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Traveling young injection drug users at high risk for acquisition and transmission of viral infections

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Abstract

Background: Young injection drug users (IDU) are highly mobile. It is not known how mobility affects their risk of acquiring and transmitting viral infections.

Methods: We conducted a cross-sectional study of young (under age 30) IDU in San Francisco (2004-2006). Participants completed a semi-structured interview and testing for hepatitis B virus (HBV), hepatitis C virus (HCV) and HIV infection. We examined whether travel was independently associated with drug, alcohol, sexual risk behaviors, and infection status, after adjusting for demographic characteristics and years injecting.

Results: Two-thirds (62%) reported past (3 months) travel outside of San Francisco (n=355). Travelers, as compared to non-travelers, were more likely to be under age 20, female, and planned to leave San Francisco in the coming months. Travel was independently associated with heavy alcohol consumption, drinking alcohol until blackout, poly-substance use, more sexual and injecting partners, and receptive needle/syringe sharing, sharing drug preparation equipment, backloading syringes, and pooling money to buy drugs. In an analysis of interactions with travel, younger travelers were more likely to be HCV positive than younger non-travelers.

Discussion: Traveling young IDU are at exceptionally high risk for acquiring and transmitting viral infections, while their mobility makes it challenging to effectively deliver interventions.

1. Introduction

Young injection drug users (IDU) are at high risk for viral infections, such as HIV, hepatitis C virus (HCV), and hepatitis B virus (HBV), due to frequent injecting, needle/syringe and other drug preparation equipment sharing, high numbers of sexual partners, and exchange of sex for money or drugs (Garfein et al., 1998; Hahn et al., 2001; Kral et al., 2000; Thorpe et al., 2000). Risk behavior in young and new IDU is increased compared to their older counterparts (Becker Buxton et al., 2004; Kral et al., 2000). Young IDU also are highly mobile; in a prior prospective study of IDU under age 30, 63% of 195 subjects had traveled in the three months

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prior to enrollment, and this travel was associated with decreased cohort retention (Hahn et al., 2002) and decreased HBV vaccine completion (Lum et al., 2003). In comparison, 11% of 1025 IDU over age 30 recruited in the Urban Health Study in San Francisco in 2005 had lived outside of San Francisco during the prior six months (personal communication, Alexis Martinez, Center for AIDS Prevention Studies, University of California San Francisco).

Migration and mobility are important factors in facilitating the spread of HIV from high to low prevalence areas (Parker et al., 2000; Perrin et al., 2003; Rachlis et al., 2007), and may also contribute to the spread of HCV and HBV infections. Injection drug users are at particularly high risk in this respect; a recent review noted that most studies of this issue have found that IDU are a mobile population and that travel increases the opportunities for high risk activities (Rachlis et al., 2007). For example, a study of IDU and their sex partners conducted in over 60 cities in the U.S. and Puerto Rico from 1988 to 1991 reported that (1) 48% of participants had traveled to another city in the prior two years, and (2) travelers had higher rates of needle sharing than non-travelers (McCoy et al., 2001). Two additional studies found that travel to areas of high HIV prevalence was associated with increased HIV prevalence among IDU (Siegal et al., 1991; Williams et al., 1997). More recently, a study of nomadic IDU recruited in New York City described extensive travel and high risk injecting behaviors (Des Jarlais et al., 2002). Polydrug use also was common in a qualitative study of traveling homeless ketamine-injecting youth who were recruited New York, New Orleans, and Los Angeles (Sanders et al., 2007). Another recent study of IDU found that housing instability, defined as moving residence within Baltimore two or more times in the prior six months, was independently associated with sharing needles and attending a shooting gallery (German et al., 2007). No studies of which we are aware have examined whether the behaviors of young IDU who travel are distinct from those of geographically stable young IDU.

The goal of this study was to estimate the associations between travel and behaviors that may facilitate the spread of viral infections. Specifically, we examined whether travel is independently associated with increased drug and alcohol consumption and injecting and sexual risk behavior, and whether HIV, HBV and HCV infections are more prevalent in young IDU that travel.

