ORIGINAL INVESTIGATION

Cigarette Smoking and Quit Attempts Among Injection Drug Users in Tijuana, Mexico

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ABSTRACT

Introduction: Injection drug use and cigarette smoking are major global health concerns. Limited data exist regarding cigarette smoking behavior and quit attempts among injection drug users (IDUs) in low- and middle-income countries to inform the development of cigarette smoking interventions. We conducted a cross-sectional study to describe cigarette smoking behavior and quit attempts among IDUs in Tijuana, Mexico.

Methods: IDUs were recruited through community outreach and administered in-person interviews. Multivariable Poisson regression models were constructed to determine prevalence ratios (PRs) for quit attempts.

Results: Of the 670 participants interviewed, 601 (89.7%) were current smokers. Of these, median number of cigarettes smoked daily was 10; 190 (31.6%) contemplated quitting smoking in the next 6 months; 132 (22.0%) had previously quit for ≥ 1 year; and 124 (20.6%) had made a recent quit attempt (lasting ≥ 1 day during the previous 6 months). In multivariable analysis, recent quit attempts were positively associated with average monthly income ($\geq 3,500$ pesos [US\$280] vs. $< 1,500$ pesos [US\$120]; PR = 2.30; 95% CI = 1.57–3.36), smoking marijuana (PR = 1.38; 95% CI = 1.01–2.90), and smoking heroin (PR = 1.85; 95% CI = 1.23–2.78), and they were negatively associated with number of cigarettes smoked daily (PR = 0.96; 95% CI = 0.94–0.98).

Conclusions: One out of 5 IDUs attempted to quit cigarette smoking during the previous 6 months. Additional research is needed to improve the understanding of the association between drug use patterns and cigarette smoking quit attempts, including the higher rate of quit attempts observed among IDUs who smoke marijuana or heroin compared with IDUs who do not smoke these substances.

INTRODUCTION

Injection drug use is a major global health concern that may be increasing in low- and middle-income countries (based on the World Bank's classification, which uses gross national income per capita; <http://data.worldbank.org/about/country-classifications>) (Mathers et al., 2008). Injection drug users (IDUs) are often affected by multiple social and structural risk factors, such as homelessness, incarceration, inadequate education, and unemployment, that increase their susceptibility to high risk behaviors, including cigarette smoking (Graham, 2009; Strathdee et al., 2010). As with injection drug use, tobacco use is a major public health concern for low- and middle-income countries (Farmer et al., 2010; World Health Organization, 2011). While evidence-based tobacco control interventions have been effective in reducing cigarette smoking prevalence in high-income countries, most low- and middle-income

countries have yet to adequately implement such interventions (World Health Organization, 2011). Smoking cessation treatment, a key component of the global tobacco control measures recommended by the World Health Organization (2011), has been particularly underutilized in low- and middle-income countries. There is an urgent need to expand effective smoking cessation programs in low- and middle-income countries, particularly for vulnerable populations such as IDUs.

Previous studies have found an extremely high cigarette smoking prevalence (90% or higher) among IDUs and a positive correlation between patterns of cigarette smoking and drug use (Clarke, Stein, McGarry, & Gogineni, 2001; Epstein, Marrone, Heishman, Schmittner, & Preston, 2010; Marshall et al., 2011; Villanti, German, Sifakis, Flynn, & Holtgrave, 2012). Craving for nicotine might increase craving for drugs, particularly for cocaine (Epstein et al., 2010; Harrell, Montoya, Preston, Juliano, & Gorelick, 2011; Levine et al., 2011).

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Despite this, drug users who smoke cigarettes consistently report high levels of interest in quitting smoking (Okoli et al., 2010). Previous studies have also found high rates of cigarette smoking quit attempts among methadone maintenance patients (Nahvi, Richter, Li, Modali, & Arnsten, 2006; Richter, Gibson, Ahluwalia, & Schmelzle, 2001). However, studies investigating cigarette smoking behavior among IDUs have primarily been conducted in urban areas of the United States (Clarke et al., 2001; Harrell, Trenz, Scherer, Pacek, & Latimer, 2012; Marshall et al., 2011; Villanti et al., 2012). Little is known about cigarette smoking patterns and attempts to quit smoking among IDUs in low- and middle-income countries.

