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Structural factors associated with methamphetamine smoking among female sex workers in Tijuana, Mexico

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Abstract

Introduction and Aims—Smoking methamphetamine is associated with increased risk of HIV among female sex workers (FSW). The structural context of substance use is an important shaper of individual behaviour; however structural determinants of methamphetamine use among FSWs are largely unknown. We identified individual, structural and neighbourhood factors associated with smoking methamphetamine among FSWs in the border city of Tijuana, Baja California, Mexico.

Design and Methods—A prospective cohort of 301 FSWs sampled from indoor and outdoor sex work venues throughout Tijuana participated in quantitative surveys on behaviours and mapping of home and work neighbourhoods across three visits. Multinomial logistic regression using generalised estimating equations identified individual, structural and neighbourhood variables associated with smoking methamphetamine.

Results—Methamphetamine use, particularly smoking, was highly prevalent among FSWs. Over half (61%) of FSWs had ever used methamphetamine in their lifetime and at baseline, 38% currently smoked methamphetamine. Smoking methamphetamine daily was associated with living in the red light district (adjusted odds ratio (AOR)=2.72, 95% confidence interval (CI)=1.23-6.02) and with perceived homelessness, but only among women in a good financial situation (AOR=4.08, 95% CI=1.58-10.50). Smoking methamphetamine less than daily was associated with older age (AOR=1.06, 95% CI=1.02-1.10).

Discussion and Conclusions—Our findings point to the important dynamic between the residential environment and more severe methamphetamine use. FSWs may prioritise the purchase

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of methamphetamine over stable housing if they have the financial means. Given the high prevalence of smoking methamphetamine among FSWs in Tijuana, drug treatment options, especially for women living in the red light district, are needed.

Keywords

crystal; HIV; commercial sex; Latin America; housing

Introduction and AIMS

In contrast to other illicit substances, rates of methamphetamine use among women are comparable or even higher to those among men [1-3]. Women are more likely than men to report using the drug for weight loss or as a way to stay awake longer for work [2,4]. Depression is also higher among female compared to male users and women may use using it as a form of self-medication or mood enhancer [2,4,5]. Among women, methamphetamine use is linked to sexual risk, including exchanging sex for money or drugs, having more sexual partners, anal intercourse and HIV/sexually transmitted infections (STI) [6-10]. Methamphetamine use can both drive entry into sex work or be a response to the challenges of the profession [11-13].

A study conducted in the Mexican border cities of Tijuana and Ciudad Juarez found female sex workers (FSW) who smoked or snorted methamphetamine had 3 times higher odds of HIV infection, independent of any injection drug use [7]. This is similar to a study of pregnant women in Tijuana, which found methamphetamine use was independently associated with HIV risk after adjusting for injection drug use [14]. Both studies suggest that methamphetamine's association with high risk sexual behaviours is what drives the risk of HIV infection. Over the past decade, smoking methamphetamine has increased in Mexican border cities and women are more likely to smoke it rather than inject it [3,5,15,16]. Besides HIV, smoking methamphetamine is associated with sexual risk behaviours, poor health and increased incidence of dependence [17,18]. The pharmacokinetics of smoking methamphetamine are similar to injecting and both routes result in a more immediate and intense high compared to swallowing or snorting [17,19]. Despite the heightened risk of HIV among those who smoke methamphetamine, there is a dearth of information on the correlates of its use among FSWs.

The structural context of substance use has been recognised as an important determinant of individual behaviour [20]. Through venue policies on substance use or abstinence, the sex work environments of FSWs can drive the context of drug use [21]. Additionally working in outdoor “venues” can be associated with substance use, such as in Canada where methamphetamine use was linked to FSWs who worked in industrialised public spaces [22]. Beyond sex work venues, neighbourhoods may represent a combination of social and physical factors that combine to increase risk through such pathways as social networks, lack of economic opportunities, norms and availability of drugs [23]. In studies among illicit drug users, neighbourhood of residence has been shown to be independently associated with increased drug initiation, frequency and risk [23-25]. Therefore, both sex work venues and residential environments may affect a FSW's drug use.