2. Methods

2.1 Study population

From September 2004 to December 2006, young (under age 30) IDU were recruited into a cross-sectional screening study to determine eligibility for a randomized trial testing methods to improve adherence to a multiple dose immunization schedule, using the combined hepatitis A virus (HAV)/HBV vaccine as a model for future HIV and HCV vaccines. This study is part of a constellation of studies of young IDU in San Francisco, known jointly as the UFO Study. Participants were recruited by street-based outreach workers in neighborhoods of San Francisco where young drug users are known to congregate. Potential study participants were approached by outreach workers familiar with the young street IDU in afternoon, evening, and weekend hours and were invited to visit one of three community-based storefront field sites to determine study eligibility. Eligible persons were under age 30, injected drugs in the prior 30 days; and reported neither a prior positive HIV antibody test nor prior HBV vaccination. Injection status was verified by field staff through visual inspection of injecting scars and questions about injection practices.

Participants enrolled in the study completed a one-hour interview, received client-centered risk reduction counseling, and underwent phlebotomy for viral testing. Participants returned one week later for viral testing results, counseling, referrals and subsequent enrollment in the vaccine adherence trial (if eligible). Participants were paid $10 for their first study visit and

$20 for the second visit. All protocols were approved by the Institutional Review Board of the University of California, San Francisco.

2.2 Variables

A semi-structured survey was administered by an interviewer, who recorded responses on a PDA device. Interview domains included demographics, including travel and living situation; health care access; knowledge and attitudes about vaccine trials; drug and alcohol consumption; and injecting practices and sexual behavior.

We asked participants if they had “been on the road or traveling outside of San Francisco” in the prior three months, and asked them to list the most recent three cities outside of San Francisco to which they traveled, and the number of days they stayed in each of those cities. We classified participants as travelers if they answered yes to the above question and whose last three cities were at least 30 miles from San Francisco. We defined literal homelessness as spending the majority of nights in the prior three months in a shelter, squat, abandoned building, vehicle, or outside. We asked participants about the number of days they drank alcohol in the prior 30 days, the typical number of drinks per day they consumed on the days they drank alcohol, and whether in the last month they drank so much alcohol that they “blacked out” or had periods in which they couldn't remember what happened after drinking. We defined heavy drinking as greater than 14 and 21 drinks per week for women and men respectively (2004). Drug consumption included types of drugs used and the number of different drugs used in the past three months; injecting behavior included the number of days injected in the prior 30, “lending needles/syringes” (letting someone inject with the participants' previously used' needle/syringe), injecting with someone else's previously used needle/syringe (receptive needle sharing), pooling money with other IDU to buy drugs, sharing cookers/spoons used to prepare drug solution (sharing drug preparation equipment), having one's syringe “backloaded” (filled with drug solution using someone else's needle/syringe), and “doing someone's rinse” (injecting the residue from someone else's cooker or cotton). Injecting partners included persons with whom the participants had injected at the same time and place, but did not necessarily include sharing drugs or injecting equipment. Sexual risk behaviors included the number of sexual partners, condom use, and exchanging sex for money in the prior three months.

2.3 Laboratory testing

HIV testing was conducted using an enzyme immunoassay (Abbott Laboratories) and confirmed by Western blot. Antibody to HCV (anti-HCV) was detected using a second-generation enzyme immunoassay (EIA-2.0; Ortho Diagnostics Systems, Raritan, New Jersey). Hepatitis B surface antigen (HBsAg), antibody to hepatitis B core antigen (anti-HBc), and antibody to hepatitis B surface antigen (anti-HBs) were detected by standard commercial enzyme immunoassays (Abbott Laboratories, Abbott Park, Illinois). Individuals were defined as HBV infected by the presence of either anti-HBc or HBsAg. An anti-HBs titer ≥10 mIU/mL in the absence of other HBV serologic markers was considered evidence of prior successful HBV immunization. Participants were considered HBV uninfected if they tested negative for all HBV markers.

2.4 Analysis

We recorded detailed information on those who were eligible but were not enrolled in the baseline study and those that were ineligible from March through December 2006, and conducted Wilcoxon Rank Sum tests and Pearson Chi-square tests to compare the distributions of age and sex of those who were not enrolled in the study due to ineligibility or other reasons to those who were enrolled in the study.

