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Factors associated with pathways toward concurrent sex work and injection drug use among female sex workers who inject drugs in Northern Mexico

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Abstract

Aims—To identify factors associated with time to initiation of (1) sex work prior to injecting drugs, (2) injection drug use, and (3) concurrent sex work and injection drug use (i.e., initiated at the same age) among female sex workers who currently inject drugs (FSW-IDU).

Design—Parametric survival analysis of baseline data for time to initiation event.

Setting—Tijuana and Ciudad Juarez situated on the Mexico-U.S. border.

Participants—575 FSW-IDUs aged ≥18.

Measurements—Interview-administered surveys assessing context of sex work and injection drug use initiation.

Findings—Nearly half (n=256) initiated sex work prior to beginning to inject, a third (n=163) initiated injection first, and a quarter (n=136) initiated both sex work and injection drug use concurrently. Low education and living in Ciudad Juarez accelerated time to sex work initiation. Being from a southern Mexican state and initiating drug use with inhalants delayed the time to first injection drug use. Having an intimate partner encourage entry into sex work and first injecting drugs to deal with depression accelerated time to initiating sex work and injection concurrently. Early physical abuse accelerated time to initiating sex work and injection, and substantially accelerated time to initiation of both behaviors concurrently.

Conclusions—Among female sex workers who currently inject drugs in two Mexican-US border cities, nearly half appear to initiate sex work prior to beginning to inject, nearly one third initiate injection drug use before beginning sex work, and one quarter initiate both behaviors concurrently. Predictors of these three trajectories differ, and this provides possible modifiable targets for prevention.

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Keywords

Sex work; injection drug use; FSW-IDU; Mexico; initiation

INTRODUCTION

Globally, considerable overlap between sex work and injection drug use behaviors has been documented [1–5], with the prevalence of injection drug use among female sex worker (FSW) populations ranging from 32% to 81% [2, 4–7]. Independently, injection drug use and sex work can place individuals at risk for exposure to blood borne infections and sexually transmitted infections (STI), but engagement in both behaviors elevates the risk substantially. Little research on the factors that influence early sex work and injection drug use initiation has been conducted among FSWs who also inject drugs (FSW-IDUs).

For women who engage in both sex work and injection drug use, three initiation trajectories are possible: some may begin participating in sex work and then later begin injecting. Others may initiate injection drug use first and subsequently begin sex work. Finally, some women may initiate injection drug use and sex work around the same time. Influence from intimate partners, prior drug use, and history of abuse were found to be associated with prior sex work among current injection drug users (IDUs) [1, 8]. IDUs may resort to sex work as an income generating activity or to support their drug habit [3, 9]. These studies suggest that trajectories may differ depending on whether individuals first initiated sex work or first began injecting drugs, but little research has examined factors related to the temporal sequence of sex work and injection drug use.

An examination of predictors of initiation into sex work and injection drug use needs to take into account factors beyond the level of the individual that influence behavior. Our study draws from the Rhodes' et al. "risk environment" framework which theorizes drug related harms as a product of both individuals and their environment [10] within two dimensions: (1) type of environment (physical, social, economic, and policy), and (2) level of environmental influence (micro and macro). The risk environment framework has been applied to understanding HIV risk among populations of IDUs, FSWs, and clients of FSWs [11–14] and can be extended to behaviors such as initiation of sex work and injection drug use.

Tijuana, Baja California and Ciudad Juarez, Chihuahua are the largest Mexican cities along the Mexico-U.S. border; both with unique HIV risk. In 2008, the proportion of FSW who injected drugs in Tijuana and Ciudad Juarez was 14% and 22%, respectively. Compared to non-injection drug using FSW, FSW-IDUs had significantly higher prevalence of HIV (12.3% vs. 5.1%), syphilis (22.7% vs. 13.1%), gonorrhea (15.2% vs. 5.2%), and Chlamydia (21.2% vs. 11.9%) [17]. Therefore, understanding factors that influence initiation of sex work and injection drug use is particularly important in this subset of women, who are disproportionately affected by HIV/STIs.

Herein, we examine how physical and social factors at the micro and macro levels of the risk environment framework [10, 18] are associated with (1) time to first initiating sex work; (2) time to first initiating injection drug; and (3) time to both injection drug use and sex work initiation among women who first engaged in both behaviors at the same age. To guide our analysis, we conceptualized explanatory variables applying the risk environment framework [18, 19].

