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Racial differences in HIV and HCV risk behaviors, transmission, and prevention knowledge among non-treatment-seeking individuals with opioid use disorder

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Abstract

In light of New York's recently reinforced strategy to end the AIDS epidemic by expanding testing, treatment, and access to Pre-Exposure Prophylaxis (PrEP), we assessed drug use and sexual risk behaviors, along with HIV/Hepatitis C virus (HCV) transmission and prevention knowledge among non-treatment-seeking adults with opioid use disorder (OUD) in NYC. Over the course of 18 months, volunteers screening for research studies in the Opioid Laboratory at the New York State Psychiatric Institute completed a locally developed self-assessment questionnaire. A total of 138 adults with OUD (24 female, 114 male) with a mean age of 46.5 years (SD=9.5 yrs) were assessed. Significant differences between the 4 racial/ethnic subgroups (n=65 African-Americans, n=34 Hispanics, n=31 Caucasians or Whites, n=8 Multiracial) were found. Whites were the youngest ($p=0.001$), most frequently injecting drugs ($p<0.001$), and engaged more often in risky drug use and sexual behaviors, although their virus transmission knowledge was comparable to that of the other subgroups. Few participants had heard about PrEP. White opioid users showed the most risk behaviors among races/ethnicities, despite comparable prevention knowledge. Better HIV/HCV prevention interventions targeting individuals with opioid use disorders who are not currently in treatment would be desirable given their large health burden.

Keywords

opioid users; risk behaviors; HIV; Hepatitis C; prevention; ethnicities

In the United States an estimated 2.1 million individuals currently suffer from substance use disorders related to prescription opioid pain relievers, and an estimated 467,000 are addicted

to heroin (SAMHSA 2013). Opioid use disorders, especially when heroin is the primary drug of abuse, pose a major public health challenge as they are associated with high morbidity and mortality rates. In particular, unintentional opioid overdose deaths are still on the rise, especially in New York City (New York City Department of Health and Mental Hygiene 2016a). North America has been found to have the highest opioid dependence DALY (disability adjusted life-years) rates (292.1 per 100 000) in the world in 2010 (Degenhardt et al. 2014). Hepatitis C virus (HCV) infection rates have been reported to be as high as 73.4% in people who inject drugs in the United States (Nelson et al. 2011), and as high as 80% in HIV-positive individuals who inject drugs (Centers for Disease Control(CDC) 2014a). An estimated 7% of new HIV diagnoses in 2012 were attributed to injection drug use (CDC 2015). Despite progress in HIV prevention and treatment leading to decreased HIV infection rates among drug users, and increasing numbers of HIV-positive drug users receiving antiretroviral therapy (ART), risk behaviors are still highly prevalent (e.g. Des Jarlais et al. 2010, 2016). The CDC report, using 2012 data (CDC 2015), revealed that 11% of people who inject drugs (PWID) had a positive HIV test result, 30% were recipients of shared syringes, 70% had vaginal sex without a condom, 25% had heterosexual anal sex without a condom, and 5% of males had male-to-male sexual contact without a condom in the previous 12 months. Fifty-one percent of PWID had been tested for HIV, 25% had participated in an HIV behavioral intervention, and 39% had participated in substance abuse treatment in the previous 12 months.

Mateu-Gelabert (2015) assessed drug-use and sexual behavior patterns of 46 young adult nonmedical prescription drug users in New York City (NYC),and found that prescription opioid use often led to long-term opioid dependence and subsequent transition to heroin use and drug injection. Moreover, the sample reported high-risk drug use behaviors, such as syringe-sharing, and sharing of non-syringe injection paraphernalia, as well as engaging in sexual risk behaviors, such as unprotected sex with casual partners, exchange sex and group sex. The study participants had little knowledge of HCV injection-related risks and safer injection practices, suggesting a need for prevention efforts addressing this target group. Notably, 70% in Mateu-Gelabert's sample were White and 59% male. Others have discussed the frequent shifts between opioid prescription drug use and heroin use, the changing demographics among those using opioids, and associated risk behaviors (e.g. Compton, Jones & Baldwin 2016, Martins et al. 2015), as well as changes in demographics in the opioid user population. For example, Suryaprasad et al. (2014),examined data from national surveillance among young adults and found increases in rates of acute hepatitis C infection, particularly in females and Whites; notably, the majority of respondents reported opioid use and/or injection drug use.

In New York, historically a focal point of the HIV epidemic with still an estimated 154,000 people living with HIV (in 2012), and about 22,000 not knowing their status, a 3-point plan to end the state's AIDS epidemic was proclaimed in 2014 by the Governor (Cohen 2015). By expanding testing, treatment, and access to Pre-Exposure Prophylaxis (PrEP), New York was to serve as an example, and to rank among the first cities to end the AIDS epidemic. PrEP consists of daily administration of a drug that might also be used to treat HIV in uninfected people who are at high risk of acquiring HIV. When an individual under PrEP treatment is exposed to HIV through sex or injection drug use, the medication can help stop

the virus from establishing a permanent infection. PrEP works better the more consistently it is used. It is recommended that PrEP is part of a more comprehensive prevention strategy including the use of condoms and other prevention methods (CDC 2014b). In the US, the only medication approved by the FDA since 2012 for PrEP is Truvada® (containing emtricitabine and tenofovir) which is specifically indicated for the treatment and prevention of HIV 1 (FDA 2016).