Of the 365 who completed the baseline study, we excluded one observation in which the interviewer reported no confidence in the validity of the interview, and one in which the respondent did not answer whether he/she had traveled in the prior 3 months. We also excluded those from analysis those persons who may have only traveled to nearby cities, i.e. those whose three most recent destinations were within 30 miles of San Francisco (n=7), and one person who had been incarcerated in San Quentin Prison for all but 15 days of the prior 90. Therefore, the analytic data set includes 355 observations. We calculated univariate statistics to describe travel patterns, and report denominators where more than 3% of the data are missing. We conducted bivariate analysis to compare the distributions of demographic variables (age, sex, race, homelessness, education, income) in addition to travel plans, and years injecting for travelers versus non-travelers, and report p-values for Pearson chi-square tests of association and Wilcoxon Rank Sum tests for categorical and continuous variables respectively. We also conducted bivariate analyses as above to examine the association of travel with drug and alcohol consumption, injecting risk behaviors, sexual risk behaviors, and infection with HCV, HBV, and HIV.

We conducted unconditional logistic regression analyses to further examine whether travel was independently associated with the following outcome variables: drug and alcohol consumption, injecting risk behaviors, sexual risk behaviors, and infection with HCV, HBV, and HIV. We adjusted each model for age (categorized in equal age increments as ages 15-19, 20-24, 25-29), sex (female versus male and versus transgender/other), race (white versus non-white), and years injecting. For number of injecting partners and number of sexual partners, we chose a cutoff to represent high risk, and therefore compared having five or more partners to fewer than 5 partners in the prior three months. For HBV status with three non-ordinal levels we conducted a generalized logit analyses with no markers of HBV vaccination as the reference category. We did not have the statistical power to examine associations with HIV prevalence.

Finally, we examined possible interaction of travel and sex, race/ethnicity, age and years injecting, in all multivariate models, treating age and years injecting as continuous variables, and considering a p-value for the interaction term of less than 0.10 as statistically significant. Due to lack of power to examine small subgroups, we excluded six observations (1.7%) from the interaction analyses for which the gender was transgender or other. We found significant interaction of age with travel for three variables (methamphetamine use, backloading, and HCV infection) and interaction with years injecting with pooling money to by drugs, and we present multivariate odds ratios stratified by age and years injecting, dividing the sample at the median age, 22.5 and at the median years injecting, 5, respectively. We chose to divide these variables at the medians for these analyses to achieve maximum power for the interaction terms. The stratified analyses are presented separately in Table 4.

3. Results

3.1 Screening and eligibility results

1207 persons were screened and 365 (30%) persons were eligible for the study. Of 312 screening visits for which we recorded detailed information, 89 (29%) enrolled in the study. Of the remaining 223, 172 (77%) were ineligible for the study due to being over age 30 (32%), not currently injecting (39%), having been vaccinated for HBV in the past (41%), and/or infected with HIV (4%). Fifty-one (22%) persons screened were eligible but were not enrolled, due to enrollment in a concurrent study (55%), or arriving to the study with too little time to complete the study activities, leaving before enrolling, and being too intoxicated to be enrolled. The 51 who were eligible but not enrolled were similar to the 89 enrolled in age (p=0.57), sex (p=0.20), and self-reported HCV status (p=0.23).

3.2 Univariate and bivariate results

The median age was 22 (Interquartile range [IQR] 20-24), 75% were white, and 70% were male (Table 1). Almost two-thirds (62%) of participants reported they had traveled in the prior three months, and 65% of the travelers planned to leave within six months. The three cities most frequently cited as visited prior to San Francisco were Portland, Los Angeles, and Santa Cruz. The median number of days spent in the prior city was 20 (IQR: 7-50) and the median total number of days in the prior three cities was 45 (IQR 22-74). Thirty-six percent had traveled to one city, 21% traveled to two cities, and 42% had traveled to three or more cities in the prior three months. Among the travelers, the median number of days in SF since their last travel was 15 days (IQR 7-44), compared to 365 days (150-1095) in those who did not identify as travelers.

Travelers reported they had traveled with a median of two companions (IQR 1-6) in the prior three months. Overall, 17% reported that they had traveled alone in the prior 3 months, while 50% had traveled with at least one injecting partner who was not a sex partner, 20% had traveled with at least one sex partner who was not an injecting partner, and 44% had traveled with at least one person who was both an injecting and a sex partner. As compared to those who stayed in San Francisco, those who traveled were younger and more likely to be female. A similar proportion of travelers had completed high school as compared to non-travelers, higher proportions reported receiving income from employment, panhandling, and selling drugs, while fewer travelers reported receiving public assistance. There was no significant difference in the number of years since first injection between travelers and non-travelers, but travelers were less likely to have first injected in San Francisco compared to those who had stayed in San Francisco during the prior three months.