Given the growing evidence of the need for smoking cessation treatment among substance users, the American Society of Addiction Medicine and the U.S. Public Health Service have recommended the integration of smoking cessation treatment into substance use treatment programs (American Society of Addiction Medicine, 1997; Fiore et al., 2008). Despite these recommendations, a 2006–2008 national survey of drug and alcohol treatment centers in the United States found that only 17.6% had incorporated a formal smoking cessation treatment program (Knudsen, Studts, & Studts, 2012). This proportion is likely to be much lower in low- and middle-income countries, where resources for services to drug users are extremely scarce, leaving IDUs and other drug users with limited access to smoking cessation treatment.

In 2010, Mexico enacted a drug reform law that emphasizes treatment instead of incarceration for persons cited for drug possession (Bustamante Moreno, Izazola Licea, & Ajenjo, 2010; Cuddehe, 2011). Under this law, persons who are apprehended with subthreshold amounts of cocaine, heroin, methamphetamine, and marijuana are encouraged to seek drug treatment. Those who are cited for drug possession 3 times are required to enroll in a drug treatment program or go to jail. As a part of this law, the Mexican Ministry of Health began expanding public drug treatment programs, including those for methadone maintenance treatment (Bustamante Moreno et al., 2010). This expansion might be an opportunity to increase access to cigarette smoking cessation treatment for IDUs and other drug users by incorporating cigarette smoking cessation treatment within drug treatment programs. However, in order to inform the integration of cessation services, additional research is needed regarding patterns of cigarette smoking among IDUs and other drug users in Mexico.

The objective of this study is to describe cigarette smoking behavior and attempts to quit cigarette smoking among IDUs in Tijuana, Baja California, Mexico. The study design was informed by adapting the Stages of Change Theory, which broadly posits that cigarette smokers are at various stages along a continuum for quitting and, consequently, some are more likely to quit smoking than others at any given time (Diclemente et al., 1991). Quit attempts represent an advanced stage in the quitting continuum, and smokers who are actively attempting to quit could benefit from interventions to help them maintain smoking abstinence during their quit attempts. Cigarette smokers who are not making quit attempts should be provided with interventions to help them progress in the quitting continuum. Such interventions include counseling methods that have been shown to increase motivation to quit among smokers (Fiore et al., 2008). An improved understanding of cigarette smoking patterns and quit attempts among IDUs in low- and middle-income countries will help inform

the development of smoking cessation interventions tailored for this population.

METHODS

Study Population

We conducted a cross-sectional study using baseline data from *Proyecto El Cuete IV*, a longitudinal cohort study that seeks to determine the impact of the 2010 Mexican drug reform law on drug use behavior and other HIV risk factors among IDUs in Tijuana, Baja California, Mexico (Strathdee, Magis-Rodriguez, Mays, Jimenez, & Patterson, 2012). Mexico is a middle-income country, and Tijuana, located near the U.S.–Mexico border, is an entry point for drug trafficking into the United States (Bucardo et al., 2005). IDUs are among Tijuana's most disadvantaged groups with poor living conditions and limited access to health care and other social services (S. A. Strathdee et al., 2012).

IDUs were recruited through community-based outreach conducted by experienced outreach workers. Eligible participants were Tijuana residents, ≥18 years old, with no plans to relocate from Tijuana for 30 months, who had injected drugs during the previous month, and who did not have more than two strikes for drug possession under the 2010 Mexican drug reform law. Participants received US\$20 (250 pesos) for the baseline visit. Study recruitment began in March 2011. For this analysis, we included participants enrolled up to July 28, 2012, with complete information on smoking status. The study protocol was reviewed and approved by the University of California San Diego Human Research Protection Program and the Tijuana General Hospital Ethics Committee, and informed consent was obtained from all participants.

Measures

Trained research interviewers administered a standardized questionnaire via computer-assisted personal interviewing (NOVA Software) in Spanish or English, depending on the participant's preference. All participants were screened for HIV using a rapid test (Advanced Quality Rapid Anti-HIV 1&2 Test; In Tec Products, Inc.), and those with positive results were confirmed by Western blot assay and referred for further counseling and treatment.