Specifically, we postulated the following: (1) pressure from drug using peers (micro-social factor) would be associated with a shorter time to injection drug use initiation; (2) first

trading sex to pay for drugs (micro-social factor) would be associated with a shorter time to sex work initiation; and (3) having lived in more cities (macro-physical factor) would be associated with a shorter time to initiating both sex work and injection drug use at the same age. Given the intertwined nature of the relationship between sex work and injection drug use, identifying characteristics and factors exogenous to the individual associated with pathways to concurrent sex work and injection drug use may help to direct prevention efforts to delay or prevent initiation of injection drug use and sex work.

METHODS

Between November 2008 and July 2010, a total of 623 FSW-IDU were recruited using convenience sampling from Tijuana (N=311) and Ciudad Juarez (N=312) into a behavioral intervention study aimed at decreasing both risky injection and sexual behaviors, as previously described [20, 21]. Briefly, targeted sampling techniques were used whereby potential participants were approached by trained community outreach workers and if interested, were referred to project offices or a mobile unit for eligibility screening. Eligibility requirements included: being at least 18 years of age, having had unprotected vaginal or anal sex with a male client during the previous month; having shared syringes or injection paraphernalia (i.e. cookers, cotton, rinse water) within the past month; ability to speak Spanish or English; ability to provide informed consent; and having no plans to move out of the city in the next 12-months. Women were reimbursed $15 USD for their participation in the baseline interview. Of the total sample of 623 FSW-IDU, 557 had complete data on age of first sex work and injection drug use. The Institutional Review Board of the University of California, San Diego and the Ethics Boards of the Tijuana General Hospital and Universidad Autónoma de Ciudad Juarez approved all study protocols.

Data collection

We restricted this retrospective analysis to baseline data. We examined measures within four domains: (i) baseline sociodemographic characteristics, (ii) context of first sex work, (iii) context of first injection drug use, and (iv) contextual factors preceding both sex work and injection drug use initiation.

Outcomes of interest: time to initiation

Participants were asked, “how old were you the first time you traded sex for money, drugs, goods, foods, or housing” and “how old were you when you first injected drugs?” At the time of the study, all participants engaged in concurrent sex work and injection behaviors. Therefore, three temporal sequences or “initiation trajectories” of sex work and injection drug use initiation were possible giving three main outcomes of interest: time from birth to (1) first sex trade, (2) first injection drug use, and (3) first sex trade and first injection drug use when these events happened at the same age.

Baseline socio-demographic characteristics

Sociodemographic variables included age, language proficiency (English, and Spanish), years of education completed, marital status, and study location (Ciudad Juarez or Tijuana).

Context of first sex work initiation

Following the Rhodes et al. framework [10, 11], measures were conceptualized as different types and levels of the risk environment (table 1). Micro-social level influences included reasons and motivations for first trading sex, and what was promised at the time of first sex trade. Reasons for first trading sex included: money to pay bills, money for drugs, money for children’s needs, varying types of external pressure (e.g. pressure from spouse), and forced

into sex work against one's will. Participants were asked if they were promised anything in exchange for sex and if so, what they were promised (e.g. money, drugs, housing, jewelry, employment). Additionally, women were asked, "whose idea was it to trade sex" (e.g., "mine", boyfriend, boss, family member (e.g. parent), husband, and stranger).

Context of first injection drug use

Factors within the micro-physical environment included physical location of first injection drug use (e.g. own home, shooting gallery, park, jail/prison, etc.), and drug type first injected. Micro-social environmental factors included who was present at time of injection (e.g. alone, friend(s), sexual partner, sex worker, clients, etc.), and the reason for first injection (e.g., drug-related reasons: deal with withdrawal, curious about high, cost of drugs, etc.; or social influence: encouraged by friends, family, or spouse; or emotional reasons: depressed, to deal with stress).

Contextual factors preceding both sex work and injection drug use

Contextual factors within the micro-physical environment included illicit drug use preceding both sex work and injection drug use initiation (e.g., age of first use, type and administration mode of illicit drug). Micro-social environmental factors included family drug involvement and physical and sexual abuse history. Macro-physical environmental factors included birthplace and migration history (e.g., number of cities lived). Contextual factors at the micro-social environment included history of family drug use, and family involvement in sex work.

Birthplace was collapsed into six regions: (1) Chihuahua, Mexico, (2) Baja California, Mexico, (3) northern Mexican states excluding Baja California and Chihuahua (Sonora, Coahuila, Nuevo Leon, Tamaulipas, Durango, Sinaloa), (4) central Mexican states (Nayarit, Zacatecas, San Luis Potosi, Aguascalientes, Guanajuato, Querelaro, Hidalgo, Jalisco, Colima, Michoacán, Mexico D.F. Tlaxcala, (5) southern Mexican states (Chiapas, Campeche, Guerrero, Oaxaca, Puebla, Quintana Roo, Tabasco, Veracruz, Yucatán), and (6) United States.

