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Sexual risk and transmission behaviors, partnerships and settings among young adult nonmedical opioid users in New York City

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Abstract

Background—Nonmedical prescription opioid use has become widespread. It can lead to heroin use, drug injection and HIV infection. We describe young adult opioid users' sexual risk behavior, partnerships and settings.

Methods—464 youth aged 18 – 29 who reported opioid use in the past 30 days were recruited using Respondent-Driven Sampling. Eligible participants completed a computer-assisted, interviewer-administered risk questionnaire and were tested for STIs and HIV.

Results—Participants (33% female; 66% white non-Hispanic) almost all had sex in the prior 90 days; 42% reported more than one partner. Same-sex sex was reported by 3% of men and 11% of women. Consistent condom use was rare. Seven percent reported group sex participation in the last 90 days but lifetime group sex was common among men and women.

Conclusions—Young opioid users' unprotected sex, multiple partners and group sex puts them and others at high HIV and STI risk.

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Compliance with Ethical Standards

Disclosure of potential conflicts of interest: We declare no potential conflicts of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

No animals took part.

Informed consent was obtained from all individual participants included in the study. . Research was conducted with oversight provided by the Institutional Review Board of National Development and Research Institute, Inc.

Keywords

Nonmedical prescription opioid users; people who use drugs; sexual behaviors and networks; group sex; STIs; HIV

INTRODUCTION

In the last 15 years, the nonmedical use of prescription opioids (PO) has become relatively widespread in the US. In 2014, an estimated 2.8 percent of young adults in the U.S., aged 18 to 25, were current nonmedical users of opioid pain relievers (1). Since 2000, the mortality rate from drug overdoses involving opioids (opioid pain relievers and heroin) has increased 200% (2). Many PO users have begun to use heroin and to inject drugs, whether POs, heroin or other drugs (3–9). There has been at least one outbreak of hepatitis C and HIV infection among nonmedical prescription opioid users, in southern Indiana (10).

Research on sexual risk behaviors and partnerships in samples of young nonmedical PO users is relatively limited. Meade et al. (11) studied sexual risk among 468 PO users (mean age 33.2) who were entering drug abuse treatment; they reported that only 8.4% of the sample (11.3% of sexually active participants) had more than one partner in the last month, but that 76.5% of sexually active participants reporting having unprotected sex at least once during this period. Benotsch et al. (12) studied 435 undergraduate students in a university in the Rocky Mountain region of the US. Among these students, 155 (36%) reported lifetime nonmedical use of prescription drugs (including, but not limited to, POs). In the last three months, participants who reported nonmedical use of prescription drugs also reported more than one sex partner (23%), any unprotected sex (51%), sex after using drugs (32%) and sex after having too much to drink (32%). Clayton et al. (13) reported that among 9th – 12th grade students in the Youth Risk Behaviors Study in 2011 and 2013, PO use was associated with being sexually active, having 4+ lifetime sexual partners, using alcohol or drugs before last sex, and not using a condom at last sex. In one of the few studies to examine a community-based sample, Crosby et al. (14) reported on rates of HIV, other STIs and risky sexual behaviors as a function of age among rural Appalachian Kentucky users of POs, cocaine, heroin or methamphetamine recruited using respondent-driven sampling. HIV prevalence was zero (0%). 8.3% of the sample reported ever having been diagnosed with genital herpes, syphilis, gonorrhea, or Chlamydia. For comparability with our data, we report here on their results about the sexual risks of “young” participants, whom they defined as being 18 – 32 years old. Half of the young men and 35% of the young women reported ever having sex with one or more people who use drugs.

A recent paper by Buttram & Kurtz (15) includes considerable data about opioid users in Florida. Their sample differs from that reported on in this paper in that all had to have used one or more psychoactive prescription medications in the last 90 days, to have had sex with a partner of the opposite gender in the last 90 days, to have used one or more club drugs at least three times in the last 90 days, and to be regular attenders of large, recognized local nightclubs. In addition, their analysis was restricted to people who had used nonmedical prescription opioids in the last 90 days. As in our paper, Respondent-Driven Sampling was