PrEP has been advertised in the NYC subway system, via pamphlets, brochures, and postcards, and via official websites. Currently, many insurance plans, including Medicaid, cover PrEP costs (New York City Department of Health and Mental Hygiene 2016b). Although injecting drug users are not the primary target group of these PrEP advertisements, they are mentioned as target groups both in the information materials for medical providers and for patients.

At the Substance Use Research Center at the New York State Psychiatric Institute (NYSPI) in NYC we have conducted studies with non-treatment seeking adults with opioid use disorders (OUDs), and have observed trends in prescription opioid and heroin use. In recent years, we have noted a high prevalence of HCV infection among our screening population (Roux et al., 2012), as well as changes in demographics and indications of frequent risk behaviors in the volunteers presenting at our lab. Brooks et al. (2013) who investigated HIV sexual and drug use risk behaviors among a drug-using national sample entering treatment, found considerable differences between non-Hispanic Blacks, non-Hispanic Whites, and Hispanic individuals, with more severe drug use risk behaviors among Whites and Hispanics. In addition, Compton et al. (2016) and Cicero et al. (2014) reported an increase in heroin and prescription opioid use in Whites in the U.S., particularly among those users who initiated their use in the past decade and lived in less urban areas.

Given these findings, the aims of this study were to assess current drug use and sexual risk behaviors, as well as HIV and HCV transmission and prevention knowledge and attitudes, among non-treatment-seeking adults with opioid use disorders in NYC. We examined differences between races/ethnicities and gender in order to identify high-risk subgroups and/or areas where prevention measures need to be improved. In addition, we specifically investigated the current status of HIV/HCV transmission and prevention knowledge and beliefs, including the most recent prevention measure PrEP.

Methods

The study was conducted at the Substance Use Research Center (SURC) at NYSPI between February 2014 and September 2015. All participants were aged 21 years or older, and participated in the screening process for clinical research studies in the Opioid Laboratory. That is, they had responded to local flyer or newspaper advertisements for non-treatment-seeking adults with opioid use disorders who would like to participate in a clinical research study. After being pre-screened over the telephone to rule out major physical and psychiatric illnesses, those eligible were invited for in-person screening to verify inclusion/exclusion criteria. All participants met DSM IV diagnostic criteria for opioid dependence (APA, 2000), were not seeking treatment at the time of screening, and had no chronic pain and no

current other substance use disorders (besides nicotine and caffeine dependence). Inclusion criteria were determined using urine toxicologies and a clinical interview. For this study, a questionnaire was developed at SURC to assess HCV and HIV risk behaviors and transmission and prevention knowledge among our participants.

This locally developed questionnaire consisted of 35 questions covering 4 domains (participant information, risk behaviors associated with drug use, sexual risk behaviors, HIV and HCV prevention knowledge). The first part covered demographic information, current drug and alcohol use, and HCV and HIV status. The drug use risk behavior section assessed lifetime, past year and past month injection frequency for various drugs; frequency of sharing needles or works, using needles that had previously been used by someone else, passing on own used needles, sharing drugs, sharing drugs/needles/works with someone of unknown HCV/HIV status and with HCV/HIV positive status; with whom drugs, needles or works were shared, if these works were cleaned in between; if the participants believed there was an HIV or HCV transmission risk by sharing various works; if participants felt well informed about drug use transmission risks and if they wanted more information about HCV/HIV drug use transmission risks. The sexual risk behavior section asked about the number of sexual partners in the past year; frequency of condom use; frequency of sex in exchange for giving or receiving drugs, money, gifts or other services; frequency of sex with someone of unknown or positive HCV and HIV status and frequency of condom use when engaging in sex with those individuals; if the participants believed there was a sexual transmission risk in various sexual practices for contracting HCV/HIV; if they felt well informed in regard to sexual transmission risks and if they wished more information on HCV/HIV sexual transmission risks. The prevention section assessed whether participants were making any efforts to prevent HCV/HIV transmission; asked participants about chemical prevention, Truvada and PrEP; asked participants how they would like to receive prevention information and how effective they thought specific prevention measures were; if they were willing to take a medication regularly to prevent HIV; which factors would influence their decision to take such a medication and if they would be willing to participate in an HIV prevention study.

The questionnaire was administered as part of the screening process of the studies for which the participants were screening, and took approximately 20 minutes to complete. Participants did not receive additional payment for completing this questionnaire.

All participants received informational materials on HCV and HIV prevention and transmission, as well as on PrEP after completing the questionnaire. Participants who indicated that they wished to receive more information on HCV and HIV were offered individual counseling with a psychologist. Study procedures were approved by the New York State Psychiatric Institute Institutional Review Board.

