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Correlates and contexts of U.S. injection drug initiation among undocumented Mexican migrant men who were deported from the United States

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Abstract

Preventing the onset of injection drug use is important in controlling the spread of HIV and other blood borne infections. Undocumented migrants in the United States face social, economic, and legal stressors that may contribute to substance abuse. Little is known about undocumented migrants' drug abuse trajectories including injection initiation. To examine the correlates and contexts of U.S. injection initiation among undocumented migrants, we administered quantitative surveys (n=309) and qualitative interviews (n=23) on migration and drug abuse experiences to deported male injection drug users (IDUs) in Tijuana, Mexico. U.S. injection initiation was independently associated with ever using drugs in Mexico pre-migration, younger age at first U.S. migration, and U.S. incarceration. Participants' qualitative interviews contextualized quantitative findings and demonstrated the significance of social contexts surrounding U.S. injection initiation experiences. HIV prevention programs may prevent/delay U.S. injection initiation by addressing socio-economic and migration-related stressors experienced by undocumented migrants.

Keywords

HIV/AIDS; undocumented migrants; injection drug use; injection initiation; Mexico

INTRODUCTION

In the United States, Hispanics are overrepresented among persons living with HIV and hepatitis C virus (HCV) [1-3]. Although illicit drug use is less prevalent among Mexican migrants than U.S.-born Mexicans and non-Latino whites [4], undocumented Mexican migrants who use drugs experience heightened HIV risk [5, 6]. Undocumented migrants also experience severe social and economic marginalization including discrimination, unemployment, and residence in neighborhoods where drug abuse is highly prevalent [7, 8]. In combination with fear of deportation, a type of forced or involuntary return migration, these factors likely contribute to high levels of stress [9], which may contribute to substance abuse as a coping mechanism [10].

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Deportees represent an important and underserved population at risk of HIV transmission and other health problems [11, 12]. Deportation, which is common in the U.S.-Mexico context [13], is increasingly triggered by drug-related criminal offenses [14, 15]. Most deportees (89%) are men [16], and many report history of substance abuse [14, 15] and engagement in risky behaviors for HIV transmission throughout their migration trajectories [17]. In 2010, ~40% of U.S. deportees to Mexico were released in Baja California, with Tijuana receiving the largest share at >126,000 persons [16]. With an estimated 1.6 million residents, Tijuana is the largest and fastest-growing city on Mexico's Northern border with the United States [18]. Drug abuse is prevalent due to availability of drugs en route to the United States [19-21]. Research by our binational team found that deportees in Tijuana experience many harms relating to drug abuse [11], including HIV transmission: among male injection drug users (IDUs), those reporting U.S. deportation had four times higher odds of HIV infection than men who were not deported [12]. A qualitative pilot study designed to investigate this association found that deported IDUs report complex, lengthy migration and drug abuse trajectories with many formative exposures to and direct experiences with illicit drug use occurring pre-deportation. In particular, some men described beginning to inject drugs in the United States [17].

The transition from non-injection to injection drug use dramatically increases the risk of transmitting HIV and other blood borne infections including hepatitis B virus (HBV) and HCV [22-26]. The period immediately following injection initiation is marked by high HBV and HCV incidence [27, 28], with rates that may exceed 35/100 person-years [22, 24, 29-32]. New injection drug users (IDUs) may rely on assistance from others to inject [33], which is associated with increased risk of HIV infection [28]. New IDUs are also less likely to self-identify as injectors, reducing their visibility to prevention and treatment programs [23, 27]. With increasing duration of injection, IDUs experience higher risk of drug dependence, overdose, and other infections (e.g., abscesses) than non-injection drug users [34, 35]. Preventing injection initiation and reaching IDUs immediately following their transition to injection have thus been identified as important public health goals [36].

Preventing injection initiation requires a thorough understanding of individual, social and contextual factors associated with the transition to injection [36]. Injection initiation has been associated with socio-demographic factors including older age, male sex, and homelessness; heavy or frequent use of heroin, cocaine, or crack; younger age at first drug use; having peers or sex partners who inject drugs; history of physical or sexual abuse; exchanging sex for drugs; and residing in neighborhoods with large proportions of minority residents and low adult education levels [37-44]. Since injection is a highly efficient drug administration route, drug users may transition to injection due to increasing drug dependence, higher drug prices or reductions in purity, or changing forms of drugs that are locally available. For example, black tar heroin, which is the most common formulation found in the Western United States and Mexico, is difficult to smoke or snort but can be dissolved in water for injection [36, 45, 46]. Social norms and influence from peers, sex partners, family and community members may also promote injection initiation [47-50].