Spanish and English versions of the smoking-related questions were adapted from the Hispanic Established Population for Epidemiologic Studies of the Elderly and field-tested extensively in Tijuana to ensure accuracy and comprehension by study participants (Markides et al., 1996). Participants were categorized as current cigarette smoker if they reported “Yes” to both of the following questions: “Have you ever smoked at least 100 cigarettes in your entire life?” and “Do you smoke cigarettes now?” Participants who answered “Yes” to the first question and “No” to the second question were categorized as former cigarette smokers, and those who answered “No” to the first question were categorized as never regular cigarette smokers. Current and former cigarette smokers were also asked “How old were you when you first started smoking cigarettes?” and former smokers were asked “About how long has it been since you have smoked cigarettes?” to determine lifetime duration of cigarette smoking. Cigarette smoking intensity was determined based on the question, “How

many cigarettes did you smoke when you last smoked?" and "How many cigarettes do you smoke?" for former and current cigarette smokers, respectively.

For current cigarette smokers, prior quit attempts were ascertained by asking "Have you ever stopped smoking cigarettes for a period of at least 1 year?" "During the past 6 months, have you quit smoking intentionally for 1 day or longer?" and "During the past 6 months, what was the longest time that you actually stayed off cigarettes?" Current cigarette smokers were also asked, "Are you contemplating quitting smoking in the next 6 months?" This item has been used to identify smokers who intend to quit in the near future as a component of stage categorization in the stages-of-change model (Diclemente et al., 1991).

Questions regarding drug use were adapted from a previous study of HIV risk among IDUs in Tijuana (Strathdee et al., 2008). We asked participants about their use of marijuana, heroin, cocaine, and methamphetamine during the previous 6 months. For heroin, cocaine, and methamphetamine, participants were also asked about their route of consumption, including smoking, inhaling, and injecting. Participants were categorized as having unstable housing if they reported having slept in a car, abandoned building, shelter, or on the street during the previous 6 months. Data for average monthly income during the previous year were categorized into quartiles. Participants' source of income was categorized as legal job, sex work, or other source, which included informal jobs, illegal activity, and financial support from friends or relatives.

Statistical Analysis

Demographic and drug use characteristics were compared using the Cochran–Armitage test for trend for ordinal variables and the chi-square test or the Fisher's exact test for other categorical variables. Age and number of cigarettes smoked per day were not found to be normally distributed (Shapiro–Wilk test: $p < .001$). Therefore, we used nonparametric statistics (i.e., median, interquartile range, and the Wilcoxon rank-sum test for comparisons) for these variables and for all other continuous variables for consistency. Multivariable Poisson regression models with robust variance were constructed for the following outcome: cigarette smoking quit attempt that lasted ≥ 1 smoke-free days during the previous 6 months. Variables associated with this outcome in bivariate analysis with a $p < .10$ were evaluated for inclusion in the multivariable model manually in a forward stepwise manner. Only statistically significant variables with a $p < .05$ were retained in the final model. Prevalence ratios (PRs) and 95% CIs were calculated for variables included in the final model. We used SAS v. 9.3 for the statistical analyses.

RESULTS

Study Population

Of the 670 study participants who had complete information for smoking status, 601 (89.7%) were current cigarette smokers, 14 (2.1%) were former cigarette smokers, and 55 (8.2%) reported never being a regular cigarette smoker. Overall, the median age was 37 years, 438 (65.4%) were male, 259 (39%) had attained primary school or lower level of education, 107 (16.0%)

reported unstable housing during the past 6 months, and 206 (30.9%) earned an average of <1,500 pesos (US\$120) per month during the previous year (Table 1). Twenty-six (3.9%) participants tested positive for HIV infection (Table 1). Drug use behaviors most frequently reported by participants were injecting heroin (95.2%), smoking methamphetamine (40.1%), smoking marijuana (31.0%), and injecting methamphetamine (27.8%) (Table 1).

