when placed in the context of other studies showing that both young and recent-onset IDUs have higher levels of risky behavior associated with HIV infection (Booth et al. 1991; Fennema et al. 1997). This provides yet more justification for targeting shooting galleries in Mexico for harm reduction interventions.

Due to the cross sectional design of this study, we were unable to determine what factors predict shooting gallery use, though these results suggest strong associations and are consistent with prior qualitative studies by our team in the same two cities that indicated a causative association between syringe possession arrests and shooting gallery attendance. As with all studies of drug behavior, ours is subject to the limitations inherent in self-report. We did not have corroborating information from police regarding arrests reported by study participants. Another potential weakness is the relatively small number of IDUs enrolled in each city, but this would tend to dampen any true associations. The use of RDS to recruit study participants, however, helps ensure that each person had an equally likely chance of being selected. Statistical adjustment to correct for any bias or clustering introduced by RDS did not change our point estimates markedly, suggesting that our findings are generalizable to the overall IDU population in both Tijuana and Ciudad Juarez.

This study found that shooting gallery attendance is common in the Mexican-US border cities of Tijuana and Ciudad Juarez. Homelessness and policing practices—both structural level factors—may be contributing to high utilization of these venues, where syringe sharing is common and young IDUs and those with a history of drug overdose are more likely to be found. Structural interventions to modify policing practices regarding syringe possession are clearly warranted in these two cities, as are efforts to address high levels of homelessness among IDUs. In the shorter term, targeting shooting galleries as venues for harm reduction activities including dissemination of HIV prevention information, syringe distribution and exchange, and overdose prevention may provide a successful and cost-effective approach for reducing morbidity and mortality among IDUs.

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