Although few studies have examined the transition to injection prospectively [31, 41, 43, 51], recent research among Mexican American heroin users in San Antonio found higher injection initiation rates than reported elsewhere, which the authors hypothesize may result from persistent poverty, social isolation, and a local subculture that normalizes heroin use and drug injection [48, 52, 53]. No studies to our knowledge have comprehensively examined critical transitions, including injection initiation, in undocumented Mexican migrants' drug abuse trajectories. Research with undocumented migrants presents challenges in identifying, approaching, and recruiting participants [54]. Thus, we sought to

examine undocumented migrants' U.S. injection initiation by analyzing data from a unique sample of deported male IDUs residing in Tijuana, Mexico.

We built upon Rhodes' risk environment framework, which emphasizes how social and environmental factors shape individuals' drug abuse experiences and related harms at multiple levels [55]. We modified this framework to consider how undocumented migrants move through diverse social and geographic risk environments. Within migrants' changing physical locations and life stages, acculturative stress and social and cultural experiences may influence transitions in drug abuse, particularly for adolescent migrants [56]. We therefore conceptualized three contexts in which undocumented migrants' injection initiation may be influenced: (1) the pre-migration context in Mexico, (2) initial U.S. migration experiences, and (3) life as an undocumented migrant in the United States. Based on the injection initiation literature and our formative research among male IDUs deported to Mexico [17], we hypothesized that men with exposure to drugs in Mexico pre-migration would be more likely to initiate injecting in the United States than those without pre-migration exposure to drugs.

METHODS

Study Design

Our study drew from *Proyecto El Cuete*, a prospective study of HIV and syphilis among 1,056 IDUs in Tijuana, Mexico [57]. In 2006-2007, outreach workers recruited IDUs using respondent-driven sampling (RDS) [58]. Briefly, a diverse group of "seeds" were given uniquely coded coupons to recruit their peers, who were in turn trained to recruit their peers [59]; recruitment continued until the desired sample was achieved [58]. Eligibility criteria included being at least 18 years of age, injecting drugs in the past month, speaking Spanish/English, planning to reside in Tijuana for the next 18 months, and providing informed consent.

For this mixed-methods study of U.S. injection initiation, we drew from quantitative and qualitative sub-studies nested within *Proyecto El Cuete*. We collected our exploratory qualitative data in 2008 and used emergent themes regarding migration and deportation [17] to develop domains and measures for the quantitative questionnaire administered in 2010 [60]. For the two-phase, explanatory mixed methods study design presented here, we first analyzed the quantitative survey data and subsequently drew from qualitative interview data to help explain our quantitative findings (i.e., we used qualitative data to help explain and contextualize the independent correlates of U.S. injection initiation obtained from multivariable logistic regression analyses) [61]. The Human Research Protections Program of the University of California, San Diego and the Ethics Board of the Tijuana General Hospital approved all research protocols.

Quantitative Data Collection

For both sub-studies, we generated a list of all *Proyecto El Cuete* participants reporting U.S. deportation ($n = 377$). Eligibility included being male, not lost to follow-up from the parent study, and confirming U.S. deportation. For our quantitative study, outreach workers attempted to recruit all deported male participants; 328 men were not lost to follow-up and completed questionnaires (87% response rate).

From January–April 2010, quantitative interviews were conducted in English or Spanish, depending on participants' preferences, in private rooms in the parent study's storefront offices in Tijuana's *zona norte*, an area characterized by high prevalence of drug abuse and proximity to the U.S. border. To ensure quality and consistency, trained interviewers used laptop computers to administer ~1 hour long computer assisted programmed interviews

(CAPI) with automatic skip patterns and built in reliability checks. Questionnaire development was informed by our formative qualitative work [17], theoretical framework, and extensive pilot testing. Measures covered the key domains in our theoretical framework, including socio-demographics (e.g., age), pre-migration experiences (e.g., birthplace, family income, educational attainment, employment, and family and personal drug use before migration), initial migration experiences (e.g., ages at independence from family and first U.S. migration, reason for emigration, circumstances of travel), and U.S. experiences (e.g., U.S. social networks, places lived, total duration of U.S. residence, drug abuse behaviors, and incarceration experiences). U.S. injection initiation, the binary dependent variable for this study, was measured by the question, "Was the United States the first place where you ever injected drugs?" Participants were reimbursed U.S. $20 for their time.