Current Cigarette Smoking

Compared with those who were not current cigarette smokers (former and never regular smokers combined), current cigarette smokers were older (median age of 38 vs. 35 years; $p = .03$), more likely to be male (67.1% vs. 50.7%; $p = .01$) and less likely to report having a legal job (12.9% vs. 18.8%) or sex work (16.6% vs. 27.5%) as the primary sources of income ($p = .02$) (Table 1). We found no association between drug use behaviors and current cigarette smoking status (Table 1).

Smoking-Related Characteristics Among Current Cigarette Smokers

Current cigarette smokers initiated smoking at a median age of 14 years and smoked for a median of 23 years and a median of 12 pack-years (Table 2). Among current smokers, the median number of cigarettes smoked per day was 10, 190 (31.6%) reported contemplating quitting smoking in the next 6 months, 132 (22.0%) had previously quit smoking for 1 year or longer, and 124 (20.6%) had made a quit attempt that lasted ≥ 1 day (Table 2).

In bivariate analysis, quit attempt during the past 6 months that lasted ≥ 1 day was associated with increase in average monthly income ($p_{\text{trend}} < .001$); fewer number of cigarettes smoked daily ($p_{\text{trend}} < .001$); decrease in lifetime pack-years of cigarette smoking ($p_{\text{trend}} < .001$); smoking marijuana ($p < .001$), heroin ($p < .001$), or methamphetamine ($p = .036$); and inhaling heroin ($p = .001$) (Table 3). These variables and inhaling cocaine (bivariate association with quit attempt, $p = .056$) were further evaluated in Poisson regression models. In the final model, making a quit attempt during the past 6 months that lasted ≥ 1 day was independently associated with average monthly income ($\geq 3,500$ pesos [US\$280] vs. <1,500 pesos [US\$120]; PR = 2.30; 95% CI = 1.57–3.36), number of cigarettes smoked daily (PR = 0.96; 95% CI = 0.94–0.98), and having smoked marijuana (PR = 1.38; 95% CI = 1.01–1.90) and heroin (PR = 1.85; 95% CI = 1.23–2.78) during the past 6 months (Table 4).

DISCUSSION

To our knowledge, the present study is the first to describe cigarette smoking and attempts to quit cigarette smoking among IDUs in a middle-income country. The 89.7% cigarette smoking prevalence that we found is consistent with previous studies conducted among IDUs (Clarke et al., 2001; Harrell et al., 2012; Liu et al., 2011; Marshall et al., 2011; Villanti et al., 2012). The age of smoking initiation and median number of cigarettes smoked per day among our study population were similar to those found in one study among IDUs in Baltimore, MD (Marshall et al., 2011). Other studies of IDUs in the

Table 1. Demographic and Behavioral Characteristics Among Injection Drug Users in Tijuana, Mexico, 2011–2012