The data were analyzed using SPSS for Mac (Version 23), applying two-tailed testing and assuming a level of significance of $\alpha=0.05$. For continuous data, t-tests for independent samples were used for gender comparisons, and Analyses of Variance (ANOVAs) for race/ethnicity comparisons. Homogeneity of variances was assessed using the Levene test. If homogeneity of variances was not present, test results were corrected applying the Welch

test. For post-hoc calculations, the Tukey HSD test was used to assess differences between specific subgroups. For categorical data, Cross Tabs and Chi Square tests were applied. If sub-groups had observed values smaller than 5, Fisher's Exact test was used.

RESULTS

Demographics and basic clinical data

One hundred and thirty eight participants completed the questionnaire (114 male, 24 female) with a mean age of 46.5 years. Among our sample, 65 self-identified their race/ethnicity as African-American, 31 Caucasian or White, 34 Hispanic or Latino and 8 multiracial. Forty-one participants (30%) indicated that they were in a relationship and 95 (69%) reported being single at the time of questionnaire completion, and the majority identified as heterosexual (n=123, 89%). For 111 individuals (80%), heroin was their current drug of choice, whereas 24 (17%) indicated that prescription opioids were their drugs of choice. Sixty-seven (49%) preferred intranasal opioid administration, 46 participants (33%) in the sample were primarily injection users (PWID), and 24 (17%) reported to take their opioids mainly orally when asked about their current main route of administration. Eighty-seven subjects (63%) reported no other drug use than opioids, 19 (14%) subjects had concurrent cocaine use, 16 (12%) reported concurrent use of other opioids, 10 (7%) reported marijuana use, and 3 (2%) reported benzodiazepine use. In the sample, 115 (83%) were current cigarette smokers, and 15 (11%) reported drinking alcohol several times per week or daily. Only 3 (2%) participants indicated that they were HIV positive, whereas 22 participants (16%) indicated that they were HCV positive, and 11 (8%) did not know or wish to report their HCV status. Table 1 shows sample characteristics as a function of race/ethnicity and sex, respectively. Gender identity was not assessed in this investigation.

Caucasians were significantly younger compared to the other races/ethnicities; post-hoc Tukey tests revealed that they were significantly younger compared to African-Americans ($p<0.001$) and Hispanics ($p=0.003$). African-American users had the highest proportion of prescription opioid use (26% vs. 7% among Whites, 12% among Hispanics and the >1 race group), whereas heroin dominated as the main drug across all groups (74% heroin use in the African-American group, 87% in the White group, 85% in the Hispanic group, and 88% in the mixed race group). The intranasal route of administration was also higher among the African-American (60%) and Hispanic/Latino (56%) subgroups compared to the White subsample (20%), where injecting was the primary route of drug administration (73% vs. 14% among African-Americans and 32% among Hispanics). Although there were no differences between the racial subgroups in terms of smoking rates, African-American smokers smoked significantly fewer cigarettes per day than Whites ($p<0.001$) and Hispanics ($p=0.013$), as revealed by a post-hoc Tukey test. All 3 HIV-positive participants were female, and 2 of them were Hispanic/Latino. African-Americans represented the smallest proportion of HCV positive participants, but also the highest proportion of unknown status, with no significant differences between genders or races/ethnicities in HCV status.

Drug use and sexual risk behaviors

Caucasians had the highest self-reported prevalence of intravenous heroin use (90% lifetime injection drug use, 87% past 12 months injection drug use, and 77% past month injection drug use), while African-Americans had the lowest injection drug use rates (28%, 25% and 20% respectively, see Table 2).

There were also significant differences between the race/ethnicity subgroups in injecting cocaine, where Whites also had the highest prevalence (65% lifetime cocaine injection drug use versus 17% in African-Americans and 12% in Hispanics/Latinos). Caucasians also most often reported having used needles that had been previously used by other drug users (42% vs. 14% among African-Americans and 6% among Hispanics). There were no statistically significant differences between the subgroups in passing on their own used needles to other users. About a third (32%) of the sample reported never using condoms, whereas a comparable proportion (33%) reported always using condoms, with no significant differences between the races/ethnicities. Although the White group engaged most frequently in sex with persons of unknown HIV or HCV status (32%/30% of Whites reported occasionally having sex with persons of unknown status versus 11/16% of African Americans and 10%/3% of Hispanics/Latinos), these differences did not reach statistical significance. There were no significant differences in frequency of engaging in sex in exchange for money, drugs, gifts or other services between the races/ethnicities. We also tested for sex differences in all of these risk behaviors and had no significant result in the entire sample.

HIV and HCV prevention and transmission knowledge

The majority of the sample (73%) considered themselves to be “well informed” about drug use transmission risks for HIV and HCV, and only about a third (28%) wished for more information on drug use transmission risks with no significant group differences (Table 3). A similar picture was observed in regard to sexual HIV and HCV transmission knowledge, although a higher percentage of African-Americans indicated that they did not feel well informed about Hepatitis C transmission risks compared to the other groups. The majority of the sample (76%) also described themselves as well informed about HIV and HCV prevention methods, with no significant group differences. However, 30% (Whites) to 44% (African Americans) requested more information about HIV and HCV prevention methods. Only about a third (30%) of our sample had heard about PrEP, with no significant group differences. When asked about the brand name Truvada®, we found significant differences; only 13% of Whites had heard about Truvada®, compared with 31% of African-Americans, 43% of the mixed race group and 54% of Hispanics. We also tested for gender differences in all of these questions and found no significant differences.