Quantitative Data Analysis

We excluded 19 men who injected drugs in Mexico pre-migration from our quantitative analysis, resulting in a final sample of 309 men who reported injection initiation following their first migration to the U.S. We examined distributional differences between groups of men who did vs. did not report U.S. injection initiation using Wilcoxon rank sum tests for continuous variables and Pearson's chi-square tests for binary and categorical variables. Univariate logistic regression identified correlates of U.S. injection initiation. For final multivariable logistic regression models, we considered all domains of our theoretical framework and variables attaining significance levels <10% in univariate models. We compared models using likelihood ratio tests and assessed collinearity and all two-way interactions. To correct for differential recruitment bias by U.S. injection initiation status, we calculated inverse probability weights based on individualized recruitment weights using the RDS Analysis Tool [62]. To account for correlation between recruiter and recruitee, we used the variable containing these weights as a cluster variable in a generalized estimating equation (GEE) algorithm. We assumed an exchangeable correlation structure within each cluster (i.e., that the correlation between any two subjects recruited by the same recruiter was the same). Correspondingly, all multivariate results presented are labeled "RDS-adjusted."

Qualitative Data Collection

Sampling for our qualitative sub-study was based on the list of *Proyecto El Cuete* male deportees, participant availability, and diversity in the total number of U.S. deportations and time elapsed since most recent deportation (i.e., to achieve maximum variation with respect to deportation characteristics) [17]. From October–November 2008, a trained male interviewer conducted semi-structured, in-depth interviews lasting ~90 minutes in the private rooms described above. Open-ended questions focused on migration, deportation, drug use and sexual risk behaviors for HIV transmission (e.g., "Tell me about the first time you ever injected drugs.") To ensure quality and consistency in data collection, the semi-structured interview guide also contained specific probes relating to places, people, and risk behaviors surrounding key events. Since men reported lengthy, complicated migration histories, participants were asked to focus on events surrounding their most recent deportation [17]. We terminated participant recruitment after interviewing 24 men, when saturation of themes was obtained [63]. Participants were reimbursed U.S. $20 for their time.

Qualitative Data Analysis

Qualitative interviews were digitally recorded and transcribed verbatim. To preserve the content of participants' interviews, Spanish and bilingual transcripts were not translated into English. Our preliminary analysis involved creating an initial coding scheme for key concepts and categories, as previously described [17]. Briefly, this coding scheme was

developed using a consensus approach in which a team of bilingual research assistants and the principal investigator independently applied codes and then compared coded text to discuss and resolve discrepancies [17]. To apply finalized codes, all transcripts were uploaded into ATLAS.ti, a qualitative data management software [64].

The present analysis of U.S. injection initiation is restricted to 23 men who also completed the 2010 quantitative surveys. We used the coding scheme [17] to obtain text segments coded for U.S. drug use and injection events. Next, we further analyzed these coded text segments to see where and how the qualitative data could help explain and/or contextualize our quantitative results [60, 65]. We selected relevant text segments (i.e., quotes) to explain each quantitative finding and illustrate additional social context surrounding their men's U.S. injection experiences. The bilingual principal investigator (VO) translated all Spanish language quotes presented here.

RESULTS

Quantitative Findings: Factors Associated with U.S. Injection Initiation

Of the 309 deported male IDUs who reported initiating drug injection following their first migration to the U.S., 114 (37%) reported U.S. injection initiation. Table I presents results from univariate analyses comparing characteristics within each of the three theoretically derived contexts for men who did and did not initiate injection in the United States. First, in the *pre-migration Mexico context*, a minority of our sample was born in Tijuana and most men reported that their families in Mexico were poor. Men who reported U.S. injection initiation were significantly less likely to be employed in Mexico pre-migration and more likely to have ever used non-injected drugs pre-migration. Overall, half of men consumed alcohol and a third reported any drug use pre-migration.

Second, regarding *initial U.S. migration experiences*, many men reported becoming independent from their families during adolescence, and younger age at first migration was significantly associated with U.S. injection initiation in univariate analyses. Men who migrated in search of better economic opportunities were less likely to report U.S. injection initiation, while those who migrated with at least one parent were more likely to initiate injection in the United States.