Characteristic		Current cigarette smoking			p value
		All participants	No	Yes	
		n (%)	n (%)	n (%)	
N		670	69	601	
Age, y	Median (IQR)	37 (31–44)	35 (30–41)	38 (31–45)	.03
Gender	Female	232 (34.6)	34 (49.3)	198 (32.9)	.01
	Male	438 (65.4)	35 (50.7)	403 (67.1)	
Education	Up to primary school	259 (38.7)	24 (34.8)	235 (39.1)	.49
	Secondary school	250 (37.3)	27 (39.1)	223 (37.1)	
	Prep school or higher	161 (24.0)	18 (26.1)	143 (23.8)	
Unstable housing during past 6 months ^a	No	563 (84.0)	56 (81.2)	507 (84.4)	.49
	Yes	107 (16.0)	13 (18.8)	94 (15.6)	
Average monthly income during past year, pesos (US\$)	<1,500 (\$120)	206 (30.9)	25 (36.8)	181 (30.3)	.34
	1,500–2,499 (\$120–\$199)	148 (22.2)	13 (19.1)	135 (22.6)	
	2,500–3,499 (\$200–\$279)	142 (21.3)	15 (22.1)	127 (21.2)	
	≥3,500 (\$280)	170 (25.5)	15 (22.1)	155 (25.9)	
Income source	Legal job	90 (13.5)	13 (18.8)	77 (12.9)	.02
	Sex work	118 (17.7)	19 (27.5)	99 (16.6)	
	Other	459 (68.8)	37 (53.6)	422 (70.6)	
Years lived in Tijuana	<5	68 (10.2)	4 (5.9)	64 (10.7)	.94
	5–14	157 (23.5)	20 (29.4)	137 (22.8)	
	15+	443 (66.3)	44 (64.7)	399 (66.5)	
HIV infection	No	643 (96.1)	66 (95.7)	577 (96.2)	.74
	Yes	26 (3.9)	3 (4.3)	23 (3.8)	
Drug use during past 6 months ^b	Smoked marijuana	208 (31.0)	16 (23.2)	192 (31.9)	.14
	Smoked heroin	44 (6.6)	6 (8.7)	38 (6.3)	.45
	Inhaled heroin	56 (8.4)	7 (10.1)	49 (8.2)	.57
	Injected heroin	638 (95.2)	66 (95.7)	572 (95.2)	.86
	Smoked cocaine	31 (4.6)	2 (2.9)	29 (4.8)	.47
	Inhaled cocaine	46 (6.9)	6 (8.7)	40 (6.7)	.53
	Injected cocaine	51 (7.6)	5 (7.2)	46 (7.7)	.90
	Smoked methamphetamine	268 (40.1)	25 (36.2)	243 (40.5)	.49
	Inhaled methamphetamine	70 (10.5)	7 (10.1)	63 (10.5)	.92
	Injected methamphetamine	186 (27.8)	14 (20.6)	172 (28.6)	.16

Note. IQR = interquartile range.

^aUnstable housing includes having slept in a car, abandoned building, shelter, or on the street.

^bDrug use categories are not mutually exclusive.

Table 2. Cigarette Smoking Behavior Among Current Cigarette Smokers, Injection Drug Users in Tijuana, Mexico, 2011–2012

Characteristic	N = 601
	n (%)
Age at smoking initiation, median (IQR)	14 (12–16)
Number of years smoked, median (IQR)	23 (17–30)
Pack-years, median (IQR)	12 (6–21)
Number of cigarettes smoked daily, median (IQR)	10 (7–20)
Contemplated quitting smoking in the next 6 months	190 (31.6)
Ever quit smoking for 1 year or longer	132 (22.0)
Cigarette smoking quit attempt that lasted ≥1 day, past 6 months	124 (20.6)

Note. IQR = interquartile range.

United States, however, have reported a much higher smoking intensity among IDUs with an average of 20 or more cigarettes smoked per day (Villanti et al., 2012). The cigarette smoking prevalence in our study population of IDUs was over five-fold higher than the 15.9% prevalence reported in the general Mexican population (Giovino et al., 2012). Current cigarette smokers in our study tended to be older, a higher proportion was male, and smoked about 10 cigarettes/day, which is consistent with the pattern found in the general Mexican population (Giovino et al., 2012).

During the 6 months prior to the study interview, 20.6% of our study participants attempted to quit cigarette smoking that lasted for ≥1 day. In comparison, a population representative survey of cigarette smokers in four Mexican cities conducted in 2008 found that 34% had made quit attempts during the previous year (Thrasher, Villalobos, Barnoya, Sansores, & O'Connor, 2011). While differences in the reference periods and definition of quit attempt (lasting for ≥1 day vs.

Cigarette smoking and quit attempts among IDUs

Table 3. Correlates of Attempts to Quit Cigarette Smoking, Injection Drug Users in Tijuana, Mexico, 2011–2012