used to recruit this sample. Their age range, 18 – 39, is somewhat wider than ours. This sample reports high rates of condomless vaginal sex (91%) and condomless anal sex (40%) in the last 90 days, and lifetime group sex participation (41%). Buying sex, trading/selling sex, and sex with a person who injects drugs (PWID) in the last year were reported by 11%, 14%, and 13%, respectively. (They are the only group to report on group sex among young opioid users other than a qualitative paper by our group (16)). Friedman et al. (17) reported that participation in group sex events was quite high among non-injecting drug users (who were not necessarily opioid users) in the Bushwick section of Brooklyn, NY, and a later paper described ways in which such settings posed very high risk for HIV or other STI transmission (18). Buttram & Kurtz (15) also report that group sex and sex with a PWID in the last 12 months are independent significant predictors of using POs by an “alternate route of administration” (that is, by a method other than swallowing a whole pill or liquid), but do not present multiple regression models of predictors of their sexual risk behavior variables.

This article addresses three interrelated concerns:

1. Are nonmedical PO and/or heroin-using young adults in New York City (NYC) at sexual risk of HIV and of other sexually transmitted infections (STIs) either through their sexual behaviors or because they engage in sex with high-risk partners or in high-risk settings?
2. And, if they should become infected, what is the likelihood that their sexual partnership patterns and their sexual behavior patterns will lead them to become a bridge population through which HIV and/or STI transmission occurs at a large scale from them to non-drug-using populations?
3. How do these sexual partnership patterns and sexual behaviors differ by the ways in which they use opioids and/or by the mixture of POs, heroin, and cocaine (if any) that they use?

As is discussed further at the end of this paper, the presence of large numbers of HIV-infected and STI-infected people who use drugs and men who have sex with men in New York City means that the likelihood of an HIV outbreak among young opioid users as a result of their sexual partnership and behavior patterns is higher than in many other parts of the United States.

METHODS

We conducted a cross-sectional study of drug use patterns and sexual- and injection-related risk behaviors among opioid-using young adults in NYC. Participants were recruited from July, 2014, through October, 2015 using Respondent-Driven Sampling (RDS), a form of chain-referral sampling designed to engage hard-to-reach populations that utilizes personal network connections to drive recruitment (19, 20). Participants were asked to recruit fellow PO and/or heroin users. Although 92% of participants initiated opioid use with POs, 85% had transitioned to exclusive or intermittent heroin use by the time of their recruitment for this study. Even those participants who started opioid use with heroin are part of an age-based cohort that began using opioids at a time when PO use was rapidly increasing – a context which affected their drug use behaviors, views, networks and trajectories.

Importantly, prior research has found that nonmedical PO users often are outside of older heroin-using networks and that many see themselves and their drug use as different from those of traditional heroin users (21, 22).

Using referrals from participants in our formative qualitative research, service providers and colleagues, and individuals recruited directly from the community by study staff, 20 eligible young adult opioid users were recruited as RDS “seeds” to initiate recruitment chains. After completing screening and the structured interview, each seed was asked to refer to the study up to three eligible opioid-using peers from their social network. This peer-referral process was repeated with the seeds’ recruits and for successive sample waves thereafter, with each participant asked to recruit up to three eligible members of their network. For this analysis, the 20 seeds are included within the quantitative sample of 464.

Eligibility criteria included: nonmedical use of POs and/or heroin use in the past 30 days; current residence in New York City; aged 18–29 years-old; English-speaking; and ability to provide informed consent. To determine eligibility, interviewers used a verbal and visual screening protocol that included: self-report of past-30-day opioid use; a point-of-care urine screen for methadone, opiates and oxycodone; a quiz in which participants were asked to identify pictures of PO pills (23); and, for those who reported recent drug injection, a visual assessment for injection marks. Participants who appeared to be age 25 or older were asked to verify their age with photo identification. Participants were paid \$60.00 for completing the interview and an additional incentive for each eligible participant they referred.

Questionnaire and Variables

Structured interviews lasted between 90 and 120 minutes and included questions on drug use, sexual behavior, sexual and injection partnerships and networks, overdose, drug treatment, HIV and hepatitis C (HCV) knowledge and testing history. The structured questionnaire also included questions about sexual exchanges (e.g., whether participants have been paid for sex with drugs or money). OraQuick rapid HIV and HCV antibody tests (OraSure Technologies) were used to determine serostatus. *Chlamydia trachomatis* and *Neisseria gonorrhoeae* were assayed by nucleic acid amplification technology by LabCorp.