Statistical Analyses

Three separate time to event analyses were performed, one for each outcome trajectory, examining factors influencing time to initiation using an accelerated failure time (AFT) model [22]. This parametric survival model allows for more efficient estimates and smaller standard errors over semi-parametric models by being able to specify the distribution of the hazard function. Further, parametric models are not subject to the same limitations as semi-parametric survival models when handling tied event times. For AFT models, the effect of a covariate is expressed as either accelerating (shortening time to event; rate ratios >1) or decelerating (lengthening time to event; rate ratios <1). Covariate effects are shown as time ratios (TR) rather than hazard ratios, thus allowing for an interpretation on the time scale.

First, an unadjusted model for each of the three trajectories was constructed. For multivariate models, variables were selected for inclusion in the models based a priori hypotheses and statistical significance (p-value ≤ 0.10) in bivariate analyses. Multivariate models were constructed using a manual forward stepwise model building method. Age and gender were explored as potential confounders. Fit diagnoses were assessed for each of the three models by comparing Akaike's information criterion (AIC) values across models with identical covariates. The final multivariate model included only variables that had p-values < 0.05. We analyzed Schoenfeld residuals to assess the proportionality assumption and evaluated goodness of fit using the likelihood ratio test. Models were stratified by study site to explore possible modifying effects; no significant differences were found.

RESULTS

Descriptives

Baseline Socio-demographics—Among 557 FSW-IDU, median age was 33 years (interquartile range [IQR]: 28–40), and median years of education completed was 5 (IQR: 2–6 years) (Table 2). Median duration of time in sex work was 19 years (IQR: 15–24), with the majority of participants currently working as street workers (88%). Median duration of injection drug use was 20 years (IQR: 17–25), with heroin as the most common drug injected in the past month. By study design, equal proportions were from Tijuana (n=279) and Ciudad Juarez, Mexico (n=278).

Among the total sample, 46% (n=258) initiated sex work first, 29% (n=163) initiated injection drug use first, and 24% (n=136) initiated both at the same age. Overall HIV prevalence was 5%; 4% among those who initiated sex work first, 6% among those who initiated injection drug use first, and 8% among those who began both at the same age (p=0.13). Figure 1 shows the Kaplan-Meier curves for the unadjusted time to first initiation event for each group.

Context of first sex work—The majority of women who initiated sex work first did so to obtain money to pay for drugs (65%), or to pay for child's needs (31%), decided "on their own" (59%) or encouraged by a friend/acquaintance (28%) to first trade sex, and promised either money (57%) or drugs (12%) (Table 2). Similarly, the majority of women who initiated sex work and injection drug use at the same age first traded sex for money to pay for drugs (64%), or to pay for child's needs (35%), decided "on their own" (64%), and were promised either money (64%) or drugs (15%).

Context of first injection drug use—The majority of women who first injected drugs before engaging in sex work did so at someone else's home (29%) or shooting gallery (29%), first injected heroin (78%), or a combination of heroin and cocaine (12%), first injected with a friend (87%), and because they were curious about the high (59%), felt peer pressure (27%) or to deal with depression/anxiety (23%) (Table 2). For women who initiated both sex work and injection at the same age, the majority first injected at someone else's house (36%) or in a hotel (26%), first injected heroin (77%) or a combination of heroin and cocaine (10%), with a friend (83%), and because they were curious about the high (56%), to help deal with depression/anxiety (32%), or because of external pressure from peers (28%).

Factors independently associated with time to initiation

Table 3 shows all univiarate associations across the three outcome trajectories.

Time to initiating sex work—Seven factors were found to be independently associated with a shorter time to initiating sex work (Table 4) including younger age (adjusted [adj] Time Ratio (TR)=0.97 per 5-years, 95% confidence interval [CI]=0.95, 0.98), fewer years of education (adj TR=0.97 per year, 95% CI= 0.96, 0.98), using a stimulant as the first non-injection drug used prior to first trading sex (adj TR=1.26, 95% CI=1.15, 1.37), first selling sex to obtain money for their child's needs (adj TR=1.08, 95% CI=1.02, 1.14), experiencing physical abuse (adj TR=1.08, 95% CI=1.02, 1.15), and currently living in Ciudad Juarez (compared to Tijuana; adj TR=1.09, 95% CI=1.02, 1.16). Conversely, having a parent or sibling who used illicit drugs was associated with longer time to initiating sex work (adj TR=0.90, 95% CI=1.02, 1.16).