Characteristic		Cigarette smoking quit attempt ^a		
		Total	<i>n</i> (%)	<i>p</i> value
Age, y	18–25	41	12 (29.3)	.496
	26–30	96	18 (18.8)	
	31–40	242	38 (15.7)	
	41–50	165	45 (27.3)	
	>50	57	11 (19.3)	
Gender	Female	198	45 (22.7)	.374
	Male	403	79 (19.6)	
Education	Up to primary school	235	46 (19.6)	.466
	Secondary school	223	45 (20.2)	
	Prep school or higher	143	33 (23.1)	
Unstable housing ^b	No	507	107 (21.1)	.506
	Yes	94	17 (18.1)	
Average monthly income during past year, pesos (US\$)	<1,500 (\$120)	181	29 (16.0)	<.001
	1,500–2,499 (\$120–\$199)	135	13 (9.6)	
	2,500–3,499 (\$200–\$279)	127	22 (17.3)	
	≥3,500 (\$280)	155	60 (38.7)	
Income source	Legal job	77	22 (28.6)	.174
	Sex work	99	21 (21.2)	
	Other	422	81 (19.2)	
Years lived in Tijuana	<5	64	15 (23.4)	.339
	5–14	137	31 (22.6)	
	15+	399	78 (19.5)	
HIV infection	No	577	122 (21.1)	.193
	Yes	23	2 (8.7)	
Number of cigarettes smoked daily ^c	<6	119	38 (31.9)	<.001
	6–10	218	43 (19.7)	
	11–20	201	38 (18.9)	
	>20	57	4 (7.0)	
Pack-years ^c	<6	130	42 (32.3)	<.001
	6–11	155	30 (19.4)	
	12–17	104	19 (18.3)	
	≥18	206	32 (15.5)	
Illicit drug use during past 6 months				
Smoked marijuana	Yes	192	58 (30.2)	<.001
	No	409	66 (16.1)	
Smoked heroin	Yes	38	17 (44.7)	<.001
	No	562	107 (19.0)	
Inhaled heroin	Yes	49	19 (38.8)	.001
	No	552	105 (19.0)	
Injected heroin	Yes	572	117 (20.5)	.633
	No	29	7 (24.1)	
Smoked cocaine	Yes	29	7 (24.1)	.633
	No	572	117 (20.5)	
Inhaled cocaine	Yes	40	13 (32.5)	.056
	No	560	111 (19.8)	
Injected cocaine	Yes	46	10 (21.7)	.852
	No	554	114 (20.6)	
Smoked methamphetamine	Yes	243	60 (24.7)	.036
	No	357	63 (17.6)	
Inhaled methamphetamine	Yes	63	17 (27.0)	.183
	No	535	106 (19.8)	
Injected methamphetamine	Yes	172	36 (20.9)	.909
	No	429	88 (20.5)	

^aAttempted to quit smoking that lasted ≥1 day during the 6 months prior to study interview.

^bUnstable housing includes having slept in a car, abandoned building, shelter, or on the street during the 6 months prior to study interview.

^cMissing for 6 participants.

Table 4. Multivariable Poisson Regression Analysis of Factors Associated With Attempts to Quit Cigarette Smoking Among Injection Drug Users in Tijuana, Mexico, 2011–2012

Variable	Cigarette smoking quit attempt ^a
	PR (95% CI) ^b
Average monthly income during past year, pesos (US\$)	
<1,500 (\$120)	1.00
1,500–2,499 (\$120–\$199)	0.62 (0.34, 1.14)
2,500–3,499 (\$200–\$279)	1.09 (0.67, 1.80)
≥3,500 (\$280)	2.30 (1.57, 3.36)
No. of cigarettes smoked daily	0.96 (0.94, 0.98)
Smoked marijuana ^c	1.38 (1.01, 1.90)
Smoked heroin ^c	1.85 (1.23, 2.78)

Note. PR = prevalence ratio. The final model was constructed after evaluating the following variables for statistical significance ($p < .05$) in a forward stepwise manner: average monthly income; number of cigarettes smoked daily; lifetime pack-years of cigarette smoking; smoking marijuana, heroin, or methamphetamine; and inhaling heroin.

^aAttempted to quit smoking that lasted ≥1 day during the 6 months prior to study interview.

^bPRs and 95% CIs for each covariate were derived while adjusting for other factors included in the final model.

^cDuring the 6 months prior to study enrollment.

any attempt) make direct comparison difficult, our findings suggest that a significant proportion of IDUs in Mexico are actively attempting to quit smoking and could benefit from professional support to maintain abstinence during future quit attempts. Furthermore, nearly one third of our study participants reported contemplating quitting cigarette smoking in the next 6 months, which is a higher proportion than the 21.2% found in Thrasher et al.'s (2011) study among a population representative sample of Mexican smokers. Additional research is needed to determine psychosocial factors associated with quit attempts and successful cessation in this population to guide the design of tailored interventions for various stages of the quitting continuum.