Third, in the *post-migration U.S. context*, nearly all men resided in California. Men who already knew someone in the United States at the time of their first U.S. migration were less likely to report U.S. injection initiation. Increasing duration of total U.S. residence and ever being incarcerated were associated with U.S. injection initiation. Overall, the most common drugs men reported ever using in the United States included marijuana (82%), cocaine (70%), heroin (56%), and crack (36%; data not shown). Among men reporting U.S. injection, 78% ever injected heroin and 45% ever injected cocaine (data not shown). Very few men reported receiving any drug treatment in the United States.

Table II presents results from our final, RDS-adjusted multivariable logistic regression model that identified three factors independently associated with U.S. injection initiation: ever consuming any drugs in Mexico pre-migration, younger age at first U.S. migration, and U.S. incarceration. No significant confounders or interactions were identified.

Qualitative Findings

Table I also presents socio-demographics and migration characteristics for the 23 men included in our qualitative analysis. In the United States, men reported consuming cocaine (61%), marijuana (52%), heroin (43%), and crack (22%; data not shown). We identified three broad themes in the qualitative interviews relating to U.S. injection initiation. The first

two themes helped contextualize two of our multivariable logistic regression results: pre-migration drug use in Mexico, and U.S. incarceration. The third theme that emerged from our qualitative analysis was the importance of social contexts surrounding U.S. injection initiation. These themes are described below, and illustrative quotes are provided in Table II.

Pre-Migration Drug Use in Mexico—Qualitative data helped contextualize our first quantitative finding that ever consuming any drugs in Mexico pre-migration was independently associated with U.S. injection initiation. In qualitative interviews, men who reportedly consumed drugs before their first U.S. migration described a high prevalence of drug abuse in their families, schools, and communities in Mexico although they only occasionally consumed alcohol and/or marijuana themselves. In contrast, drug abuse was not accepted or condoned in all families or communities: non-drug using participants described social pressure against substance use within their families and communities in Mexico, with one man attempting to hide drugs from parents during adolescence.

U.S. Incarceration—Passages from qualitative interviews also helped clarify our quantitative finding that men reporting U.S. incarceration were nearly six times more likely to report U.S. injection initiation. As described in interviews, once incarcerated, most men who reported U.S. injection initiation were already injecting drugs. Interview texts revealed that men's lengthy U.S. criminal histories began in adolescence or early adulthood and were intertwined with escalating drug abuse and related social and family problems, including running away from home. Many men with lengthy criminal records reported being arrested at least once for drug-related crimes, including drug or paraphernalia possession charges. Men were also arrested for crimes indirectly related to their drug abuse, such as drug selling or theft to earn money for drugs. Despite acute withdrawal that some men reported experiencing in prison, drug treatment services were generally unavailable. One man reported that although he was sent to a court-mandated U.S. drug treatment program, he was returned to prison to await deportation upon discovery of his migration status.

Social Contexts of U.S. Injection Initiation—While our quantitative survey did not fully capture the social environment under which injection occurred, men who participated in qualitative interviews emphasized and elaborated upon the social contexts surrounding their U.S. drug abuse. For many men ($n = 14$), U.S. social networks were central in descriptions of first injection experiences. Ten men described U.S. injection initiation occurring with close friends, family and neighbors who often provided men with help injecting. Four men described injection initiation as occurring with girlfriends and sexual partners. One man reported that his girlfriend was already injecting when she introduced him to drugs, so he never used other routes of administration (e.g., smoking or snorting). Another man started injecting at a party where he wanted to impress a woman.

Men's U.S. social networks reduced barriers to injecting drugs (e.g., apprehension or fear of syringes or not knowing how to inject). Starting in high school in the United States, some men frequently attended parties where drugs were present. Friends provided drugs and injection equipment, and exposure to drug selling. Although some men described curiosity about the drugs used by friends who eventually enabled their own injection initiation, others described stronger social pressure to inject and even placed blame on friends for negatively influencing them or encouraging their escalating drug abuse. Transitions to injection also occurred for practical reasons, including coping with increasing physical dependence, seeking a stronger effect or more efficient route of administration, and trying to stay awake for long work shifts. One man described using drugs to cope with guilt and other emotional effects resulting from his criminal activities.