Time to first injection drug use—Five factors were independently associated with initiating injection drug use prior to beginning sex work (table 5). Younger age (adj

TR=0.94 per 5-years, 95% CI=0.92, 0.97), having previously used any non-injection drug (adj TR=1.16, 95% CI=1.07, 1.25), and experiencing prior physical abuse (adj TR=1.08, 95% CI=1.00, 1.17) were associated with a shorter time to first injection drug use initiation. Inhalant use as the first illicit drug used and being born in a southern state in Mexico were both associated with a longer time to first injection drug use (adj TR=0.85, 95% CI=0.76, 0.95, and 0.70, 95% CI= 0.51, 0.97 respectively).

Time to first sex work and first injection drug use at the same age—Factors independently associated with a shorter time to initiating sex work and injection drug use at the same age (table 6) included being younger (adj TR=0.92 per 5-years, 95% CI=0.90, 0.99), first trading sex because a regular partner/boyfriend/spouse encouraged it (adj TR=1.29, 95% CI=1.05, 1.57), using a stimulant as their first illicit drug (adj TR=1.18, 95% CI=1.06, 1.31), first injecting drugs to help deal with depression/anxiety (adj TR=1.08, 95% CI=1.00, 1.12), and experiencing prior physical abuse (adj TR=1.12, 95% CI=1.04, 1.22).

DISCUSSION

In this study of the context of sex work and injection drug use initiation in two Mexico-US border cities, we found that nearly half initiated sex work prior to beginning to inject, nearly one third initiated injection drug use before beginning sex work, and one quarter initiated both sex work and injection drug use at the same age. Although the cross-sectional nature of this study precludes inference of causality, we identified important differences among women across these three trajectories. These findings may prove valuable when designing targeted prevention efforts to delay or protect against initiation of sex work and injection drug use.

As anticipated, early illicit drug use, particularly early stimulant use was associated with an accelerated time to initiation across all three groups. These findings contribute to a growing body of literature illustrating the multiple downstream risks associated with early stimulant use among women. For example, early crack use and methamphetamine use are associated with engaging in survival sex [23], while early cocaine and crystal methamphetamine use increases risk for later injection drug use [24], and for initiating injection drug use at a younger age [25].

In contrast, for women who initiated injection drug use first, we found that prior inhalant use delayed the time to first injection. The accessibility and inexpensiveness of inhalants make them the most commonly used drug by adolescents in Mexico [26] and may be one reason why we found a delayed time to first injection among users. Although our findings suggest that early illicit drug use shortens time to subsequent sex work and injection drug use initiation, there may be a window of opportunity to alter this trajectory.

For women who initiated sex work prior to first injecting drugs, markers of vulnerability such as low levels of education, early exposure to physical abuse, and the perceived need to engage in sex work to obtain money for their child's needs were independently associated with an accelerated time to initiating sex work. Previous studies in the Mexico-U.S. border region report that high proportions of sex workers have children (approximately 95%) and these women are the primary economic provider for their families [27, 28]. Similarly, a mixed methods study of current sex workers in Nagaland, India reported 45% of women beginning sex work did so to obtain money to support themselves or their family [29].

Our findings encourage the examination of interventions such as micro-finance programs for women that could provide economic alternatives to sex trade. In addition, a continued emphasis on increasing women's access to family planning programs and avenues for

women to access free or reduced cost contraception may further empower women to control when and how many children they have. To our knowledge, no studies have shown a direct association between increased education and a lower likelihood in entering sex work. However, some literature suggests that encouraging young girls to stay in school could reduce their risk for future participation in sex work [30, 31], and drug use [32] by increasing their economic empowerment. Even a small increase in educational attainment can have a large impact on economic opportunities available to young women [33, 34]. *Oportunidades*, a governmental social assistance program in Mexico designed to provide cash payments to families in exchange for regular school attendance within rural areas, has been shown to reduce poverty and improve health and education [35, 36]. However, these programs may not be reaching vulnerable populations in urban settings, especially along the Mexico-U.S. border.

Being born in a southern Mexican state greatly delayed time to first injection drug use among those who did so before beginning sex work. FSW who migrated to Baja California were at lower risk for STI acquisition compered to women born in Baja California [38]. Additionally, recently relocated female IDU had lower odds of being HIV-positive than female IDU who had been born in the city [37]; however, this protective effect diminished for every year women lived in Tijuana [37]. Migration and mobility have been shown to influence drug use behaviors in Tijuana and Ciudad Juarez at the macro level by influencing the availability of drugs, and at the micro level by changing peer-networks [15, 39]. Within our study, the majority of women who moved from a Southern state migrated because their family relocated there or to seek economic opportunities. Often, planned moves happen in a context of stability, which may explain the delayed initiation of injection drug use [37].