Data about sexual partnerships and behaviors such as condom use cover the 90 days prior to interview. We also present data about participants’ or partners’ use of drugs in the last 30 days; and about injection drug use in the last 90 days and last year. Data on exchange sex were asked in terms of whether respondents had ever done this in their lifetime. Some analyses necessarily involve sex and drug behaviors over different time periods due to the need to limit questionnaire length which meant that time frames were to some degree non-commensurable.

Group sex variables were derived from the following sequence of questions: After the general question about how many people they had had vaginal, anal or oral sex with in the last 90 days, respondents were asked:

- How many of those partners did you have sex with in a group setting? Later on they were asked:

- How old were you when you first had group sex? (by group sex we mean sex with more than 2 people at the same time or sequentially in a given setting)
- In your lifetime, how many group sex events have you attended where you've had sex with other people?

We do not conceptualize the variables describing the numbers and types of partners that participants had or the group sex questions as behavioral variables. Partnership variables are (simple) network variables, and group sex variables describe a more complicated mixing pattern variable. Since almost all participants remain as yet uninfected with HIV, these network and group sex variables have a double meaning in terms of HIV risk and the framing questions for this paper: On the one hand, they describe network characteristics that are likely to be pathways through which the virus can travel to infect participants; and on the other hand, if participants become infected, these networks describe potential pathways through which they may infect others, particularly during the early infection period during which they are likely to be highly infectious and are unlikely to have adjusted their partnerships or their behaviors (24). We have elsewhere described group sex events empirically and shown that, at least in New York, they are often quite large, involve considerable partner swapping, limited condom use, and involve participants who are discordant in terms of their HIV, HSV-2 and other STI infection statuses (16, 17).

Analysis

As part of the analysis, we compared sample frequencies with RDS-adjusted population estimates. These population estimates were calculated using the successive sampling estimator (25) in the R package RDS (26), using a working population size of 15,000. Results were not sensitive to working population size. Prior to calculating population estimates, multiple imputation was conducted using the R package MICE (27) to impute missing network size data for a portion of the sample. Analytic crosstabs and logistic regressions did not adjust for sample weights or other RDS design issues.

Exploratory analyses of relationships between drug use behaviors and selected sexual risk variables were conducted. Bivariate analyses using crosstabs are presented in the tables. Multivariate logistic regression analyses that controlled for age and sex were also conducted.

Statistical analyses were conducted with SPSS versions 21 and 22 and with R version 3.2.4. Heuristic p-values were calculated using chi squared tests and linear regression t-tests.

RESULTS

The analytic sample was approximately two-thirds men and one third women (see Table I). Men had a higher mean age (24.8) than women (23.7) The sample was mainly white and mainly non-Hispanic. Whites comprised 69% of men and 80% of women in the sample. Eighty percent had high school graduate/GED or higher education. Economically, 60% had been homeless at some time in their lives; 18% currently had full- or part-time jobs on the books, while 17% did off-the-books work or odd jobs (19% of men, 11% of women). Participants' self-reported socioeconomic status when they were growing up was 56% middle class or higher. Most of the sample lived in Manhattan or Brooklyn. Comparisons of

sample proportions with RDS-adjusted estimates of proportions in the population of drug users who would be eligible for participation in the study generally found only small differences (see Tables I a and b; II a and b; and III.) One area of possible divergence is that the RDS-adjusted figures for numbers of male sex partners of female participants indicate more had one partner than for the sample percent.

Almost all participants had had sex in the last 90 days (Table II), with 42% reporting more than one partner. Only 3% of men reported having had male partners during this period, whereas 10% of women reported sex with women. Lifetime rates of same-sex partnerships were higher for both men and women, with 56% of women and 8% of men reporting ever having had sex with someone of the same gender. Six percent of men and 5% of women reported having had sex in a group setting in the last 90 days; this was not associated with their age at time of interview.

Forty percent of the respondents reported having had sex in the last 90 days with one or more people who inject drugs (PWID), including 30% of men and 53% of women ($p < 0.001$). Almost all (168) of the 174 who reported having sex with PWID had injected drugs at some point in their lives. Among the 129 who had never injected drugs, only 6 (3%; 4 men and 2 women) reported sex with a PWID in the last 90 days, but 168 (51%) of the 326 who had themselves ever injected reported at least one PWID sex partner in the last 90 days. The picture is similar if we look at participants who had injected within the last year (rather than lifetime), although 11 (7%) of the 146 who reported not injecting in this period reported having had sex with a PWID in the last year.