Attitudes about HIV/HCV prevention

When asked about what methods were effective in preventing HIV/HCV transmission, the majority of the sample agreed that condoms were effective. About two thirds also thought sexual abstinence was effective, and about half of the participants thought transmission knowledge or no drug use was effective, with no significant differences in endorsement of these beliefs, between the races/ethnicities (multiple responses could be selected to respond

to this question about effective prevention methods). Only 43% of African-Americans thought the use of sterile equipment was effective, followed by 53% of Hispanics; whereas 84% of Caucasians thought sterile equipment was effective ($p=0.001$). A low proportion (22%) of our participants indicated that they believed the use of medications like Truvada® was effective, with no significant group differences.

When asked to endorse all preferred methods of receiving prevention information, Hispanics (71%) and Whites (65%), had the highest preference for receiving prevention information from a health care professional, whereas African-Americans had a higher preference for the internet (52%) compared to health care professionals (46%). About half of the sample indicated they would like to receive prevention information via leaflets, brochures or posters, whereas e-mails/text messages and peers were less popular as vehicles for delivery of prevention information, with no significant group differences. The lowest preference was given to sexual partners and family members in this regard (see Table 4). When asked in which settings they would feel most comfortable receiving information about HIV/HCV transmission/prevention (multiple responses were allowed), the most popular setting was face-to-face with a professional. There were no significant group differences with regard to a group setting with peers and a setting involving the partner and a health care professional, which were of moderate popularity. The least popular settings were face-to-face settings with a peer and anonymously via internet, although Whites (32%) and multiracial participants (43%) liked this option significantly more often than African-Americans (10%) and Hispanics (10%).

When asked if they would be willing to take a medication to prevent HIV infection, over half of the sample (39% said definitely yes, 20% probably) indicated they would be, with no significant group differences. Effectiveness of the medication was the criterion that received the highest ratings of being the basis for their decision to take such a medication, with no significant group differences. About half of the sample would base their decision on the information they received from their doctor, whereas a slightly lower proportion of participants indicated experiences from other people who had taken the medication and information on the internet as decisive. The fear of getting infected and the prescription information on the drug label carried little importance for their decision, with no group differences. Significant differences were revealed with regard to side effects of the medication, (financial) costs of the medication, and the hassle to get the medication; these 3 criteria were most important for Whites (77%/67%/43%), and least important for African-Americans (47%/25%/9%). Finally, over half of the participants in our sample indicated that they would be willing to participate in a clinical study involving medication administration to prevent HIV infection, with no group differences. Sex differences were not found for any of these questions.

DISCUSSION

The current study investigated a non-treatment seeking sample of adults with opioid use disorders in NYC, with a distribution of racial/ethnic subgroups that is representative of our study participant population. Due to the small proportion of women, we only found significant sex differences in some basic demographic and clinical variables, such as age and

relationship status, and interestingly, all 3 self-reported HIV-positive cases were women. We could not identify any gender differences in risk behaviors, transmission and prevention knowledge or preferences. We would have expected a higher number of women engaging in sexual behaviors in exchange for drugs or money compared to men, as reported by the National HIV Behavioral Surveillance System (Broz et al. 2014).

Our results revealed, however, a number of differences by racial/ethnic group. (Non-Hispanic) Whites were not only the youngest in our sample, most often injection drug users, and the heaviest cigarette smokers, they also constituted the subgroup with the highest rates of injection drug use, whereas African-Americans had the lowest injection drug use rates in our sample. African-Americans were the lightest smokers, and were most frequently using their opioids intranasally or orally. Furthermore, they had the highest proportion of non-medical prescription opioid use and the lowest rates of drug use risk behaviors, whereas Whites had the highest rates, and Hispanics/Latinos ranked in between. These results are in line with those recently found by Wu et al. (2010) who investigated a sample of 343 adult opioid-dependent adults currently in detoxification treatment in NYC. Whites in their sample also showed more risky drug use behaviors, some of which are inter-related such as injection drug use and passing on used needles, compared to African-Americans. Williams et al. (2013), who assessed 3079 drug-using individuals for HIV prevalence and risk behaviors, reported a similar finding – Whites (and Latinos) showed higher rates of injection drug use and needle-sharing compared to African-Americans. However, in Wu's sample (2010), African-Americans were more likely to use heroin and cocaine compared to Whites, and Whites were more likely to use prescription opioids. We do not know why our results are different in this regard, but our sample was not seeking treatment, smaller, and assessed a few years later and in a different geographic area of the US.