Understanding the risk environment is especially salient in border settings where there is a high overlap of substance use and sex work amidst a backdrop of social stressors, such as migration, poverty and deportation [26]. Tijuana is both situated along a major methamphetamine trafficking route and contains a thriving red light district, or “Zona Roja”, which has a high density of sex work venues and open and largely tolerated sex work and drug economies [27, 28]. Despite the purported legality of sex work and the decriminalisation of illicit drugs for personal consumption, there is continued policing of these activities within Tijuana, especially within the Zona Roja [29].

Current rehabilitation centres in Tijuana predominantly serve men and suffer from unstandardised treatment and poor conditions [30-32]. Given that individual-level methamphetamine interventions are still nascent, particularly in resource-constrained settings such as Tijuana, understanding the structural context of methamphetamine use in FSWs is urgently needed [17, 33]. Framing the study of methamphetamine use in terms of the risk environment, we examined individual, structural and neighbourhood factors associated with methamphetamine smoking among a longitudinal cohort of FSWs in Tijuana. We hypothesised that in this border setting, structural factors (i.e. homelessness, migration) and neighbourhood would be associated with greater methamphetamine use, independent of individual behaviours.

Design and Methods

Study population and recruitment

From March 2013-March 2014, 301 FSWs from Tijuana were enrolled into a longitudinal study assessing how changes in social, spatial, and physical factors affect HIV/STI transmission, risk behaviours, and access to healthcare (*Mapa de Salud* study, NIH R01DA028692). To comprehensively identify sex work venues (e.g. massage parlours, nightclubs) located both in and outside of the Zona Roja, we utilised maps developed by previous research as well as continuously added new venues identified by staff, participants, and community stakeholders. Participants were recruited from all identified venues using modified time-location sampling, with greater recruitment occurring during the evening. No more than 15 women were recruited from any one venue. Recruiters were trained local Mexican field staff with previous experience working with FSWs and other vulnerable groups. Recruiters would approach potential participants, invite them to participate, then use a brief screening tool to assess eligibility. Eligible women were invited to come to the study office if interested.

Eligibility criteria for the longitudinal parent study included: (i) being 18 years or older; (ii) biologically female; (iii) exchanging sex for money or goods in the past month; (iv) willing to undergo STI testing and treatment; and (v) residing in Tijuana with no plans to move out of the city in the next 18 months. All participants provided written informed consent and were reimbursed \$20 USD at baseline, with an additional \$5 added to this amount for each follow-up visit.

Data collection

Quantitative survey—At baseline and follow-up visits every six-months, participants underwent laboratory testing for HIV/STIs and completed an interviewer-administered survey in English or Spanish. The survey elicited information on sociodemographics, exposure to violence, sexual and substance using behaviours, sex work history, HIV knowledge and interactions with law enforcement. Questions from the survey were adapted from a prior study of FSWs in Mexico and standardised instruments [36]. The present study used data from baseline, 6 and 12 month follow-up visits.

Geospatial data—At each study visit participants were asked to provide the spatial location where they live, work and use drugs (if applicable). Using Google Maps, interviewers worked alongside participants to identify each location. Geographical coordinates were recorded and imported into ArcMap 10.2.2 (ESRI, Redlands, CA, USA).

All study activities were approved by the Institutional Review Boards of the University of California, San Diego and El Colegio de la Frontera Norte in Tijuana.

Measures

The outcome of interest was frequency of smoking methamphetamine coded into a three-category variable of behaviour over the past 6-months: never used, used less than daily (i.e. “occasional use”) and daily use. The outcome was created from a Likert scale of: never; one time per month or less; 2 to 3 days per month; one time per week; 2 to 3 days per week; 4 to 6 days per week; once a day; more than once a day. We hypothesised that women who frequently smoke methamphetamine would be a higher-risk population than women who use it occasionally for work or recreation. Therefore, we created a 3-category outcome variable.

The risk environment is a framework organising how social and physical space exogenous to an individual may interact to increase drug-related harms [37]. This framework along with prior literature informed our selection of covariates.

Individual sociodemographic variables—Included age (in years), education (dichotomised as ≤ 9 years versus > 9 years, which is the cut-off of compulsory education in Mexico) and children living at home (yes vs no). Perceived financial situation was coded from a 5-point scale into a binary measure (very good/good/neutral versus bad/extremely bad). Perceived financial situation was considered a more accurate measure than income, because it takes into account a wider range of financial hardship (e.g. debt, household expenses). Depression was calculated using the Center for Epidemiologic Studies Depression Scale which has a suggested cut-off score of >10 as indicating depression [38].