Relatively small proportions of men and women reported consistent condom use in the last 90 days. In sex between men and women, 27% of men who had vaginal sex with a woman reported consistent condom use during vaginal sex and 26% of 62 men who had anal sex with a woman consistently used condoms; and 13% of women reported that a condom was always used in the last 90 days during vaginal sex and 3% (1 of 29) during anal sex. Two of nine men who reported either insertive or receptive anal sex with another man said that they always used condoms when doing so.

Considerably more participants reported having participated in group sex in their lifetimes than in the last 90 days. Among men, only 142 (46%) reported never having had group sex. Eighteen percent reported having had sex at one group sex event; 10% at two events, and 5% reported having had sex at 10 or more group sex events. The two men with the highest lifetime rates of group sex participation reported attending 50 and 300 events, respectively. The interquartile range for the age at which men who ever had group sex reported first engaging in it was 17 – 21. Among women, only 88 (57%) reported never having had group sex; 12% reported sex at one group sex event, 8% at two events, and 5% at 10 – 20 events. The two women with the highest rates reported attending 15 and 20 group sex events, respectively. The interquartile range for the age at which women who ever had group sex reported first engaging in it was 16 – 21.

Given these levels of high-risk partnerships, rates of sexually transmitted infections were relatively low: only four participants (0.9%), all men, tested positive for HIV. One was a

man who has sex with men, three injected drugs, and at least one was born HIV-infected. In the last 90 days, three of these men had had sex with a total of six women, and one with three men. The self-reported lifetime rate of chlamydia was higher, at 9.5% (44 people). Women (13%) were more likely to report having had chlamydia than men (7%; $p = 0.051$) although laboratory testing data show that only seven participants (4 men and 3 women) were currently infected. Only one man tested positive for gonorrhea.

In the exploratory analyses of drug use patterns by sexual risk variables (see Tables IV and V), those who reported injecting drugs in the last 90 days were more likely to have ever engaged in sex work and less likely to be consistent condom users (in the last 90 days). They did not have different numbers of partners; nor were they more likely to engage in group sex. Participants who engaged in nonmedical use of POs (in the last 30 days) but did not use heroin, crack cocaine or powdered cocaine were more likely than those who used heroin or some form of cocaine to report more than four sex partners but less likely to have ever engaged in sex trading and more likely to report always using condoms. These relationships remained significant in logistic regression controlling for sex and age with one exception: Those who inject drugs only tended to be more likely to engage in sex work ($AOR = 1.08$; $CI = 0.992, 1.18$).

DISCUSSION

These data present a worrisome picture about the potential for sexual transmission of HIV and other infections among emerging cohorts of young adult opioid users and their sex partners to the extent that their sexual (or injection) networks come to include HIV-infected PWID, MSM or other infected people such as older non-injecting drug users (NIDUs). This is a real possibility since large numbers of infected MSM, PWID and NIDUs live in New York City. HIV prevalence among PWID entering drug abuse treatment in NYC has decreased to about 10%, and among NIDUs entering treatment is about 16% (28). In addition, there are additional large numbers of infected PWID and NIDUs who do not want or cannot gain access to such treatment, and additional numbers of infected “ex-users” who may be in the social or risk networks of active users and might become sex partners of young opioid users as a result. Almost half of the sample in the current study also reported having had sex with PWID, which suggests a considerable risk that HIV could become epidemic among opioid users through sexual transmission. This could occur despite the success of harm reduction and other programs in keeping the risk of injection transmission low. Similar patterns may put the group at risk due to virus entering from among MSM. In the 2011 MSM wave of the National HIV Behavioral Study, ten percent or more of MSM in New York City were HIV-infected (counting the 8.7% ($n = 36$) who reported being uninfected but tested positive and taking account of the 12 additional MSM who self-reported having tested positive in the past) (29).