Travelers were more likely to use crack cocaine, powder cocaine, and use more than one drug (Table 2), and they were less likely to use methamphetamine than non-travelers. Compared to those who stayed in San Francisco, travelers were more likely to drink heavily, including drinking to blackout, to engage in higher risk injecting behaviors, and to have more sex partners. Higher risk injecting behaviors included pooling money to buy drugs, injecting with five or more people, sharing drug preparation equipment, and injecting with someone else's used needle/syringe. The prevalence of HCV and various markers of HBV were similar between travelers and non-travelers, while there was a borderline association between travel and HIV, with non-travelers having a higher prevalence of HIV infection (Table 3).

3.3 Adjusted odds ratios and interactions

Differences detected in bivariate analyses between travelers and non-travelers in drug and alcohol consumption, injecting risk behaviors, sexual behaviors, and HBV and HCV infection status persisted after adjusting for age, sex, race, and years injecting in logistic regression analyses (Tables 2 and 3). There was no significant interaction of travel with sex and race for all outcomes. There was interaction of age and travel in the models of methamphetamine use, backloading and HCV antibody status, and interaction of years injecting with travel in the model of pooling money to buy drugs. In those age 22.5 years and older, methamphetamine use was less likely among travelers compared to non-travelers, while the association between travel and methamphetamine use was not significant in the younger IDU (Table 4). Travel was associated with syringe backloading only among those under age 22.5. The odds ratio for the association between travel and pooling money to buy drugs was 4.6 in those injecting fewer than 5 years, and 2.3 in those injecting for 5 or more years. HCV infection was more likely in those who traveled compared to those who did not in the age group that was younger than 22.5, but there was no significant difference between HCV infection by travel status in the IDU age 22.5 to 29.

4. Discussion

Young injecting drug users as a population engage in high-risk activities. We found that a high proportion of young IDU travel and plan to continue to travel. Travelers reported consistently higher levels of alcohol consumption, polysubstance use, and injecting and sexual risk behaviors than non-travelers, suggesting that travel in young IDU is an important factor in the transmission of viral infections. The only exceptions to this pattern of higher risk in the travelers were that (1) those who traveled were less likely to be daily injectors, and (2) older IDU who traveled were less likely to have used methamphetamine. Less frequent injecting may be the result of lower access to reliable sources of injectable drugs while traveling, a lower severity of addiction required to travel, or social norms in the traveling group that require lower involvement in the injecting scene in favor of a more nomadic identity (Des Jarlais et al., 2002).

These data also highlight a very high degree of heavy drinking in traveling young IDU, which can result in serious negative health and social outcomes, including sexual risk dis-inhibition (Booth et al., 1993; Fenaughty and Fisher, 1998) as well as accelerated progression of liver disease among those with chronic HCV (Peters and Terrault, 2002; Schiff and Ozden, 2003) and/or HBV infection (Liaw and Sollano, 2006). In addition, heavy alcohol use is associated with higher HCV viral load (Pessione et al., 1998) and thus may increase the risk of transmitting HCV to others.

The prevalence of HCV was significantly higher in the IDU under age 22.5 years who traveled compared to those who had not. The higher prevalence of HCV in the young IDU who traveled is consistent with the higher risk behavior reported by travelers, which may have caused them to become infected with HCV. The finding of increased injecting risk taken together with increased HCV prevalence suggest that travel may be an important factor in both the acquisition and transmission of HCV. We note that the prevalence of HCV in young IDU in our studies has decreased from 45% in 308 young IDU studied from 1997 to 1999 (Hahn et al., 2001), to 39% in young IDU studied from 2000 to 2001 (Hahn et al., 2002) to 35% in this study, consistent with recent reports of declining HCV prevalence in IDU in other cities (Burt et al., 2007; Des Jarlais et al., 2005a). However, this trend may not be sustained given the high level of injecting risk behavior reported by the travelers in this study. However, the prevalence of HCV, HBV, and HIV infections may have been somewhat underestimated because we excluded young IDU reporting prior HBV vaccination and/or HIV infection. HIV infection was higher (with borderline statistical significance) among non-travelers as compared to travelers. We suggest that this difference may be attributed to increased service and housing opportunities for HIV positives in San Francisco which may help keep HIV positive IDU in San Francisco (Shafer et al., 2002).