DISCUSSION

This mixed-methods study extends previous research on deported male IDUs' drug abuse trajectories [17] by quantifying statistical associations with a larger study population and contextualizing U.S. injection initiation using data from men's qualitative interviews. Our quantitative survey revealed that over one-third of deported male IDUs first injected drugs while living as undocumented migrants in the United States. U.S. injection initiation was independently associated with ever consuming drugs in Mexico pre-migration, being younger at first migration, and ever being incarcerated in the United States. Qualitative interviews with a subset of deportees contextualized two of these three quantitative findings (pre-migration drug use and U.S. incarceration), and an additional theme emerged regarding the importance of social contexts surrounding first injection experiences in the United States. Findings from our study emphasize the influence of changing risk environments on undocumented migrants' drug abuse trajectories in several ways.

First, we found qualitative and quantitative evidence that pre-migration circumstances and initial migration experiences may shape migrants' early drug use behaviors, as posited in our theoretical framework. We found quantitative support for our hypothesis that pre-migration drug use would be positively associated U.S. injection initiation. Since the majority of our quantitative sample did not migrate with parents, any pre-migration parental monitoring and social pressure against drug use may have also declined with initial U.S. migration. Quantitative data further revealed that younger age at first U.S. migration was associated with U.S. injection initiation: on average, men migrated at approximately 16 years of age. Taken together, our qualitative data regarding the pre-migration period suggest ways in which pre-migration drug use and younger age at first migration may lead to U.S. injection initiation. For example, unaccompanied migrant youths may be vulnerable to drug initiation or continued use following migration to U.S. communities where drug abuse, injection practices, and deviant or delinquent behaviors are normative [8]. Additional research is needed to fully elucidate the social/familial and drug use climates experienced by undocumented migrant youths.

Our qualitative findings emphasize the importance of the social risk environment in influencing undocumented U.S. migrants' drug abuse trajectories. This social context was not fully captured in our quantitative data, and qualitative methods may be better suited for exploring broad social processes and contexts (e.g., how injection may be learned through one's social network), as well as understanding the meanings that individuals attach to social phenomena [61, 66]. Men's qualitative interviews revealed the social nature of first injection experiences and confirmed previous research findings that injection drug use is a learned behavior requiring facilitation through social relationships and depending on the social environment in which potential injection initiates reside [48]. Qualitative interviews indicated that men often required injection assistance for their first injection event(s), a practice that has been associated with elevated risk of HIV seroconversion [67] and receptive syringe sharing in Tijuana [68] and internationally [69, 70]. Research has also identified social processes (e.g., spending time with friends or sexual partners who inject drugs) that render injecting acceptable and even appealing to non-injectors [50]. This social network influence and facilitation of injection initiation has been found in other settings [32, 42], including among Mexican American heroin users in Texas [8, 52], where high rates of injection initiation are of particular concern [53]. Men in our sample reported already spending time within drug using social networks when they were presented with opportunities to begin injecting. Additional research is needed to identify factors that facilitate involvement in drug-using social networks or inhibit time spent within such networks, including the positive (i.e., anti-drug) social norms within migrant communities [47, 71].

Finally, our quantitative finding that U.S. incarceration was associated with increased odds of U.S. injection initiation supported our theoretical framework's emphasis on the importance of the physical risk environment [55] in shaping undocumented migrants' drug abuse [56]. Although we cannot determine the temporality of U.S. injection initiation in relation to incarceration events from our quantitative data, our mixed methods approach helped illuminate social contexts and processes surrounding injection initiation and incarceration. In qualitative interviews, men explained how increasing drug abuse, dependence, and injection contributed to their engagement in delinquent and criminal behaviors, suggesting that U.S. injection initiation likely occurred in the community before, and possibly led to, incarceration. As in the general population of U.S. prisoners, illegal drug seeking and drug-related behaviors contributed to male deportees' lengthy criminal records [72].

Our findings regarding U.S. incarceration and injection initiation are concerning given international evidence linking incarceration to risky injection behaviors and increased risk of blood borne infections, particularly among new (i.e., recently initiated) IDUs [73, 74]. Although more than one third of drug-dependent U.S. prisoners access drug treatment services while incarcerated [72], few men in our study (<2%) reported receiving any drug treatment services during their entire U.S. residence, and one man was removed from a court-mandated drug treatment due to his undocumented migration status. Despite recommendations regarding the treatment of drug abuse and addiction within the criminal justice system [75], our findings indicate an unmet need for drug treatment services for incarcerated migrants during incarceration and deportation, and following release.