Once HIV enters their networks, high levels of behavioral and network risk make it more likely that each case of acute or other early high-viral-load infection can be transmitted through these young opioid users’ networks and perhaps to their non-using sex partners. This is because few of them use condoms consistently (even among those who do not use heroin, cocaine or crack), and two-fifths report having sex with more than one partner in the

last 90 days. Although group sex in the last 90 days was reported by only 7% of the sample, almost all of these participants had 2 or more partners at group sex events. Substantial proportions of both men and women in this sample reported having taken part in group sex events at least once. Data are not available on the proportion who had group sex in the last year, but the lack of correlation between age and group sex participation in the last 90 days suggests that it could be considerably more than 7% and perhaps comparable to the rates we found in a risk-network study we conducted in Brooklyn in 2002 – 2004. In that project, rates of having had sex at a group sex event in the last year were 28% for non-injecting users of heroin or cocaine; 39% for crack smokers; and 29% for people who injected drugs (17). Among those study participants who attended group sex events, infection rates were high: HIV 10%, HSV-2 49%, chlamydia 30%; and one or more of these three infections, 58%. This suggests that the participants in our current sample are at high risk of having sex with infected partners. Later qualitative research into group sex events which non-injector users of hard drugs attended provided detailed descriptions of these events and of ways in which event organizers sometimes try to reduce risks, such as having designated participants enforce safety rules (18). Research should be conducted on who else takes part in group sex events that young opioid users attend. Depending on the answers, these data could indicate considerable risk that, if an HIV or other STI epidemic gains traction among young opioid users, it could also spread widely among people who do not use drugs.

These findings are limited to the extent that self-report data are limited. The different time periods covered by sexual and drug use variables limit the conclusions that can be reached from their associations. In addition, an earlier paper by this project reported that some men have sex with women or MSM opioid users when they are semi-conscious or unconscious due to the effects of drugs (30). This could lead to under-reporting of partnerships and other sexual risks by these unwitting partners.

Given these data about sexual patterns, it is encouraging that HIV remains rare in the sample and, indeed, that self-reported and laboratory-confirmed infection with other STIs remains moderate or even low. In some ways, this is a testament to the success of New York City's and New York State's multi-pronged efforts to reduce HIV transmission (31, 32). On the other hand, the rates of high-risk sex and the patterns of group sex attendance, as well as the Indiana outbreak (1), suggest that there is a high potential for an HIV and/or STI epidemic among young adult opioid users in NYC that could potentially spread to non-drug-using groups via sexual transmission. Targeted prevention efforts seem necessary, along with research in how to best reduce transmission risk among young opioid users. Although PrEP has been recommended for some populations, little is known about its impact on young opioid users. It might be less effective or counterproductive among young opioid users in low-HIV-prevalence contexts. Research should be conducted on this. Increasing the reach and frequency of HIV and STI testing among young opioid users might also help prevent an HIV and/or STI epidemic from occurring, particularly if rapid access to treatment can then be assured. Such efforts might aim to support condom-use norms among young opioid users and their networks as well as at group sex events they attend, and to raise awareness among them that their networks could be vulnerable to rapid "silent" spread of HIV and/or some other STIs.

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TABLE I

a. CHARACTERISTICS OF THE SAMPLE ^a				
	Total (n= 460) ^a	Men (n= 307; 66.7%)	Women (n = 153; 33.3%)	p (t)
Mean age: years (SD)	24.45 (3.23)	24.81 (2.93)	23.73 (3.67)	0.0224153
	%	%	%	p (chi-squared)
Race^b				0.200
White	72.6	68.7	80.4	
American Indian/Alaskan Native	1.3	1.6	6.5	
African American	4.3	5.5	2.0	
Asian	1.5	1.6	1.3	
Multiracial	9.7	10.7	7.2	
Total	89.4	88.3	91.5	
Ethnicity				0.191
Latino	26.7	29.3	21.6	
Education				0.436
Some high school	19.8	20.5	17.6	
High school graduate/GED	40.1	41.7	37.9	
Some college	34.7	32.2	39.2	
College graduate	4.7	5.2	3.9	
Some post-graduate education	0.4	0.3	0.7	
Total	99.8	100.0	99.3	
Ever homeless	60.1	59.3	60.8	<0.001
Socio Economic Class Growing Up				0.120
Upper-middle/upper-class	14.9	12.4	19.6	
Middle-class	41.6	41.4	43.1	
Lower/lower-middle class	43.1	45.6	37.3	
Total	99.6	99.3	100.0	
Borough of NYC				0.223
Manhattan	34.5	35.8	30.7	
Staten Island	15.1	15.0	15.0	
Brooklyn	35.6	32.9	41.8	
Bronx	4.5	5.9	2.0	
Queens	10.1	10.1	10.5	
Total	99.8	99.7	100.0	
Employment				0.127
Employed full time on the books	9.7	10.4	8.5	
Employed part time on the books	8.0	8.5	7.2	
Odd Jobs or off the books	17.0	19.2	11.1	
Disabled for work	3.2	3.3	3.3	
Unemployed	55.0	51.5	62.7	
Other	6.7	7.2	5.9	