We note that travel itself impairs prevention efforts in young IDU. Current methods for the prevention of viral infection in young IDU, such as HAV and HBV immunizations and behavioral interventions to reduce injecting and sexual risk, (Garfein et al., 2005; Kapadia et al., 2007) require multiple contacts over a defined period of time for optimal effectiveness. However, to minimize loss to follow up, the largest behavioral prevention trials with young IDU in the US to date excluded those young IDU who did not plan to stay in the town of recruitment for at least 12 months (Kapadia et al., 2007).

The data presented here underscore the dilemma that those most in need of intervention, i.e. those at highest risk for infection, are the most difficult to engage over the time required to benefit from most interventions. Research studies historically have had difficulty retaining young IDU, with one-year retention rates for cohorts of young (under age 30) IDU ranging from 10 to 41% (Des Jarlais et al., 2005b). However, some recent progress has been made;

automated teller machine cash cards to reimburse traveling young drug users to complete study activities over the telephone achieved a one-year retention rate of 71% (Des Jarlais et al., 2005b), and we achieved a six-month retention rate in young IDU of 65% using similar methods (J Hahn, unpublished data). However, the ability to implement prevention programs that require face-to-face contact over a period of months, such as the administration of a multiple dose vaccine series, are likely to be more limited. In prior studies in San Francisco, 47% of young IDU completed a three-dose HBV immunization series with intensive outreach efforts and a flexible vaccine schedule, while only 36% of those who had traveled before enrollment completed the series (Lum et al., 2003). We are currently conducting a study to assess the feasibility of administering the combined HAV/HBV immunization series to traveling young IDU using a network of youth-friendly health-care and service providers in the geographic locations where young IDU are most likely to travel.

The data collected in this study are self-reported and may be subject to under- or over- reporting. It is possible that stigmatized risk behaviors are somewhat under-reported due to social desirability, while it is unlikely that travel will be subject to this bias given the lack of stigma associated with travel. As the bias in reporting risk behaviors is most likely to be non-differential, the effect of this bias is to the null. There may have been under-reporting of travel due to recall bias, also leading to bias to the null. We also cannot ascribe causality to the associations observed in this study due to its cross-sectional nature, however it is plausible that the circumstances of travel increase the opportunity for risk, for example, by decreasing access to services such as needle exchange, outreach workers, and service providers, and by fluctuations in injecting networks (Costenbader et al., 2006). The associations also might be explained by self-selection, such that persons who engage in high-risk behavior are also more likely to travel.

These data highlight that traveling young IDU are at exceptionally high risk for acquiring and transmitting bloodborne infections due to increased injecting and sexual risk behavior, compounded by heavy alcohol consumption. Interventions that address both the high level of risk behavior and the geographic mobility of this group of young IDU are urgently needed.

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Table 1

Demographic characteristics and duration injecting in young IDU in San Francisco, overall and by recent travel (N=355).

Characteristic	Overall	Traveled in the prior 3 months (N=221)	Did not travel in the prior 3 months (N=134)	p-value
Median age (IQR)	22.5 (20-24)	22 (20-24)	23 (31-25)	<0.01
15-19	19.2%	23.2%	12.7%	<0.01*
20-24	57.3%	57.7%	56.7%	
25-29	23.5%	19.1%	30.6%	
Sex	27.9%	31.2%	22.4%	0.02
Female	70.4%	66.1%	77.6%	
Male	1.7%	2.7%	0%	
Transgender/Other				
Race	74.9%	77.4%	70.9%	0.17
White	25.1%	22.6%	29.1%	
Non-White				
Literally homeless, prior 3 months	64.7%	67.9%	59.4%	0.11
Yes	35.3%	32.1%	41.6%	
No				
Completed high school	62.7%	60.0%	67.2%	0.18
Yes	37.3%	40.0%	32.8%	
No				
Sources of income last 3 months:	35.4%	40.6%	26.9%	<0.01
Employment	13.0%	9.1%	19.4%	<0.01
General assistance	25.8%	23.3%	29.9%	0.17
Money from family or friends	59.5%	75.8%	32.8%	<0.01
Panhandling	38.8%	42.9%	32.1%	0.04
Selling drugs	10.6%	10.7%	10.5%	0.94
Selling sex	24.9%	23.7%	26.9%	0.51
Stealing				
Time plan to stay in San Francisco	48.8%	64.8%	22.9%	<0.01
(n=352)	40.4%	23.0%	68.7%	
0-6 months	10.8%	12.2%	8.4%	
>6 months				
Don't know				
Years since first injected, median (IQR)	5 (2-7)	4 (2-7)	5 (2-7)	0.51
0-3	33.7%	35.2%	31.3%	0.62*
4-6	24.4%	25.6%	22.4%	
7-9	24.4%	22.4%	27.6%	
>=10	17.6%	16.9%	18.7%	
First injection occurred in San Francisco	19.5%	14.6%	27.6%	<0.01
Yes	80.5%	85.5%	72.4%	
No				