Participants were asked about the frequency (lifetime or past 6 months) of use of a variety of illicit drugs and the route of administration. We selected the most prevalent types and routes of illicit drugs as covariates. Injection drug use was a dichotomous variable of ever use versus no use in the past 6 months. Non-injection cocaine use was a dichotomous variable of ever snorting or smoking cocaine (including crack cocaine) versus no use in the past 6 months. Years of smoking methamphetamine was calculated by subtracting age at first use from age at first study visit. This measure was limited in that it did not account for periods

of abstinence. We also asked women to select all the types of places they used drugs in the past 6 months: at their home; at someone else's home; shooting gallery; other indoor site (e.g. bar); outdoor public location (e.g. alley); other.

Structural variables—Assessed at baseline included migrant status, indicated by whether or not the participant was born in the state of Baja California (where Tijuana is located) and whether they had moved to the city because of deportation from the US. Other structural variables included perceived homelessness, “have you ever thought of yourself as homeless (e.g. not having a stable place to live or living in the street)”, in the past 6 months (yes vs no) and transience coded from a continuous report of number of places lived in the past 6 months and dichotomised as: lived two or more places versus did not move. We created two binary variables for sex work venue environments: bars/clubs (versus other venues) and street/outdoors (versus indoor venues). Participants were also asked if they lived and worked in the same place.

Arrest history was assessed at baseline by asking participants if they had ever been arrested and, if so, when this last occurred. This was dichotomised as arrested within the past 6 months versus never/more than 6 months ago. At subsequent visits, arrest was assessed by asking if participants had been arrested in the past 6 months.

Neighbourhood—Variables included whether the woman resided in the Zona Roja (red light district) or worked in the Zona Roja. The Zona Roja was defined as encompassing the Zona Norte and Zona Centro neighbourhoods. Primary work and housing locations came from the geospatial data.

Statistical analysis

Preliminary analyses included chi-square tests to compare factors across visits. We conducted sensitivity analyses to assess if participants lost to follow-up after baseline were significantly different than participants with at least one follow-up visit. Baseline descriptive statistics and chi-square tests were run to compare differences in variables by the outcome.

We ran bivariate and multivariable multinomial logistic regression to identify individual, structural and neighbourhood variables associated with smoking methamphetamine using generalised estimating equations. Generalised estimating equations are used for repeated measures and account for correlated data within participants using a variance-covariance matrix. The multinomial outcome required the use of an independent variance-covariance matrix [39,40]. We assessed the matrix by comparing the robust and model-based variance-covariance matrices and determined the independent structure was acceptable. Bivariate and multivariate models controlled for time, measured by follow-up visit defined as 0, 6 or 12 months. Multivariable models *a priori* controlled for years of smoking methamphetamine.

Potential collinearity was assessed with Pearson correlation coefficients. The model was built using a hierarchical block method to see the impact of the three levels of risk (individual, structural, neighbourhood) on the outcome. Individual-level variables significant at $P=0.1$ in the bivariate model were added to the multivariate model. Variables at $P<0.1$ were retained in the models. The same procedure was followed for structural and

neighbourhood block variables. Any non-significant associations in the final model are the result of retaining them in previous hierarchical blocks. Finally, we tested the following hypothesised interactions: homelessness and residential neighbourhood; homelessness and financial situation; transience and residential neighbourhood. All analyses were conducted using SAS software version 9.4 (SAS, Cary, NC, USA).

Results

A total of 301 women in Tijuana were enrolled at baseline. Between baseline and the 6-month visit, 1 woman withdrew and 3 women died, leaving 297 able to return for follow-up. Subsequent follow-up rates were 77% (n=228) at month 6 and 79% (n=234) at month 12.

Reports of transience ($P<0.01$), homelessness ($P=0.05$), working in a bar ($P<0.01$), and non-injection cocaine use ($P<0.01$) significantly decreased over time. Women who reported their primary venue was the street were significantly more likely to return for follow-up visits. No other baseline characteristics were significantly associated with returning for at least one follow-up visit.