Our study yields implications for interventions to prevent injection initiation, for which several models exist [32, 48, 76]. Since preventing or delaying injection initiation requires reaching drug users earlier in their drug careers [33, 36], our findings suggest that programs should reach immigrant, including undocumented, youth before they progress to frequent drug use and delinquent behaviors. Community-based participatory research and other strategies for reaching undocumented populations [54] could help identify ways to adapt promising existing interventions such as *Familias Unidas* [United Families], a parent-centered intervention to reduce adolescent substance abuse and other behavior problems in poor immigrant Hispanic families [77, 78]. We also found that injection initiation occurred in highly social environments (e.g., neighborhood parties), implying that interventions should identify and leverage positive social or cultural norms that discourage injecting [47, 71]. Existing models to promote the successful community reentry of drug abusing parolees should be adapted for migrants [79]. These models should also be extended to deported individuals facing significant unmet need for drug treatment, a problem that may be compounded by the worsened economic and legal vulnerabilities that follow deportation [17]. Within the post-deportation environment in Mexico, HIV prevention programs could draw from innovative harm reduction approaches to reducing drug-related harm, including peer education and outreach models [71].

Our study was limited by several factors. First, we relied on self-report of sensitive migration and drug-related behaviors. However, our use of trained interviewers known to the study population should have reduced social desirability bias. A second limitation was our reliance on recall of past events using quantitative and qualitative instruments that were conducted approximately two years apart, implying a possibility of inconsistency. However, there is evidence that drug users can accurately recall early and significant drug use and life events [80]. Third, due to the length and complexity of migration trajectories, we asked men to focus on their "most recent deportation" and consequently lacked detailed data regarding injection initiation for persons who initiated outside of the United States. Nevertheless, our mixed methods approach allowed us to disentangle the temporal nature of certain contexts

(e.g., drug abuse and criminal trajectories). Finally, our study drew from a specific population of deported male IDUs residing in Tijuana and our findings cannot be generalized to broader populations of deported individuals in Mexico or undocumented migrants in the United States. However, given the paucity of data on drug abuse among undocumented migrants, we feel that our involvement with a unique a group of high risk deportees provides important and rare insight into the undocumented experience.

Our use of multiple sources of data enabled us to more thoroughly understand the epidemiology and contexts of U.S. injection initiation among a sample of deported IDUs who lacked documented status in the United States. Additional research is needed to further contextualize the injection careers of migrant IDUs who initiated injection outside of the United States (i.e., pre- or post-deportation). We also recommend further research to identify strategies to reach other high risk, migrant drug users including women and non-injecting deportees who may be at risk of post-deportation injection initiation or other escalations in drug abuse. Our findings imply an unmet need for drug treatment and other health and social services for drug abusing migrants on both sides of the U.S.-Mexico border. Given the strong associations with public health harms, including transmission of HIV and other blood borne infections, delinquency and incarceration, preventing injection initiation should become a binational priority.

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Table I

Selected Factors Associated with U.S. Injection Initiation Among Deported Male IDUs in the Quantitative (N = 309) and Qualitative (N = 23) Sub-Studies in Tijuana, Mexico, 2010

	QUANTITATIVE SAMPLE						QUALITATIVE SAMPLE
	Full Sample (*n*, %)	**Initiated Injection in the U.S. (*n*=114; 37%)**	**Did Not Initiate Injection in the U.S. (*n*=195; 63%)**	**χ^2 (*P-value*)**	**RDS-Adjusted Univariate Odds Ratio**	**RDS-Adjusted 95% Confidence Interval**	**(*n*, %) [a]**
Pre-Migration (Mexico) Context & Socio-Demographics							
Median age [a, b] (interquartile range; IQR)	39 (34–44)	37 (32–43)	39 (34–44)	1.683 (.092)	1.00	0.94–1.06	40 (33–44)
Born in Tijuana	72 (23)	35 (31)	37 (19)	5.536 (.019)	1.83	0.56–5.93	2 (9)
Family in Mexico was poor	212 (69)	71 (62)	141 (72)	3.358 (.067)	0.35	0.14–0.85	11 (48)
Median highest year of education completed in Mexico (IQR) [b]	6 (4–9)	5 (0–7)	6 (6–9)	5.476 (<.001)	0.77	0.67–0.89	6 (3–8)
Employed in Mexico pre-migration	207 (67)	56 (49)	151 (77)	26.080 (<.001)	0.17	0.07–0.42	17 (74)
Ever consumed alcohol in Mexico pre-migration	157 (51)	55 (48)	102 (52)	.475 (.491)	0.55	0.23–1.33	13 (57)
Ever consumed any drugs in Mexico pre-migration	95 (31)	49 (43)	46 (24)	12.707 (<.001)	1.28	0.51–3.19	11 (48)
Consumed marijuana [c]	89 (94)	47 (96)	42 (91)	.853 (.356)	1.31	0.52–3.31	9 (39)
Consumed inhalants (glue) [c]	30 (32)	20 (41)	10 (22)	3.996 (.046)	2.23	0.57–8.73	2 (9)
Saw family members in Mexico consuming drugs pre-migration	45 (15)	20 (18)	25 (13)	1.290 (.256)	0.65	0.24–1.76	3 (13)
Knew people involved in drug trade in Mexico pre-migration	90 (29)	39 (34)	51 (26)	2.262 (.133)	0.85	0.38–1.90	2 (9)
Initial U.S. Migration Experiences [d]							