Micro-social level factors pertaining to intimate partner relationships and abuse were associated with a shorter time to concurrent initiation of sex work and injection drug use. Having an intimate partner encourage them to begin sex work was associated with concurrent initiation of sex work and injection drugs. Consistent with literature showing that childhood physical and sexual abuse places females at higher risk for subsequent illicit drug use and vulnerability for initiating sex work [40–43] and injection drug use [44], we found early physical abuse to be associated with shorter time to initiation across all groups. A substantially shorter time to initiation was observed for women who initiated both sex work and injection at the same age; the majority of whom experienced this abuse from a boyfriend or spouse. One of the many effects of abuse is intense and long term depression [45–47] which may provide context for our finding that women who first injected drugs to help deal with feelings of depression experienced a shorter time to initiation of both sex work and injection drug use at the same age. These findings suggest the need for programs to help women cope with the trauma associated with childhood abuse and intimate partner violence along with the need for mental health treatment.

Several limitations must be taken into account in the interpretation of these results. Of primary importance is that this is a post-hoc analysis using baseline data from a longitudinal study of current FSW-IDU. Because of this we lacked information on time-dependent covariates such as early childhood and adolescent measures of peer-networks, homelessness, and family characteristics. The small sample size may also have limited our power to detect some associations. Second, misclassification may have influenced all three subgroups and thus may bias our estimates toward the null. It is unlikely that misclassification severely biased our results since we did observe different correlates across the three groups examined. Future longitudinal mixed methods studies examining different trajectories of sex work initiation and stages of illicit drug use are needed to investigate the role of other modifiable factors that influence the initiation and temporality of both behaviors.

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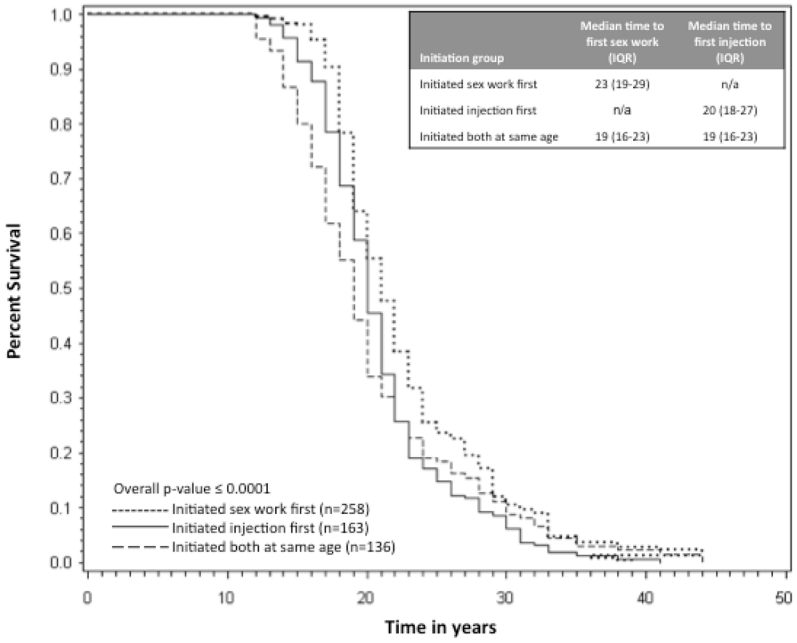

Figure 1.
Kaplan-Meier of observed time from birth to event of interest across three initiation groups.

Table 1

Explanation of Measures within Risk Environment*

	Micro-environment	Macro-environment
Social Risk Factors	Motivations for first trading sex	
	Person first injected drugs with	
	Reasons for first injecting drugs	
	Early family drug involvement	
	Early physical or sexual abuse	
Physical Risk Factors	Location of first injection drug use	Birthplace
	Type of drug first injected	Migration history
	Illicit drug use prior to both sex work and injection initiation	

*Adapted from the Rhodes Risk Environment Framework

Table 2

Summary of demographic characteristics for baseline sociodemographics, circumstances surrounding sex work initiation, and injection drug use initiation among 557 FSWs who inject drugs overall and stratified by initiation trajectories.