Baseline characteristics

Women had a median age of 32 years, and a majority lived at home with their children (57%) and had a spouse or steady partner (56%) (Table 1). Three quarters of participants had more than 'secundaria' education (equivalent to middle school in the US) and 62% reported their financial situation as neutral to very good.

Methamphetamine was the most commonly used illicit drug (besides marijuana), with 182 (61%) of FSW reporting they had ever used it, followed by cocaine (49%) and heroin (28%). Among the 134 women who used methamphetamine in the past 6 months, smoking was the most common route of use (n=115, 86%), followed by snorting (n=49, 37%) and injecting (n=28, 21%). Women who used methamphetamine reported having done so for a median of 10 years (interquartile range 6-16). At baseline 21% of women smoked methamphetamine daily, 17% smoked less than daily and 62% had not smoked in the past 6 months.

When asked about all the locations where they used (any) drugs, 57% of FSWs reported using drugs where they live, 34% used at a public indoor location (e.g. bar, work), 27% used at someone else's home and 11% used outside.

Longitudinal bivariate associations with methamphetamine smoking

Table 2 provides results from the bivariate multinomial generalised estimating equations regression. Individual-level demographics and behaviours were examined first. Compared to non-methamphetamine smokers, FSWs who smoked daily or less than daily were significantly more likely to be older, have a bad financial situation, be depressed, inject drugs and report non-injection cocaine use. Daily or occasional smokers were significantly less likely than non-smokers to have their children living at home with them. Compared to non-users, daily smokers had higher odds of using non-injection cocaine.

Structural variables positively associated with occasional or daily smoking were: primarily working on the street, living and working in the same place, being arrested in the past 6 months, having a history of deportation, and living or working in the Zona Roja. Working in a bar was negatively associated with daily or occasional methamphetamine smoking. Transience was only associated with daily smoking of methamphetamine.

Longitudinal multivariable associations with methamphetamine smoking

Results of the multivariable multinomial generalised estimating equations model are shown in Table 3. Smoking methamphetamine less than daily was significantly associated with older age (adjusted odds ratio [aOR]=1.06, 95% confidence interval [CI]=1.02, 1.10). Smoking methamphetamine daily was associated with living in the Zona Roja (aOR=2.72, 95% CI=1.23, 6.02).

We found a significant interaction in that self-perceived financial situation moderated the association between homelessness and smoking methamphetamine daily (Table 4). Specifically, among FSWs in a good financial situation, the odds of smoking daily were 4 times greater among homeless compared to non-homeless FSWs (AOR =4.08, 95% CI =1.58, 10.50) whereas this association was non-significant among FSWs in a poor financial situation (AOR = 0.89, 95% CI= 0.35, 2.25). A sub-analysis found that homelessness was positively associated with living in the Zona Roja (OR=1.38, 95% CI: 1.03, 1.84, $P=0.03$).

Discussion

Methamphetamine use, particularly smoking, was highly prevalent in our sample of FSWs in Tijuana. More than half (61%) of the women had ever used methamphetamine and 38% currently smoked methamphetamine at study enrolment.

We found an almost 3-fold increase in the odds of smoking methamphetamine daily among women who live in the Zona Roja, independent of other individual and structural factors. Neighbourhood environments have previously been shown to be independently associated with increased or riskier substance use [23,41,42]. While this is the first study to specifically look at the Zona Roja in terms of methamphetamine use, other studies have found this area to be associated with heightened risk for HIV/STIs [43,44]. It is believed that macro-level inequalities in neighbourhoods (e.g. income, segregation) can lead to varying levels of access to harmful and helpful physical and social resources [41]. Given our findings, neighbourhood-level interventions, specifically ones that modify the home environment, are recommended over individual-level interventions for women who want to reduce their methamphetamine use.

While we found a strong relationship between smoking methamphetamine daily and living in the Zona Roja, we were unable to establish whether this level of use occurred prior to or after moving into this neighbourhood. While knowing which came first can have implications for prioritising housing versus substance abuse treatment, in reality the relationship is likely a dynamic one [45]. Prior in-depth interviews with FSWs found both movement into the Zona Roja in order to support their substance use and initiation of substance use after arrival [46,47]. Research in other settings has also been mixed as to

whether substance use or poor housing is the “causal” factor [23,45]. Future work should explore the specific pathways in which the Zona Roja and methamphetamine use interact (e.g. through social networks or lack of supportive resources), as these pathways may indicate targets for intervention.