* Chi-square test for trend

Table 2

Drug and alcohol consumption, injecting risk, and sexual risk behaviors overall and by travel, and adjusted odds with 95% confidence intervals for travel as a risk factor for each behavior. Odds ratios are adjusted for age, race, sex, and years injecting in logistic regression models.

Consumption/Behavior	Overall	Traveled in the prior 3 months (N=221)	Did not travel in the prior 3 months (N=134)	p-value (unadjusted)	Adjusted OR*** (95% CI)
Drug use, prior 3 months					
Used (injected/snorted/smoked) heroin Yes No	80.9% 19.2%	83.7% 16.3%	76.1% 23.9%	0.05	1.40 (0.80-2.44) ---
Used (injected/snorted/smoked) powder cocaine Yes No	50.1% 49.9%	55.7% 44.3%	41.0% 59.0%	0.01	1.76 (1.12-2.76) ---
Used (injected and/or snorted) crack cocaine Yes No	52.3% 47.7%	56.5% 43.6%	45.5% 54.5%	0.05	1.56 (1.00-2.44) ---
Used (injected/snorted/smoked) methamphetamine Yes No	71.6% 28.4%	67.4% 32.6%	78.4% 21.6%	0.03	0.59 (0.35-0.98) ---
Used more than one of the above drugs (poly-substance use) Yes No	83.1% 16.9%	87.2% 12.8%	76.3% 23.7%	<0.01	1.99 (1.11-3.59) ---
Alcohol consumption, prior 30 days					
Heavy drinking (>14 and >21 drinks/week for women and men respectively) Yes No	37.7% 62.3%	52.3% 47.7%	13.7% 86.3%	<0.01	6.87 (3.84-12.28) ---
Drank until blacked out Yes No	28.2% 71.8%	36.8% 63.2%	13.7% 86.3%	<0.01	3.63 (2.02-6.50) ---
Injecting behaviors, prior 3 months					
Median number of days injected of the past 30 (IQR)	18 (8-30)	16 (9-29)	21 (6-30)	0.22	
Injected daily, past 30 days Yes No	27.3% 72.7%	23.5% 76.5%	33.6% 66.4%	0.04	0.56 (0.33-0.93) ---
Median number of injecting partners (IQR) 0 1 2-4 >=5	5 (2-15) 8.4% 11.0% 27.9% 52.7%	5 (3-17) 4.5% 8.6% 27.2% 59.7%	4 (1-10) 14.9% 14.9% 29.1% 41.1%	<0.01 <0.01*	--- --- --- 2.16 (1.37-3.40)
Lent a needle/syringe Yes No	50.7% 49.3%	53.4% 46.6%	46.3% 53.7%	0.19	1.26 (0.81-1.97) ---
Injected with someone else's used needle/syringe (N=341) Yes No	46.9% 53.1%	52.3% 47.7%	37.8% 62.2%	<0.01	1.61 (1.01-2.55) ---
Pooled money to buy drugs Yes No	78.8% 21.2%	86.4% 13.6%	66.2% 33.8%	<0.01	3.07 (1.79-5.27) ---