Characteristic	Overall sample (N=557)	Temporal sequence of initiation events		
		Initiated sex work first (N=258)	Initiated injection drug use first (N=163)	Initiated both events at the same age (N=136)
Baseline sociodemographics				
Median age in years (IQR)	33 (28–40)	33 (27–41)	35 (29–41)	31 (26–37)
Speaks English	157 (28)	66 (25)	64 (39)	27 (20)
Mean highest year of school completed (IQR)	5 (2–6)	5 (2–6)	7 (5–9)	6 (5–9)
Married/common law	217 (39)	99 (38)	60 (37)	58 (42)
Born outside of study city	336 (59)	160 (62)	104 (63)	72 (53)
City of residence				
Tijuana	279 (50)	127 (50)	90 (11)	62 (46)
Ciudad Juarez	278 (49)	131 (51)	73 (44)	74 (55)
HIV positive[†]	30 (5)	9 (4)	10 (6)	11 (8)
Context of sex work initiation				
Main Reason first traded sex				
Money for drugs	357 (64)	167 (65)		86 (64)
Money for child's needs	179 (31)	81 (31)		48 (35)
Whose idea for you to first trade sex?				
Own	341 (61)	151 (59)		86 (64)
Boyfriend/husband	22 (3)	9 (3)		5 (4)
Friends/acquaintance	158 (28)	77 (30)		37 (27)
Promised anything in exchange for sex the first time, even if you didn't get it?	412 (74)	191 (74)		110 (81)
Among those promised something, What did you obtain in exchange for sex the first time?				
Drugs	80 (14)	32 (12)		21 (15)
Money	316 (57)	147 (57)		87 (64)
Context of injection drug use initiation				
Physical location when first injected				
At your home/parent's home	84 (15)		30 (19)	20 (15)
At someone else's home	166 (30)		48 (29)	48 (36)
Shooting gallery	78 (14)		24 (29)	14 (10)
Hotel/Rented Room	153 (27)		31 (19)	36 (26)
Jail or prison	11 (2)		5 (3)	1 (<1)
Drug first injected				
Heroin	429 (78)		125 (78)	106 (77)
Cocaine or crack	33 (6)		8 (5)	8 (6)
Speedball (cocaine and heroin)	47 (9)		18 (12)	13 (10)
Methamphetamine	29 (5)		6 (1)	5 (1)

Characteristic	Overall sample (N=557)	Temporal sequence of initiation events		
		Initiated sex work first (N=258)	Initiated injection drug use first (N=163)	Initiated both events at the same age (N=136)
All reasons first injected				
External pressure from friends, family, partner	141 (25)		44 (27)	37 (28)
Depressed or stressed out	154 (28)		37 (23)	44 (32)
I was curious about the high	326 (59)		96 (59)	76 (56)
Who did you inject with the first time?				
Friend	476 (86)		141 (87)	112 (83)
Spouse/partner	71 (13)		18 (11)	20 (14)

† HIV results based on confirmation using Western Blot and HIV-1 enzyme immunoassay.

Table 3

Unadjusted models for factors associated with time to initiation for women who initiated sex work prior to injecting, women who initiated injection drug use prior to sex work, and women who initiated both sex work and injection drug use at the same age.

	Time to first sex work* (N=258)	Time to first injection drug use ** (N=163)	Time to initiation of sex work and injection drug use at same age*** (N=136)
	TR (95% CI)	TR (95% CI)	TR (95% CI)
Baseline sociodemographics			
Age (per 5-years)	**0.96 (0.95–0.97)**	**0.95 (0.95–0.96)**	**0.92 (0.92–0.94)**
Study location (TJ vs. CJ)	0.99 (0.93, 1.05)	0.99 (0.91, 1.07)	1.04 (0.95, 1.14)
Number of education years completed (per year)	**0.97 (0.96, 0.98)**	0.99 (0.98, 1.01)	0.99 (0.99, 1.02)
Speaks English	0.99 (0.93, 1.07)	0.97 (0.91, 1.02)	1.00 (0.90, 1.13)
Context of sex work initiation			
Main Reason first traded sex	**1.10 (1.03, 1.17)**		**0.90 (0.82, 0.99)**
Money for drugs	**0.91 (0.87, 0.95)**		**1.12 (1.02, 1.23)**
Money for child's needs			
Whose idea for you to first trade sex?			
Own	1.04 (0.97, 1.10)		0.97 (0.88, 1.07)
Boyfriend/husband	0.96 (0.79, 1.06)		**1.32 (1.04, 1.66)**
Friends/acquaintance	0.91 (0.89, 1.02)		0.99 (0.88, 1.09)
Promised anything in exchange for sex the first time, even if you didn't get it?	0.99 (0.93, 1.07)		1.01 (0.89, 1.14)
Among those promised something, What did you obtain in exchange for sex the first time?			
Drugs	0.99 (0.90, 1.09)		0.96 (0.85, 1.09)
Money	1.03 (0.96, 1.14)		1.01 (0.89, 1.15)
Context of injection drug use initiation			
Physical location when first injected drugs:			
Own house or parent's house		1.01 (0.92, 1.13)	1.03 (0.90, 1.17)
Someone else's house		1.06 (0.97, 1.15)	0.94 (0.85, 1.03)
Shooting gallery		1.09 (0.98, 1.22)	0.89 (0.77, 1.04)
Hotel/rented room		0.95 (0.89, 1.20)	1.09 (0.98, 1.21)
Jail or prison		0.89 (0.71, 1.13)	1.48 (0.85, 2.49)
Drug first injected:			
Heroin		1.04 (0.96, 1.16)	1.02 (0.91, 1.14)
Cocaine or crack		0.95 (0.81, 1.17)	*0.85 (0.70, 1.04)*
Speedball (cocaine and heroin)		0.90 (0.80, 1.02)	0.90 (0.77, 1.06)
Methamphetamine		0.98 (0.78, 1.18)	*1.26 (0.98, 1.62)*
Primary reason first injected:			
External pressure from friends, family, or partner		1.03 (0.95, 1.13)	*0.90 (0.81, 1.00)*
To deal with stress or feelings of depression		1.08 (0.98, 1.19)	*1.09 (0.99, 1.20)*
Curiosity about the drug or the effect		0.99 (0.92, 1.07)	0.95 (0.86, 1.04)