We found that FSWs who experienced a period of homelessness, but still maintained a good financial situation, were more likely to smoke methamphetamine daily. Others have found a similar link between frequency of drug use and homelessness [48-50]. The proposed mechanism behind the counterintuitive modifier of income is that higher income women may be prioritising the purchase of methamphetamine over securing housing [51]. It is also important to note that we measured perceived homelessness, which could include a wider range of unstable housing situations (e.g. living in a hotel, staying with a boyfriend) than the strictest definition of unsheltered homelessness. Therefore we hypothesise that substance use may increase as a way to cope with the stressors of being unstably housed and that this coping strategy is limited to those with the financial means to afford the drug [52, 53].

Only older age was independently associated with less than daily smoking of methamphetamine, compared to non-smokers. Daily use was not associated with older age, which could reflect that women who have been using for a longer period were less likely to participate in our study. There may also be a smaller cohort of older, daily users given that negative health effects of methamphetamine may lead to greater mortality [17].

No structural factors were associated with less than daily smoking methamphetamine. It could be that this group reflects a more mixed group of women – those who are occasional users as well as more frequent users who have cycled off daily use because of economics or availability. Thus finding structural factors associated with the continuum of methamphetamine use would likely warrant a larger sample of women who use methamphetamine.

While sex work venues remain an important intervention point for FSWs, more work is needed to understand how the home environments of FSWs influence their substance use. The majority of women in our study reported using drugs within their home. This is similar to qualitative and spatial research among women who use drugs in Tijuana, which found women who inject drugs prefer to buy and use drugs within their homes or residential neighbourhood [43,54,55]. Despite this, the risk environment of women in sex work is often framed in terms of the workplace rather than the home, because of the emphasis on understanding HIV risk [56,57]. While we found residential neighbourhood to be associated with daily methamphetamine use, we did not find an association between sex work venue type or venue neighbourhood and smoking methamphetamine. This differs from a study of street-based FSWs in Canada, which found methamphetamine use was associated with working in industrial areas [22].

Development of safe and affordable housing located outside of the Zona Roja may be a rehabilitation option for FSWs who want to reduce their methamphetamine use. “Housing first” strategies prioritise getting people into stable housing first, followed by provision of any necessary services (e.g. mental health, drug treatment). Unstable housing is associated

with increased substance use risk behaviours [52] and improvements in housing status can reduce risk behaviours (e.g. substance use, needle sharing) [58,59]. While the current lack of affordable housing in Tijuana may make this an optimistic intervention, the potential public health benefits resulting from safe and supportive housing for FSWs extend beyond methamphetamine addiction [60-62].

The results of this analysis should be considered in light of certain limitations. First, we were not able to determine causality between the covariates and smoking methamphetamine. Secondly, data were self-reported and therefore may have underestimated undesirable behaviours, biasing results towards the null. Finally, this cohort may not be representative of all FSWs working in Tijuana, and in particular may not capture women who exclusively work at private homes or other venues not sampled. Additionally, women whose primary venue was the street were more likely to have returned for a follow-up visit and may be over represented in this study. Despite these limitations in generalisability to all FSW, we believe the associations between the factors and smoking methamphetamine are valid and can inform future interventions in Tijuana.

Conclusions

Given the high prevalence of smoking methamphetamine among FSWs in Tijuana, more informed drug treatment options for women are needed. Our findings point to the important dynamic between the home environment and more severe methamphetamine use. Future work in the region should explore the mechanisms that link the residential neighbourhood and homelessness to individual substance use behaviours.