There were no statistically significant differences in sexual risk behaviors in our sample, although Whites, as compared to other groups, indicated more frequent engagement in sex with persons of unknown HIV and HCV status. In the sample of Williams et al. (2013), Whites were also using condoms more inconsistently compared to African-Americans and Latinos; however, in their sample there was a significant difference in sexual orientation with African-Americans being significantly less likely to report same-sex partners. In our sample, the proportion of participants reporting homosexual orientation was extremely low, making sexual risk behavior patterns more difficult to compare.

At least two-thirds of the sample felt very well informed about drug use and sexual virus transmission risks, whereas a slightly lower percentage of participants indicated that they felt not as well informed about HCV transmission risks. However, about 20-45% of the sample indicated that they wished for more information on transmission risks and HCV and HIV prevention, with no significant differences by racial/ethnic group. At least two-thirds of the sample indicated that they had not heard about PrEP, whereas these percentages slightly changed when asked about the brand name "Truvada®". Significantly fewer Whites had heard about Truvada®, compared to the other groups. Truvada® was most known among Hispanics/Latinos – more than half of whom indicated that they had previously heard about Truvada. We do not have a clear explanation for this difference in recognizing the drug by its

name. It could be a coincidence or a sign of more successful information campaigns in certain neighborhoods in NYC.

We gave handouts about HCV and HIV prevention to all participants who requested more information, including a general information sheet about PrEP. However, we believe that heterosexual opioid users should be targeted more by PrEP advertisement campaigns, given that less than a third of the sample (32%) had heard about the medication. Stein et al. (2014), who asked injecting opioid users admitted for inpatient detoxification in Massachusetts in 2013, reported that only 7% had heard about a preventive pill for HIV. Thus, our figures are already higher. However, the participants assessed by Stein and colleagues (2014) differed from our participants, who were not seeking or currently in treatment, and who were mostly using heroin intranasally. However, in general PWID are underrepresented in HIV prevention and treatment programs as well as HIV prevention research, probably due to systematic discrimination of drug users (Strathdee et al. 2012).

Over 80% of our sample believed that condoms were effective for viral transmission prevention, contrasted with only one fifth to one fourth of the sample that believed in effective prevention by medications like Truvada®; however, a large number of the users had never heard about the medication. Between 30% and 70% indicated that they would be willing to take a medication on a daily basis in order to prevent HIV infection. While the effectiveness of the medication seemed to be an important factor across groups, as well as the information the doctor provides, significant group differences were revealed regarding the following factors that would serve as a basis for the decision about whether or not to take the medication: side effects, cost of the medication, and hassle to get the medication. Whites had significantly higher ratings for all of these factors compared to the other racial/ethnic groups, which suggests that different aspects of PrEP might have to be highlighted to reach or address different user groups. More than half of the sample indicated that they would be willing to participate in a research study involving daily medication administration to prevent HIV infection.

Taking into account that these data were self-reported, they still offer a picture of risk behaviors and prevention knowledge in non-treatment-seeking opioid-dependent adults in NYC. This sub-population has not been targeted by most recent prevention efforts in the city, which focused either on the Lesbian, Gay, Bisexual, and Transgender (LGBT) community or African-Americans and Hispanics/Latinos. Heterosexual middle-aged White opioid users seem to show more risky behaviors and potentially are harder to target by effective prevention interventions. CDC surveillance data from 2000–2013 showed that in the past 5 years, acute HCV rates have increased for African-Americans (33.3%), Caucasians (28.1%), and Hispanics (4.8%) in the United States; for new HIV infections, the highest risk group is Caucasian men who have sex with men (CDC 2015). In addition, it seems notable that Caucasian men in our sample were well informed about transmission risks, but still displayed high-risk behaviors. Recent studies have also shown that non-Hispanic White ethnicity is associated with heroin dependence (Compton, Jones, Baldwin 2016) and that White drug users more frequently exhibit HIV risk behaviors than non-Hispanic African-Americans (Brooks et al. 2013); however, only 14% of the participants in this risk behavior assessment study indicated opioids as their primary drug of abuse and they

were also significantly younger, suggesting that a different subgroup of drug users was assessed by Brooks et al. (2013) than our sample in NYC. A study by Jordan et al. (2015) that aimed at assessing HCV infection trends among PWID in NYC from 2006 to 2013 found that despite increased prevention efforts and decreasing HIV infection rates, the HCV prevalence among PWID has not decreased compared to previous years (2000–2001), and remained stable at around 67%. Our self-reported prevalence is much lower than that, although we also evaluated non-injecting opioid users and some participants might not know their status or might not want to report it; thus, our rate could actually be higher.

Despite increased prevention efforts in New York City, our opioid-using sample had only moderate knowledge about viral transmission, wished for more prevention information, and was very poorly informed about new prevention methods such as PrEP. More studies with larger sample sizes are necessary to assess gender and racial/ethnic differences among drug users, and current viral prevention efforts need to be improved for drug users in NYC, particularly for those who are currently not in treatment. Finally, this sub-population is interested in receiving more education about viral transmission and would be willing to actively participate in both a prevention program as well as a prevention study.