While we were not able to find any previous studies examining cigarette smoking quit attempts among IDUs in low- or middle-income countries, a study conducted among methadone maintenance clinic attendees in New York found that 50% of the study participants had made attempts to quit cigarette smoking in the previous year (Nahvi et al., 2006). Similarly, in a study among IDUs recruited from methadone maintenance clinic attendees and needle exchange programs in Providence, RI, 62% reported contemplating quitting cigarette smoking in the next 6 months (Clarke et al., 2001). The higher rates of cigarette smoking quit attempts and contemplating quitting found in these studies are likely to be because participants drawn from drug treatment and harm-reduction programs are more inclined to seek behavior change, such as quitting cigarette smoking, than participants drawn from the community, as was done in our study.

The negative association between the number of cigarettes smoked per day and quit attempts that we found is consistent with studies conducted among the general population of

smokers in China, Thailand, and Malaysia (Li et al., 2010; Yang et al., 2011). Another study conducted in China did not find this association but found that the time to first cigarette, another measure of cigarette dependence, predicted quit attempts (Li et al., 2011). A recent systematic review concluded that low levels of cigarette dependence are consistent predictors of cigarette smoking quit attempts and successful cessation (Vangeli, Stapleton, Smit, Borland, & West, 2011). However, given the limited smoking cessation research among IDUs, additional research is needed to determine whether the fewer cigarettes smoked per day found in our study compared with that found in other studies of IDUs are associated with increased smoking cessation rates.

The lack of an association that we found between drug use patterns and smoking prevalence contradicts results of a previous study among IDUs in the United States that found that cigarette smoking was associated with injecting heroin and smoking of marijuana and crack (Harrell et al., 2012). This inconsistency suggests that the relationship between cigarette smoking and drug use behaviors might be specific to local IDU communities. We found that smoking marijuana and heroin were independently associated with cigarette smoking quit attempts. A possible reason for this finding might be that smoking marijuana or heroin is a proxy for participants seeking to reduce harm by switching from injecting drugs to substance use behavior perceived to be less harmful than injecting drugs. Conceivably, such participants would be more likely to attempt to quit cigarette smoking. Additional research is needed to confirm the higher rate of cigarette smoking quit attempts among IDUs who smoke marijuana or heroin compared with IDUs who do not smoke these substances and to explore reasons for this pattern.

Study participants in the highest income category were more likely to make cigarette smoking quit attempt compared with those in the lowest income category, which suggests that social and economic factors affect quitting behavior among IDUs. This finding is consistent with previous studies among IDUs that found that higher educational attainment was associated with lower levels of nicotine dependence (Clarke et al., 2001). In addition, social disadvantage has consistently been shown to negatively affect smoking cessation in numerous settings worldwide. For example, lower levels of education, Black race, lower income, and higher levels of financial strain are consistent predictors for poorer smoking cessation outcomes in the United States (Biener, Hamilton, Siegel, & Sullivan, 2010; Kendzor et al., 2010; Sheffer et al., 2012; Trinidad, Perez-Stable, White, Emery, & Messer, 2011). Given that IDUs are primarily marginalized individuals with numerous social risk factors, offering cigarette smoking cessation interventions in isolation without addressing the challenges posed by social disadvantage may not be effective (Sheffer et al., 2012). Integration of cigarette smoking cessation services along with treatment of other addictions in a comprehensive social service program may be the most effective means of helping IDUs quit smoking. While smoking cessation interventions in drug treatment programs have had mixed results, a multifaceted approach has been successful in reducing the prevalence of cigarette smoking among drug and alcohol treatment participants in New York City (Guydish et al., 2012; Okoli et al., 2010; Prochaska, Delucchi, & Hall, 2004). Furthermore, policy and societal reform to protect the rights of IDUs and to reduce discrimination and social stigma against IDUs may help establish

an environment in which IDUs can reduce risky behavior, including cigarette smoking (S. A. Strathdee et al., 2012).