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Table 1 Characteristics of female sex workers by reported frequency of smoking methamphetamine in the past 6 months, baseline visit (N=301)

	Smoked methamphetamine, past 6 months				Chi-2 (P-value) †
	Total N=301 N (%)	Never n=186 n (%)	Occasionally n=52 n (%)	Daily n=63 n (%)	
<i>Sociodemographics</i>					
Median age, years (IQR)	32 (25-40)	30 (23-37)	35 (27-45)	33 (29-42)	12.1 (<0.01)
9 years of education (ref: >9years) (n=292)	74 (25)	44 (24)	15 (31)	15 (24)	0.9 (0.65)
Current financial situation bad or extremely bad (ref: very good to neutral)	113 (38)	61 (33)	23 (44)	29 (46)	4.72 (0.09)
Currently lives with children at home	172 (57)	125 (68)	25 (48)	22 (35)	22.68 (<0.01)
Has spouse or steady partner	169 (56)	100 (54)	27 (52)	42 (67)	3.64 (0.16)
Current depression (CES-D 10)	190 (64)	106 (57)	37 (73)	47 (76)	9.26 (0.01)
<i>Individual behaviours</i>					
Injection drug use (any drug) ^a	71 (24)	18 (10)	19 (37)	34 (54)	57.07 (<0.01)
Non-injection cocaine use ^a	52 (17)	23 (12)	11 (21)	18 (29)	9.31 (<0.01)
Median years smoking methamphetamine (IQR)	10 (6-16)	8 (5-13) *	8 (3-15)	13 (8-18)	15.84 (<0.01)
<i>Structural</i>					
Primary work venue a bar/club, past 30 days	98 (33)	75 (40)	14 (27)	9 (14)	15.44 (<0.01)
Primary work venue the street, past 30 days	90 (30)	36 (19)	17 (33)	37 (59)	35.04 (<0.01)
Currently live and work in same place	22 (7)	4 (2)	6 (12)	12 (19)	21.49 (<0.01)
Perceived homelessness ^a (ref: stably housed)	69 (23)	26 (14)	10 (19)	33 (52)	39.76 (<0.01)
Transience ^a (ref: lived 1 place)	102 (34)	51 (27)	19 (37)	32 (51)	11.67 (<0.01)

	Smoked methamphetamine, past 6 months				Chi-2 (P-value) [†]
	Total N=301 N (%)	Never n=186 n (%)	Occasionally n=52 n (%)	Daily n=63 n (%)	
Arrested ^a	70 (23)	21 (11)	18 (35)	31 (49)	42.12 (<0.01)
Born outside Baja California ("migrant")	193 (64)	125 (67)	31 (60)	37 (59)	2.02 (0.36)
Moved to city because deported from US	18 (6)	4 (2)	5 (10)	9 (14)	13.80 (<0.01)
<i>Neighbourhood</i>					
Primary residence in the red light district	81 (28)	31 (18)	16 (33)	34 (54)	30.71 (<0.01)
Primary work venue in the red light district	172 (59)	93 (51)	31 (61)	48 (79)	14.14 (<0.01)

[†]P-values are based on chi-square tests, non-parametric Kruskal-Wallis Test or Fisher's Exact test.

^aWithin the past 6 months.

* Years of methamphetamine use is among those that had used methamphetamine prior to the past 6 months (n=67). CES-D, Center for Epidemiologic Studies Depression Scale; IQR, interquartile range.

Table 2
Bivariate generalised estimating equations logistic regression analysis of factors associated with methamphetamine smoking frequency in the past 6 months among female sex workers