	Time to first sex work* (N=258)	Time to first injection drug use ** (N=163)	Time to initiation of sex work and injection drug use at same age*** (N=136)
	TR (95% CI)	TR (95% CI)	TR (95% CI)
Person with:			
Friend		0.92 (0.94, 1.09)	1.07 (0.94, 1.20)
Spouse/partner		0.85 (0.82, 1.06)	0.95 (0.82, 1.08)
Contextual Factors preceding sex work and injection drug use initiation			
Illicit drug use			
Used any non-injection illicit drug before initiating either sex work or injection drug use †	**1.16 (1.09, 1.23)**	**1.09 (1.01, 1.18)**	0.98 (0.88, 1.08)
Heroin (non-injection)	0.97 (0.67, 1.39)	**1.56 (1.10, 2.20)**	0.96 (0.55, 1.62)
Cocaine, crack, or methamphetamine (non-injection stimulant)	**1.26 (1.15, 1.48)**	1.09 (0.92, 1.34)	**1.17 (1.02, 1.44)**
Inhalant	0.99 (0.90, 1.11)	0.93 (0.84, 1.05)	0.87 (0.70, 1.06)
Agua Celeste	1.06 (0.92, 1.22)	1.08 (0.83, 1.20)	0.81 (0.62, 1.08)
Migration			
Born outside of study city	1.02 (0.95, 1.08)	0.99 (0.91, 1.06)	1.05 (0.96, 1.15)
Region of birth city:			
Northern Mexican state (not Baja or Chihuahua)	1.03 (0.96, 1.11)	1.04 (0.92, 1.14)	*1.11 (0.98, 1.26)*
Chihuahua, Mexico	0.98 (0.93, 1.05)	1.02 (0.94, 1.10)	0.96 (0.87, 1.06)
Baja, Mexico	1.01 (0.94, 1.09)	1.02 (0.94, 1.12)	0.97 (0.86, 1.09)
Central Mexican state	1.05 (0.96, 1.16)	1.03 (0.85, 1.17)	1.05 (0.90, 1.23)
Southern Mexican State	**0.72 (0.56, 0.91)**	**0.62 (0.45, 0.88)**	1.02 (0.81, 1.28)
United States	0.91 (0.80, 1.04)	0.92 (0.86, 1.08)	*0.82 (0.65, 1.02)*
Number of cities lived (per city) ††	1.01 (0.99, 1.03)	1.00 (0.98, 1.02)	1.33 (0.98, 1.04)
History of Abuse			
Experienced physical abuse before initiating either sex work or injection drug use	**1.09 (1.02, 1.16)**	1.07 (0.98, 1.16)	**1.16 (1.04, 1.28)**
Experienced rape before initiating either sex work or injection drug use	**1.11 (1.03, 1.19)**	1.05 (0.96, 1.14)	1.04 (0.92, 1.16)
History of Family drug use and sex work involvement			
Any family member used illicit drugs ††	*0.95 (0.89, 1.01)*	0.99 (0.91, 1.07)	0.98 (0.89, 1.08)
Parent or sibling used illicit drugs ††	**0.91 (0.85, 0.97)**	0.98 (0.90, 1.05)	0.99 (0.90, 1.08)
Any family member used injection drugs ††	0.98 (0.90, 1.05)	1.01 (0.91, 1.12)	1.05 (0.92, 1.18)
Parent or sibling used injection drugs ††	0.94 (0.87, 1.01)	1.00 (0.92, 1.08)	1.02 (0.91, 1.14)
Any family member participated in sex trade ††	0.94 (0.87, 1.02)	1.05 (0.85, 1.04)	0.98 (0.87, 1.09)

*Time >1 indicates shorter time to sex work initiation per year and hence “higher risk”. Survival model assuming a gamma distribution

**Time>1 indicates shorter time to injection drug use initiation per year and hence “higher risk”. Survival model assuming a log-normal distribution

***Time>1 indicates a shorter time to initiation and hence “higher risk”. This group initiated both sex work and injection drug use at the same age. Survival model assuming a log-normal distribution.