Mexico has ratified the Framework Convention on Tobacco Control, an international treaty to implement evidence-based tobacco control interventions (World Health Organization, 2011). In recent years, Mexico successfully implemented pictorial warning label requirements for cigarette packaging and an increase in cigarettes tax, which might have contributed to reduction in population level cigarette consumption (Saenz-de-Miera et al., 2010; World Health Organization, 2011). However, implementations of smoke-free policies and cessation support services have been relatively ineffective and weak (Borland et al., 2012; Thrasher, Boado, Sebrie, & Bianco, 2009). For example, a population-based survey of smokers conducted in 15 countries, including 5 middle-income countries, found that Mexico rated among the worst in access to smoking cessation counseling from medical providers, and Mexican smokers had no access to telephone quitlines (Borland et al., 2012). While plans are in place to improve and expand Mexico's tobacco control interventions, additional efforts may be needed to ensure that disadvantaged groups benefit from national tobacco control measures.

The expansion of drug treatment programs as part of recent Mexican drug policy reform might be an invaluable opportunity to improve access to cigarette smoking cessation treatment for IDUs and other drug users. However, previous studies in Mexico found widespread discrimination and violations of the rights of IDUs (Beletsky et al., 2012; Strathdee et al., 2010, 2011). For example, among female sex workers in Tijuana and Ciudad Juarez, Mexico, who inject drugs, nearly 50% reported having their syringes confiscated by the police despite syringe possession being legal (Beletsky et al., 2012). This study also found high rates of sexual abuse and extortion of female sex workers who inject drugs by the police (Beletsky et al., 2012). Given Mexico's discriminatory environment in which the rule of law is often ignored for IDUs, the enactment of the new drug policy might not lead to actual increases in treatment services for drug users. Furthermore, a recent study found significant variability in the quality of drug treatment programs in northern Mexico (Syvertsen et al., 2010). Integration of cigarette smoking cessation treatment might not be effective if the overall quality of existing drug treatment services is not significantly improved. While federal funding will be provided to accredited drug treatment centers, the extent to which the funding will sufficiently finance the expansion of treatment services is unclear. Significant out-of-pocket costs to those mandated for treatment or inadequate resources for treatment programs would adversely affect the quality of drug treatment services overall and any attempt to incorporate smoking cessation intervention (Syvertsen et al., 2010).

Our study findings are subject to the following limitations. First, we defined quit attempts as intentionally quitting smoking for ≥ 1 day, which has been found to exclude 6%–17% of smokers who report any attempt to quit smoking (Hughes & Callas, 2010). Therefore, our finding of 20.6% prevalence of recent quit attempts is likely to be an underestimate of the proportion of participants who had recently attempted to quit cigarette smoking. In addition, given the cross-sectional study design, we cannot infer causality based on correlates of cigarette smoking and quit attempts. We conducted street outreach, targeted advertising, and word-of-mouth to recruit study

participants, which limits the generalizability of our findings to the broader IDU population in Tijuana or elsewhere. In particular, our sampling approach might have undersampled isolated IDUs who are not well connected to larger IDU social networks. Furthermore, given that Tijuana is socially and economically affected by its location on the U.S.–Mexico border, our findings might not be representative of cigarette smoking behavior among IDUs in other parts of Mexico or other low- and middle-income countries. Additional studies are warranted to improve the understanding of cigarette smoking and quitting behavior among IDUs in low- and middle-income countries.

In this study, we provide critical baseline data to inform the incorporation of cigarette smoking cessation treatment into drug treatment programs that serve IDUs in Mexico. We found that more than 20% of our participants had recently attempted to quit cigarette smoking, and the proportion of our participants who contemplated quitting cigarette smoking during the next 6 months was higher than that reported in the general population of smokers (Thrasher et al., 2011). Our findings suggest that integrated smoking cessation interventions can be effective in helping IDUs quit cigarette smoking in Tijuana. Cigarette smoking cessation treatment should be considered for integration into drug treatment programs as part of a broader effort to ensure that Mexico's national tobacco control interventions reach IDUs and other vulnerable subgroups.

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DECLARATION OF INTERESTS

None declared.

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