a. CHARACTERISTICS OF THE SAMPLE^a				
	Total (n= 460) ^a	Men (n= 307; 66.7%)	Women (n = 153; 33.3%)	p (t)
Mean age: years (SD)	24.45 (3.23) %	24.81 (2.93) %	23.73 (3.67) %	0.0224153 p (chi-squared)
Total	99.6	100.0	98.7	
b. RDS-adjusted estimates of population characteristics for this sample				
	Mean	Std		
Sex				
Male	65%	0.04437178		
Female	34%	0.04446479		
Race				
White	72.1%	0.0556769		
American Indian/Alaskan Native	1.5%	0.01323116		
African American	7.0%	0.04143559		
Asian	1.5%	0.01305319		
Multiracial	8.0%	0.02139309		
Total	90.1%			
Ethnicity				
Latino	26.4%	0.04677847		
Education				
Some high school	21.1%	0.04514568		
High school graduate/GED	36.1%	0.04185562		
Some college	36.6%	0.04574389		
College graduate	6.0%	0.02928891		
Some post-graduate education	0.1%	0.00071399		
Total	99.8%			
Ever homeless	62.2%	0.04815098		
Socio Economic Class Growing Up				
Upper-middle/upper-class	15.5%	0.03406907		
Middle-class	39.1%	0.04591993		
Lower/lower-middle class	44.6%	0.05027293		
Total	99.3%			
Borough of NYC				
Manhattan	35.0%	0.05345284		
Staten Island	13.7%	0.02700149		
Brooklyn	34.4%	0.04524596		
Bronx	6.3%	0.04283902		
Queens	10.5%	0.02696082		
Total	99.9%			
Employment				
Employed full time on the books	35.0%	0.05345284		
Employed part time on the books	7.5%	0.026657		

b. RDS-adjusted estimates of population characteristics for this sample

	Mean	Std
Odd Jobs off the books	18.7%	0.04937484
Disabled for work	2.8%	0.01164088
Unemployed	10.5%	0.02696082
Other	6.5%	0.02233335
Total	80.9%	

^aFour transgender participants were excluded from this table.

^bThe percentages for Race do not add up to 100% because some respondents said that they had already answered this by saying their ethnicity was Latino and they were omitted from this variable.

^aThe percents for Race do not add up to 100% because some respondents said that they had already answered this by saying their ethnicity was Latino and they were omitted from this variable.

TABLE II

Sex Partnerships in the Last 90 Days

<u>Sample percentages</u>	Percent of participants who report having zero, one, two to four, or five or more partners of the given type in the last 90 days			
	0	1	2–4	5+
Total sex partners	12%	45%	31%	11%
Female sex partners (Male respondents only)	4%	47%	34%	15%
Male sex partners (Female respondents only)	5%	58%	32%	6%
Male sex partners (Male respondents)	96%	1%	2%	0%
Female sex partners (Female respondents)	89%	8%	2%	1%
Sex partners who inject drugs	56%	31%	10%	2%
Sex partners who use non-prescription opiates (and perhaps other drugs)	51%	33%	13%	3%
Sex partners they had sex with in a group setting	93%	1%	5%	1%