	QUANTITATIVE SAMPLE						QUALITATIVE SAMPLE
	Full Sample (*n*, %)	**Initiated Injection in the U.S. (*n*=114; 37%)**	**Did Not Initiate Injection in the U.S. (*n*=195; 63%)**	**χ^2 (*P-value*)**	**RDS-Adjusted Univariate Odds Ratio**	**RDS-Adjusted 95% Confidence Interval**	**(*n*, %) [a]**
Median age independent from family (IQR) [b]	17 (15–18)	16 (14–17)	17 (15–18)	5.192 (<.001)	0.87	0.75–1.10	16 (14–18)
Median age at first U.S. migration (IQR) in years [b]	17 (13–19)	15 (3–17)	17 (15–20)	5.909 (<.001)	0.84	0.78–0.91	17 (12–18)
Migrated in search of better economic opportunities	211 (68)	60 (53)	151 (77)	20.438 (<.001)	0.27	0.10–0.72	16 (70)
Migrated with parent(s)	92 (30)	49 (43)	43 (22)	15.074 (<.001)	4.72	1.55–14.40	4 (17)
Migrated with sibling(s)	87 (28)	29 (25)	58 (30)	.6591 (.417)	1.50	0.45–5.06	6 (26)
Migrated with friend(s)	173 (56)	53 (46)	120 (62)	6.610 (.010)	0.19	0.08–0.44	12 (52)
Migrated with smuggler (e.g., *coyote*)	57 (18)	15 (13)	42 (22)	3.359 (.067)	0.58	0.21–1.58	2 (9)
Post-Migration (U.S.) Context							
Already knew people living in U.S. [d]	237 (78)	73 (66)	164 (85)	13.491 (<.001)	0.75	0.28–2.04	17 (74)
Lived in California, vs. all other U.S. states [d]	305 (99)	112 (98)	193 (99)	0.299 (.585)	2.76	0.94–8.12	21 (91)
Median total years living in U.S. (IQR) [a, b]	13 (10–17)	15 (10–22)	12 (10–15)	−3.929 (<.001)	1.12	1.03–1.21	14 (8–20)
Ever incarcerated in U.S.	203 (66)	104 (91)	99 (51)	52.254 (<.001)	8.35	2.05–34.00	16 (70)
Median years incarcerated U.S. (IQR) [b, e]	2 (1–5)	2.5 (1.5–5)	1.5 (0.4–4)	−3.660 (<.001)	1.02	0.88–1.19	3 (1–6)
Ever accessed drug treatment services in the U.S.	5 (2)	3 (3)	2 (1)	1.166 (.280)	2.61	0.43–15.84	1 (4)

[a] Data are from quantitative surveys conducted between January and April, 2010.

[b] Test statistic is *z*-score for Wilcoxon rank-sum test.

[c] Among those who ever consumed drugs in Mexico pre-migration ($n = 95$).

[d] Refers to experiences surrounding first U.S. migration.

[e] Among those who were ever incarcerated in the United States ($n = 203$).