	Smoke methamphetamine less than daily ^b		Smoke methamphetamine daily ^b			
	uOR [†]	(95% CI)	P-value	uOR [†]	(95% CI)	P-value
<i>Sociodemographics</i>						
Age (per year)	1.04	(1.01, 1.07)	<0.01	1.03	(1.01, 1.06)	0.02
9 years of education (ref: >9years) (n=292)	1.18	(0.64, 2.19)	0.60	0.92	(0.48, 1.76)	0.80
Current financial situation bad or extremely bad (ref: very good to neutral)	2.11	(1.22, 3.35)	<0.01	2.70	(1.73, 4.22)	<0.01
Currently lives with children at home	0.40	(0.23, 0.70)	<0.01	0.35	(0.20, 0.62)	<0.01
Current spouse or steady partner	1.03	(0.64, 1.65)	0.90	1.33	(0.84, 2.13)	0.23
Current depression (CES-D 10)	1.74	(1.09, 2.78)	0.02	2.25	(1.41, 3.59)	<0.01
<i>Individual behaviours</i>						
Injection drug use (any drug) ^a	3.95	(2.19, 7.11)	<0.01	7.62	(4.23, 13.74)	<0.01
Non-injection cocaine use ^a	1.27	(0.65, 2.48)	0.49	2.02	(1.14, 3.58)	0.02
Years of smoking methamphetamine	1.01	(0.96, 1.06)	0.67	1.09	(1.04, 1.14)	<0.01
<i>Structural</i>						
Primary work venue a bar/club, past 30 days	0.40	(0.22, 0.73)	<0.01	0.23	(0.11, 0.46)	<0.01
Primary work venue the street, past 30 days	1.88	(1.14, 3.12)	0.01	4.98	(3.09, 8.02)	<0.01
Live and work in same place	3.99	(1.80, 8.81)	<0.01	7.00	(3.02, 16.24)	<0.01
Perceived homelessness ^a (ref: stably housed)	1.73	(1.02, 2.91)	0.04	4.38	(2.64, 7.26)	<0.01
Transience ^a (ref: lived 1 place)	1.51	(0.91, 2.51)	0.11	2.39	(1.55, 3.70)	<0.01

	Smoke methamphetamine less than daily ^b		Smoke methamphetamine daily ^b	
	uOR [†]	(95% CI)	P-value	(95% CI)
Arrested ^a	2.89	(1.70, 4.93)	<0.01	(3.48, 9.25)
Born outside Baja California ("migrant")	0.82	(0.48, 1.41)	0.47	(0.41, 1.30)
Moved to city because deported from US	4.69	(1.67, 13.20)	<0.01	(1.63, 14.45)
<i>Neighbourhood</i>				
Primary residence in the red light district	2.06	(1.17, 3.62)	<0.01	(2.64, 7.97)
Primary work venue in the red light district	2.17	(1.23, 3.85)	<0.01	(1.97, 6.52)

[†]All models were adjusted for months since baseline visit.

^aWithin the past 6 months.

^bReference group: Never smoked methamphetamine. CES-D, Center for Epidemiologic Studies Depression Scale; CI, confidence interval; uOR, unadjusted odds ratio.

Table 3
Multivariable generalised estimating equations logistic regression analysis of factors associated with methamphetamine smoking frequency in the past 6 months among female sex workers

	OR [†]	95% CI	P-value	OR [†]	95% CI	P-value
<i>Sociodemographics</i>						
Age (per year)	1.06	(1.02, 1.10)	0.01	0.99	(0.94, 1.03)	0.61
Current depression (CES-D 10)	1.35	(0.71, 2.58)	0.36	1.68	(0.89, 3.20)	0.11
<i>Individual behaviours</i>						
Injection drug use (any drug) ^a	1.20	(0.55, 2.59)	0.65	1.67	(0.79, 3.52)	0.18
Non-injection cocaine use ^a	1.34	(0.58, 3.80)	0.49	1.72	(0.78, 3.75)	0.18
<i>Structural</i>						
Primary work venue the street, past 30 days	0.91	(0.43, 1.92)	0.81	1.62	(0.81, 3.23)	0.17
Currently live and work in same place	2.38	(0.88, 6.43)	0.09	2.72	(0.85, 8.70)	0.09
<i>Neighbourhood</i>						
Primary residence in the red light district	1.08	(0.49, 2.38)	0.84	2.72	(1.23, 6.02)	0.01

[†]All models were adjusted for all other variables listed, years of meth use, time (in months) of study visit, and an interaction term between perceived homelessness and financial situation (see table 2-4).

[‡]Model also adjusted for interaction term between financial situation and homelessness.

^aWithin the past 6 months.

^bReference group: Never smoked methamphetamine. CES-D, Center for Epidemiologic Studies Depression Scale; CI, confidence interval; OR, odds ratio.

Table 4
Interaction between financial situation and homelessness among daily methamphetamine smokers (reference: non-users)

Good financial situation		Poor financial situation	
	OR (95% CI) †		OR (95% CI) †
Not homeless	1.00	Not homeless	1.00
Homeless	4.08 (1.58-10.50)	Homeless	0.89 (0.35-2.25)

†Models were adjusted for variables in table 3, years of meth use, and time (in months) of study visit. CI, confidence interval; OR, odds ratio.

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