Consumption/Behavior	Overall	Traveled in the prior 3 months (N=221)	Did not travel in the prior 3 months (N=134)	p-value (unadjusted)	Adjusted OR*** (95% CI)
Shared cooker/spoon to prepare drugs	59.8%	67.0%	48.1%	<0.01	2.10 (1.34-3.32)
Yes	40.2%	33.0%	51.9%		---
No					
Syringe was backloaded	56.9%	62.7%	47.4%	<0.01	1.87 (1.19-2.95)
Yes	43.1%	37.3%	52.6%		---
No					
Did someone's "rinse"	39.4%	42.5%	34.3%	0.13	1.32 (0.83-2.10)
Yes	60.6%	57.5%	65.7%		---
No					
Sexual behaviors, prior 3 months					
Median number of sexual partners (IQR)	2 (1-3)	2 (1-3)	1 (1-2)	<0.01	---
0	12.7%	7.2%	21.6%	<0.01*	---
1	36.6%	34.4%	40.3%		---
2-4	37.5%	43.4%	27.6%		1.64 (0.82-3.27)
>=5	13.2%	15.0%	10.5%		
Traded sex for money or drugs	11.6%	11.3%	11.9%	0.86	0.91 (0.45-1.85)
Yes	88.4%	88.7%	88.1%		---
No					
>90% condom use (N=306, sexually active)	23.7%	24.3%	22.5%	0.73	1.09 (0.59-2.02)
Yes	76.3%	75.7%	77.5%		---
No					

* Chi-square test for trend

** The adjusted odds ratio for >=2 sex partners prior 3 months compared to 0-1 sexual partners is 2.21 (1.40-3.49).

*** Adjusted for age, sex, race, and duration injecting.

Table 3

Viral serology by travel and adjusted odds with 95% confidence intervals for travel as a risk factor for each virus. Odds ratios are adjusted for age, race, sex, and years injecting in logistic regression models.

Serologic marker	Overall	Traveled in the prior 3 months (N=229)	Did not travel in the prior 3 months (N=134)	p-value (unadjusted)	Adjusted OR (95% CI)
HBV status*	10.3%	9.2%	12.2%	0.47	0.67 (0.41-1.09)
HBsAg or anti-HBc positive	40.1%	39.0%	42.0%		0.75 (0.41-1.68)
Anti-HBs positive only	49.6%	51.8%	45.8%		---
No markers of HBV					
HCV antibody positive	33.8%	35.3%	31.3%	0.44	1.32 (0.79-2.19)
Yes	66.2%	64.7%	68.7%		---
No					
HIV antibody positive*	2.3%	0.9%	4.6%	0.06**	NA
Yes	97.7%	99.1%	95.5%		
No					

* Note that prescreening excluded those with HBV vaccination history and with known HIV infection.

** Fisher's exact test

Table 4

Proportion traveled and adjusted odds with 95% confidence intervals for each variable for which there was interaction with age or years injecting. Stratified odds ratios are adjusted for age, race, sex, and years injecting in logistic regression models.

Variable	Overall	Traveled in the prior 3 months	Did not travel in the prior 3 months	p-value (unadjusted)	Adjusted OR for travel (95% CI)
Used (injected/snorted/smoked) methamphetamine, among those under age 22.5 (n=178) Yes No	70.8% 29.2%	70.4% 29.6%	71.7% 28.3%	0.86	0.95 (0.46-1.97) ---
Used (injected/snorted/smoked) methamphetamine, among those age 22.5 and older (n=177) Yes No	72.3% 27.7%	63.5% 36.5%	82.7% 17.3%	<0.01	0.34 (0.17-0.71) ---
Pooled money to buy drugs among those injecting for <5 years (n=173) Yes No	80.2% 19.8%	88.8% 11.2%	62.5% 37.5%	<0.01	4.56 (2.00-10.41) ---
Pooled money to buy drugs among those injecting for ≥5 years (n=182) Yes No	77.5% 22.5%	83.8% 16.2%	68.8% 31.2%	0.02	2.26 (1.09-4.70) ---
Syringe was backloaded among those under age 22.5 (n=178) Yes No	56.9% 43.1%	63.6% 36.4%	41.5% 58.5%	<0.01	2.35 (1.19-4.67) ---
Syringe was backloaded among those age 22.5 and older (n=177) Yes No	56.8% 43.2%	61.5% 38.5%	51.3% 48.7%	0.17	1.46 (0.79-2.70) ---
HCV antibody positive, among those younger than age 22.5 (n=178) Yes No	25.4% 74.6%	31.2% 68.9%	11.8% 88.2%	<0.01	3.21 (1.18-8.73) ---
HCV antibody positive, among those age 22.5 and older (n=177) Yes No	42.1% 57.9%	40.6% 59.4%	43.8% 56.2%	0.68	0.71 (0.37-1.40) ---