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Table 1

Sample characteristics according to race/ethnicity and sex

Characteristic	African American (n=65)	White/Caucasian (n=31)	Hispanic/Latino (n=34)	Multiracial (n=8)	p	Men (n=114)	Women (n=24)	p
Sex								–
Male	55 (85%)	21 (68%)	30 (88%)	8 (100%)	0.088		–	
Female	10 (15%)	10 (32%)	4 (12%)	0 (0%)		–		
Age in years (mean, SD)	50.4 (5.6)	40.8 (9.5)	46.7 (6.4)	44.1 (6.9)	0.001	47.2 (7.6)	42.9 (15.4)	0.191
Sexual orientation								0.005
Heterosexual	59 (91%)	27 (87%)	29 (85%)	8 (100%)	0.258	106 (93%)	17 (71%)	
Homosexual	1 (2%)	0 (0%)	3 (9%)	0 (0%)		3 (3%)	1 (4%)	
Bisexual	2 (3%)	4 (13%)	2 (6%)	0 (0%)		3 (3%)	5 (21%)	
Other	3 (5%)	0 (0%)	0 (0%)	0 (0%)		2 (1%)	1 (4%)	
Relationship status *								<0.001
Single	47 (72%)	17 (57%)	25 (74%)	6 (75%)	0.354	86 (75%)	9 (39%)	
In a relationship	18 (28%)	13 (43%)	9 (26%)	2 (25%)		28 (25%)	14 (61%)	
Current main drug *								0.027
Heroin	48 (74%)	27 (87%)	29 (85%)	7 (88%)	0.097	95 (83%)	16 (70%)	
Prescription opioid	17 (26%)	2 (7%)	4 (12%)	1 (12%)		19 (17%)	5 (22%)	
Methadone	0 (0%)	1 (3%)	1 (3%)	0 (0%)		0 (0%)	2 (8%)	
Other	0 (0%)	1 (3%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)	
Route of administration *								0.539
Injection	9 (14%)	22 (73%)	11 (32%)	4 (50%)	<0.001	39 (34%)	7 (30%)	
Intranasal	39 (60%)	6 (20%)	19 (56%)	3 (38%)		57 (50%)	10 (44%)	
Oral	17 (26%)	2 (7%)	4 (12%)	1 (12%)		18 (16%)	6 (26%)	
Current smoker	53 (82%)	27 (87%)	28 (82%)	7 (88%)	0.810	94 (82%)	21 (88%)	0.368
Number of daily smoked cigarettes (mean, SD)	6.6 (5.6)	14.7 (9.6)	11.0 (10.4)	7.1 (6.8)	<0.001	9.4 (8.5)	10.5 (8.9)	0.554

Characteristic		African American (n=65)	White/ Caucasian (n=31)	Hispanic/ Latino (n=34)	Multiracial (n=8)	p	Men (n=114)	Women (n=24)	p
Frequency of alcohol use^a									
Never		14 (22%)	2 (7%)	8 (24%)	1 (14%)	0.361	20 (18%)	5 (22%)	0.784
Occasionally		30 (46%)	22 (73%)	17 (50%)	4 (57%)		58 (51%)	15 (65%)	
Monthly		5 (8%)	3 (10%)	1 (3%)	0 (0%)		8 (7%)	1 (4%)	
Weekly		9 (14%)	1 (3%)	4 (12%)	0 (0%)		13 (12%)	1 (4%)	
Several times/week		4 (6%)	0 (0%)	2 (6%)	1 (14%)		7 (6%)	0 (0%)	
Daily		3 (5%)	2 (7%)	2 (6%)	1 (14%)		7 (6%)	1 (4%)	
HIV status									
Positive		1 (2%)	0 (0%)	2 (6%)	0 (0%)	0.520	0 (0%)	3 (13%)	0.008
Negative		61 (93%)	30 (97%)	32 (94%)	8 (100%)		111 (97%)	20 (83%)	
Unknown/not reported		3 (5%)	1 (3%)	0 (0%)	0 (0%)		3 (3%)	1 (4%)	
Hepatitis C status									
Positive		7 (11%)	7 (23%)	5 (15%)	3 (38%)	0.133	18 (16%)	4 (17%)	1.000
Negative		52 (80%)	22 (71%)	27 (79%)	4 (50%)		87 (76%)	18 (75%)	
Unknown/not reported		6 (9%)	2 (6%)	2 (6%)	1 (12%)		9 (8%)	2 (8%)	