† non-injection illicit drugs include: cocaine, crack, methamphetamine, heroin, general inhalants, agua celeste (a solvent prevalent in Northern Mexico), barbiturates, and tranquilizers.

†† Lifetime

Bold indicate significant at alpha <0.05; *italic* indicate significant at alpha<0.10.

All variables significant at alpha ≤ 0.10 were considered in the multivariate model.

Table 4

Independent factors associated with time to sex work initiation among women who initiated sex work before injection drug use (N=258).

Baseline Contextual Factor	Adjusted time to first sex work* (95% CI)
Age (per 5-years)	0.97 (0.95, 0.98)
Education completed (per year)	0.97 (0.96, 0.98)
Stimulant was first non-injection drug used prior to first sex work†	1.26 (1.15, 1.37)
Reason for first sex trade was for money to pay for child's needs††	1.08 (1.02, 1.14)
Parent or sibling used illicit drugs	0.90 (0.86, 0.96)
Experienced physical abuse prior to first sex work	1.08 (1.02, 1.15)
Living in Ciudad Juarez at time of interview†††	1.09 (1.02, 1.16)

*Time >1 indicates shorter time to first sex work and hence "higher risk".

Survival model with a specified gamma distribution.

†Methamphetamine, Cocaine, or Crack.

††Compared to sex for drugs, housing, external pressure, or because high on drugs.

†††Compared to Tijuana.

In addition to the above measures, the following measures were significant at ≤ 0.10 level in univariate models and were assessed for inclusion in the multivariate model using a manual forward stepwise procedure: first traded sex for money to buy drugs, used any non-injection drug prior to first sex work, experienced rape before first sex work, family sex work involvement and born in a southern state in Mexico.

Table 5

Independent factors associated with time to first injection drug use among women who initiated injection drug use before sex work (N=163)

Baseline Contextual Factor	Adjusted time to injection drug use initiation* (95% CI)
Age (per 5-years)	0.94 (0.92, 0.97)
Used any non-injection illicit drug before injection initiation†	1.16 (1.07, 1.25)
Inhalant was first non-injection drug used	0.85 (0.76, 0.95)
Experienced physical abuse prior to injecting drugs	1.08 (1.00, 1.17)
Born in a southern state in Mexico††	0.70 (0.51, 0.97)

*Time >1 indicates a shorter time to injection drug use initiation and thus “higher risk”.

Survival model with a specified log-normal distribution

†Non-injection illicit drugs include: cocaine, crack, methamphetamine, heroin, general inhalants, agua celeste (a solvent prevalent in Northern Mexico), barbiturates, and tranquilizers.

††Representation from the following southern states include: Chiapas, Campeche, Guerrero, Oaxaca, Puebla, Quintana Roo, Tabasco, Veracruz, Yucatán.

In addition to the above measures, the following measures were significant at ≤ 0.10 level in univariate models and were assessed for inclusion in the multivariate model using a manual forward stepwise procedure: first injected drugs in a shooting gallery, injected drugs to deal with depression or anxiety, and interview location.

Table 6

Independent factors associated with time to initiating sex work and injection drug use at the same age (N=136).

Baseline Contextual Factor	Adjusted time to initiation of both injection and sex work at same age* (95% CI)
Age (per 5-years)	0.92 (0.90, 0.99)
Sexual partner or spouse's idea to first trade sex†	1.30 (1.05, 1.57)
Stimulant was first non-injection drug used prior to injecting	1.18 (1.06, 1.31)
Reason first injected was to deal with anxiety/stress or feelings of depression††	1.08 (1.00, 1.12)
Experienced physical abuse prior to injecting drugs or first sex work	1.12 (1.04, 1.22)

*Time >1 indicates shorter time to initiation of both injection and sex work and hence "higher risk"

Survival model with a specified log-normal distribution.

†Compared to own idea, friends/acquaintance, family member, or sex worker's idea.

††compared to because of peer pressure, pressure from family, pressure from boyfriend/spouse, to deal with withdrawal symptoms or for more efficient high, curious about high/drug, or injected against will.

In addition to the above measures, the following measures were significant at ≤ 0.10 level in univariate models and were assessed for inclusion in the multivariate model using a manual forward stepwise procedure: reason for selling sex was for money to pay for child's needs; reason for selling sex for money to pay for drugs, born in Northern state in Mexico (not Baja or Chihuahua), born in the United States, and study site.