<u>Estimated population percentages</u>	Estimated percent of young adult opioid-using population in New York with zero, one, two to four, or five or more partners of the given type in the last 90 days (Standard deviation of the population estimate)			
	0	1	2–4	5+
Total sex partners	11% (.028)	49% (.046)	28% (.039)	11% (.039)
Female sex partners (Male respondents only)	3% (.014)	49% (.065)	32% (.060)	16% (.060)
Male sex partners (Female respondents only)	5% (.038)	65% (.068)	25% (.055)	5% (.028)
Male sex partners (Male respondents)	97% (.010)	0.9% (.005)	1.1% (.005)	0.6% (.008)
Female sex partners (Female respondents)	90% (.047)	7% (.040)	3% (.029)	0.4% (.002)
Sex partners who inject drugs	60% (.044)	30% (.045)	8% (.016)	2% (.009)
Sex partners who use non-prescription opiates (and perhaps other drugs)	51% (.055)	35% (.053)	12% (.027)	3% (.009)
Sex partners they had sex with in a group setting	93% (.025)	0.5% (.002)	5% (.021)	1% (.015)

Table III

Sample and RDS-adjusted population estimates for three ways of characterizing participants' drug use in the last 90 days

	Sample		Population Estimates	
	N	%	Mean	SD
Drug injection in the last 90 days				
Injected drugs	299	64.4%	63.9%	5.8%
Did not inject drugs	165	35.6%	36.1%	5.7%
	464			
Cocaine and opioid use in the last 30 days				
Used crack	98	21.1%	20.6%	4.3%
Used cocaine without crack	118	25.4%	27.4%	4.4%
Used heroin, without crack or cocaine	181	39.0%	39.7%	5.0%
Used POs, without heroin, crack, or cocaine	62	13.4%	14.4%	4.6%
	459			
Opioid use (disregarding all other drug use) in the last 30 days				
Used POs and heroin	255	55.0%	54.1%	4.8%
Used heroin, not POs	131	28.2%	28.1%	4.6%
Used POs, not heroin	71	15.3%	16.3%	4.8%
	457			

Table IV
Selected sexual risk variables by whether or not participant injected drugs in the last 90 days

Sex risk in the last 90 days		Injected drugs		Did not inject drugs		Total	p (χ ²) value
Number of Sexual Partners	N	%	N	%			0.691
0	39	13.0%	18	10.9%		57	0.159
1	130	43.5%	81	49.1%		211	
2-4	96	32.1%	48	29.1%		144	
5+	34	11.4%	18	10.9%		52	
Total	299	100.0%	165	100.0%		464	
Group Sex							
Did not have group sex	277	92.6 %	159	96.4 %		436	0.001
Did have group sex	22	7.4%	6	3.6%		28	
Total	299	100.0%	165	100.0%		464	
Condom Use							
Did not always use protection	219	84.9%	104	70.7%		323	0.042
Always used protection	39	15.1%	43	29.3%		82	
Total	258	100.0%	147	100.0%		405*	
Lifetime Sex Exchange							
Did not have sex for money or drugs	206	68.9%	129	78.2%		335	0.042
Had sex for money or drugs	93	31.1%	36	21.8%		129	
Total	299	100.0%	165	100.0%		464	

* 59 people either had not had sex in the past 90 days or were missing

Table V

Patterns of drug use in the last 30 days by selected sexual behaviors in the last 90 days among 458 participants*

	Used Crack		Used cocaine without crack		Used heroin without cocaine/crack		Used PO without heroin/cocaine/crack		Total	P (chi-square)
	n	%	n	%	n	%	n	%	n	
Number of Partners										0.001
0	14	14.3	19	16.1	18	10.2	7	10.8	58	
1	36	36.7	47	39.8	102	57.6	22	33.8	207	
2-4	39	39.8	39	33.1	44	24.9	21	32.3	143	
5+	9	9.2	13	11.0	13	7.3	15	23.1	50	
Total	98		118		177		65			
Group Sex										0.465
Did not have group sex	90	91.8	109	92.4	168	94.9	63	96.9	430	
Did have group sex	8	8.2	9	7.6	9	5.1	2	3.1	28	
Total	98		118		177		65			
Condom Use**										.001
Does not always use protection	72	85.7	85	85.9	126	79.2	35	60.3	318	
Always uses protection	12	14.3	14	14.1	33	20.8	23	39.7	82	
Total	84		99		159		58		400	
Lifetime Sex Exchange										0.003
Did not exchange sex for money or drugs	67	68.4	79	66.9	125	70.6	59	90.8	330	
Exchanged sex for money or drugs	31	31.6	39	33.1	52	29.4	6	9.2	128	
Total	98		118		177		65			

* Six participants with other drug use patterns were excluded from this analysis

** 59 people either had not had sex in the past 90 days or were missing