*. Data for 1 participant missing in at least one of the subgroups

Table 2

Risk behaviors by race/ethnicity

Risk behavior	African American (n=65)	White/Caucasian (n=31)	Hispanic/Latino (n=34)	Multiracial (n=8)	p
Injecting heroin					
Lifetime	18 (28%)	28 (90%)	14 (41%)	6 (75%)	<0.001
Past 12 months	16 (25%)	27 (87%)	14 (41%)	5 (63%)	<0.001
Past month	13 (20%)	24 (77%)	14 (41%)	5 (63%)	<0.001
Injecting cocaine					
Lifetime	11 (17%)	20 (65%)	4 (12%)	5 (63%)	<0.001
Past 12 months	9 (14%)	13 (42%)	3 (9%)	5 (63%)	<0.001
Past month	5 (8%)	8 (26%)	2 (6%)	5 (63%)	<0.001
Sharing drug equipment					
Used used needles	9 (14%)	13 (42%)	2 (6%)	4 (50%)	0.004
Passed on needles	8 (12%)	6 (19%)	1 (3%)	2 (25%)	0.234
Sexual partners past year *					
0 partners	14 (22%)	3 (10%)	4 (13%)	0 (0%)	0.076
1 partner	34 (52%)	13 (43%)	19 (61%)	5 (71%)	
2-5 partners	13 (20%)	13 (43%)	6 (19%)	0 (0%)	
6-10 partners	2 (3%)	1 (3%)	1 (3%)	0 (0%)	
>10 partners	2 (3%)	0 (0%)	1 (3%)	2 (29%)	
Frequency of condom use *					
Never	20 (33%)	10 (34%)	11 (35%)	3 (43%)	0.906
Rarely/Occasionally	5 (8%)	4 (14%)	3 (10%)	1 (14%)	
Sometimes	6 (10%)	3 (10%)	2 (7%)	2 (29%)	
Most of the time	7 (11%)	4 (14%)	2 (7%)	0 (0%)	
Always	23 (37%)	8 (28%)	13 (41%)	1 (14%)	
Frequency of sex with persons of unknown HIV status *					
Never	56 (86%)	20 (65%)	28 (90%)	6 (75%)	0.058

Risk behavior	African American (n=65)	White/Caucasian (n=31)	Hispanic/Latino (n=34)	Multiracial (n=8)	p
Rarely/Occasionally	7 (11%)	10 (32%)	3 (10%)	2 (25%)	
Weekly	0 (0%)	1 (3%)	0 (0%)	0 (0%)	
Daily	2 (3%)	0 (0%)	0 (0%)	0 (0%)	
Frequency of sex with persons of unknown Hepatitis C status*					0.058
Never	52 (82%)	21 (70%)	29 (94%)	5 (71%)	
Rarely/Occasionally	10 (16%)	9 (30%)	1 (3%)	2 (29%)	
Weekly	0 (0%)	0 (0%)	1 (3%)	0 (0%)	
Daily	1 (2%)	0 (0%)	0 (0%)	0 (0%)	
Frequency of sex for money, drugs*					0.904
Never	51 (79%)	25 (81%)	29 (94%)	7 (88%)	
Rarely/Occasionally	10 (15%)	6 (19%)	2 (6%)	1 (12%)	
Weekly	3 (4%)	0 (0%)	0 (0%)	0 (0%)	
Daily	1 (2%)	0 (0%)	0 (0%)	0 (0%)	

* Data for at least 1 participant missing in at least one of the subgroups

Table 3

HIV- and Hepatitis C transmission and prevention knowledge by race/ethnicity

Knowledge/attitudes *	African American (n=65)	White/Caucasian (n=31)	Hispanic/Latino (n=34)	Multiracial (n=8)	p
Well informed about IV use risks for HIV & Hepatitis C?					0.211
No		0 (0%)	2 (7%)	0 (0%)	
Yes, for both viruses	4 (7%)	27 (90%)	24 (86%)	5 (71%)	
Well for HIV, not for Hepatitis	45 (80%)	2 (7%)	0 (0%)	2 (21%)	
Well for Hepatitis, not for HIV	5 (9%)	0 (0%)	1 (4%)	0 (0%)	
Not sure	0 (0%)	1 (3%)	1 (4%)	0 (0%)	
	2 (4%)				
More Information about IV use risks?					0.971
No		22 (73%)	19 (68%)	5 (71%)	
Yes, for HIV & Hepatitis C	35 (61%)	6 (20%)	8 (29%)	2 (29%)	
More HIV risk info	18 (32%)	0 (0%)	0 (0%)	0 (0%)	
More Hepatitis C risk info	1 (2%)	1 (3%)	0 (0%)	0 (0%)	
Not sure	2 (4%)	1 (3%)	1 (4%)	0 (0%)	
	1 (2%)				
Well informed about sexual transmission risks?					0.077
No		1 (3%)	2 (7%)	1 (12%)	
Yes, for both viruses	6 (9%)	26 (84%)	27 (87%)	5 (63%)	
Well for HIV, not for Hepatitis	46 (71%)	3 (10%)	0 (0%)	1 (12%)	
Not sure	12 (18%)	1 (3%)	2 (7%)	1 (12%)	
	1 (2%)				
More information about sexual transmission risks?					0.091
No		22 (71%)	17 (55%)	3 (38%)	
Yes	35 (54%)	7 (23%)	14 (45%)	3 (38%)	
More info for Hepatitis C	26 (40%)	1 (3%)	0 (0%)	0 (0%)	
Not sure	3 (5%)	1 (3%)	0 (0%)	2 (25%)	
	1 (2%)				
Well informed about HIV/Hepatitis C prevention?					0.270
No		0 (0%)	2 (7%)	0 (0%)	
Yes	6 (10%)	28 (93%)	27 (87%)	5 (71%)	
Not sure	47 (77%)	2 (7%)	2 (7%)	2 (29%)	
	8 (13%)				