Table II

Quantitative and Qualitative Findings Regarding U.S. Injection Initiation Among Deported Male IDUs in Tijuana, Mexico (2008 – 2010)

	QUANTITATIVE RESULTS		QUALITATIVE RESULTS	
Context from Theoretical Framework	**Variable**	**RDS-Adjusted AOR [a] (95% CI) [b]**	**Theme**	**Illustrative Quotes**
1. Pre-Migration (Mexico) Context	**Ever consumed any drugs in Mexico pre-migration**	4.61 (2.36–9.00)	**Limited drug use in Mexico pre-migration:** • Some exposure to illicit drugs by families, schools, communities • Social pressure against drug use	*There in Sonora, they've always had heroin. Since I was a kid, I saw tecatos [junkies; IDUs]; I saw drugs. I had an uncle who died of an overdose when I was just a kid.* –first migrated at age 17 *I started to smoke [marijuana], very hidden. I remember well that I was just a kid. […] I would hide it in my socks or other places so they wouldn't find it in the house.* –first migrated at age 14
2. Initial U.S. Migration Experiences	**Age first migrated to U.S. (per year increase)**	0.86 (0.82–0.89)	--	--
3. Post-Migration (U.S.) Context	**Ever incarcerated in United States**	6.00 (2.84–12.68)	**U.S. criminal records were intertwined with drug abuse:** • Early delinquency related to drug use • Crimes relating to drugs (possession, paraphernalia) • Poor access to drug treatment (immigration status) • Coping with guilt/ emotions from criminal activities	*Because sometimes I couldn't earn enough money, well, I would go out to make mischief, rob or sell drugs. It wasn't an honest way to live. Then, because I was selling drugs and doing bad things to survive, so that I wouldn't run out of drugs, they caught me and … and sent me the first time to [juvenile hall] and then to prison. […] There were a lot of tecatos [junkies; IDUs] in there.* –first migrated at age 12 *I went to pick up some heroin, and that's when they caught me. I had malilla [withdrawal], and I was going to find a syringe … A patrol car passed by and they saw me … I think someone must have pointed me out, because when I started running, they already had me … they caught me with the drugs.* –first migrated at age 3 *I did time [in] a [drug] rehabilitation center. I was in the program for like eight months, and my counselor found out that I got an immigration hold. So they told me that I can't keep with the program because I got to be deported. And so they threw me out.* –first migrated at age 17 *I was initiated into a gang over there with my cousins. […] Using drugs, I wouldn't have a guilty conscience if I hit someone, hurt someone, that is, it wouldn't bother me who it was. That's the reason why I started using more drugs: to believe myself to be superior to the others.* –first migrated at age 8

	QUANTITATIVE RESULTS		QUALITATIVE RESULTS	
Context from Theoretical Framework	**Variable**	**RDS-Adjusted AOR [a] (95% CI) [b]**	**Theme**	**Illustrative Quotes**
	--	--	**Importance of U.S. social context:** • Social networks facilitated first injection; friends, family, neighbors helped inject • Girlfriends/sex partners helped initiate; inject to impress women • Social networks reduced barriers to injecting (e.g., fear of syringes, low knowledge) • Drug abuse, injection, selling were pervasive in social networks • Social pressure to inject; blaming of friends for negatively influencing drug abuse trajectories	*I started because of my neighbors who were already injecting. I didn't know that it was heroin. I just saw that they were mixing something with cocaine and they offered me some … They told me, "Think about it, because this is strong." […] That's how I started injecting, and I liked it.* –first migrated at age 12 *There were several of us there, and I liked this girl … one time she suddenly asked me, "Do you want some [heroin]?" And in order to look good, I said, "Sure," and she said, "Put out your arm," and she injected me, and that was the first time I tried heroin. […] I started to vomit, sweat, and after all of that passed, well, I liked it… I told her that I would like more… and that's how I started using.* –first migrated at age 19 *I was with some friends of mine, and they doctored me up, you know, a few times. I was kind of scared by the needle, but after they helped me get used to seeing it, I started using every three or four days.* –first migrated at age 17 *When I was there, [cocaine] was all I was seeing all day, you know what I mean? I saw everyone doing it. I just kept using it, and after a little while, I got addicted. […] My friends were kind of drug dealers and I didn't have to pay for it, so it was easy for me to get it. Sometimes they'd just tell me, "Go ahead, use it if you want to." "I don't have a pipe." "So just slam [inject] it," you know what I mean?* –first migrated at age 11 *I didn't want to inject because … I had my job, I had my apartment. I was doing well … the thing that did me the most harm was my friends … My friends really derailed me.* –first migrated at age 24

[a] Adjusted odds ratios from multivariable logistic regression model; adjusted for RDS sampling method.

[b] Confidence Interval; all variables significant at $P \leq 0.001$.