Knowledge/attitudes *		African American (n=65)	White/Caucasian (n=31)	Hispanic/Latino (n=34)	Multiracial (n=8)	p
More information about HIV/Hepatitis C prevention?						
No		30 (48%)	19 (63%)	17 (55%)	3 (43%)	0.800
Yes		27 (44%)	9 (30%)	12 (39%)	3 (43%)	
Not sure		5 (8%)	2 (7%)	2 (5%)	1 (14%)	
Heard about PrEP		20 (32%)	7 (33%)	11 (37%)	3 (43%)	0.607
Heard about Truvada®?		18 (31%)	4 (13%)	15 (54%)	3 (43%)	0.008

* Data for at least 1 participant missing in at least one of the subgroups

Table 4

Attitudes toward HIV/Hepatitis C prevention

Questions *	African American (n=65)	White/Caucasian (n=31)	Hispanic/Latino (n=34)	Multiracial (n=8)	p
Effective for prevention?					
Condoms	50 (82%)	25 (81%)	25 (83%)	8 (100%)	0.734
Sexual abstinence	44 (72%)	20 (65%)	17 (57%)	6 (75%)	0.484
No drug use	23 (38%)	19 (61%)	12 (40%)	5 (63%)	0.116
Sterile equipment	26 (43%)	26 (84%)	16 (53%)	6 (75%)	0.001
Medications like Truvada®	13 (21%)	8 (26%)	5 (17%)	2 (25%)	0.801
Transmission knowledge	30 (49%)	11 (36%)	15 (50%)	4 (50%)	0.598
How would you like to receive prevention info?					
Via internet	33 (52%)	19 (61%)	14 (45%)	6 (75%)	0.398
Leaflets/brochures	27 (43%)	12 (39%)	21 (68%)	4 (50%)	0.085
E-Mails/Text messages	15 (24%)	10 (32%)	7 (23%)	2 (25%)	0.796
Peers	17 (27%)	11 (36%)	11 (36%)	4 (50%)	0.482
Family members	11 (18%)	5 (16%)	10 (32%)	2 (25%)	0.342
Sexual partner	12 (19%)	6 (19%)	9 (29%)	2 (25%)	0.682
Health care professional	29 (46%)	20 (65%)	22 (71%)	2 (25%)	0.025
Preferred prevention setting					
Group setting with peers	31 (51%)	12 (39%)	12 (40%)	2 (29%)	0.536
Face to face with peer	16 (26%)	8 (26%)	8 (27%)	1 (14%)	0.976
Face to face/professional	33 (54%)	24 (77%)	21 (70%)	6 (86%)	0.079
Partner & professional	17 (28%)	15 (48%)	14 (47%)	4 (57%)	0.101
Anonymous/internet	9 (15%)	10 (32%)	3 (10%)	3 (43%)	0.038
Would you take a medication to prevent HIV?					
Yes	26 (43%)	9 (29%)	15 (48%)	4 (57%)	0.256
Probably	11 (18%)	8 (26%)	6 (19%)	2 (29%)	
Not sure	9 (15%)	11 (36%)	6 (19%)	1 (14%)	
No	15 (25%)	3 (10%)	4 (13%)	0 (0%)	

Questions *	African American (n=65)	White/Caucasian (n=31)	Hispanic/Latino (n=34)	Multiracial (n=8)	p
What would your decision to take meds be based on?					
Effectiveness of medication	29 (51%)	20 (67%)	19 (63%)	6 (86%)	0.228
Side effects	27 (47%)	23 (77%)	14 (47%)	4 (57%)	0.043
Information from doctor	24 (42%)	16 (53%)	20 (67%)	3 (43%)	0.163
Information on internet	14 (25%)	9 (30%)	7 (23%)	1 (14%)	0.887
Experiences by other people	18 (32%)	16 (53%)	13 (43%)	4 (57%)	0.176
Costs of medication	14 (25%)	20 (67%)	9 (30%)	2 (29%)	0.001
Prescription information	14 (25%)	8 (27%)	8 (27%)	1 (14%)	0.964
Hassle to get it	5 (9%)	13 (43%)	6 (20%)	2 (29%)	0.002
Fear of getting infected	13 (23%)	10 (33%)	12 (40%)	2 (29%)	0.378
My partner asks me to	9 (16%)	12 (40%)	7 (23%)	3 (43%)	0.052
Would you participate in an HIV prevention study?					
Yes	26 (43%)	11 (36%)	11 (36%)	4 (57%)	0.588
Probably	8 (13%)	5 (16%)	8 (26%)	1 (14%)	
Not sure	11 (18%)	10 (32%)	5 (16%)	2 (29%)	
No	15 (25%)	5 (16%)	7 (23%)	0 (0%)	

* Data for at least 1 participant missing in at least one of the subgroups