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HIV Sex-Risk Behaviors among In- versus Out-of Treatment Heroin-Addicted Adults

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Abstract

Background: Relatively limited empirical evidence exists comparing the impact on HIV sex risk behavior for patients admitted to methadone treatment programs (MTPs) as compared to non-treatment seekers.

Methods: This longitudinal cohort study examined HIV sex-risk behavior among 164 out-of-treatment heroin-dependent adults recruited from the street and 351 newly-admitted MTP patients. The AIDS Risk Assessment was administered at baseline, 6 and 12 months. Generalized Linear Mixed Model and Generalized Estimating Equation analyses were used to examine the changes in sex risk behavior over time.

Results: The participants mean age was 41.5, 74.8% were African-American, 24.3% were White, and 54.4% were men. There were no significant differences between Groups in age, race or gender. At baseline, the out-of-treatment group compared with the in-treatment group reported more sex partners ($p < .001$) and higher frequency of sex ($p = .001$). There was a Group x Time interaction for three of the sex-risk items and the out-of-treatment Group reported having significantly more sex partners at both follow-up time points and having significantly more frequent unprotected sex while high at 6-months (all $ps < .01$).

Conclusions: Non-treatment seekers are at higher HIV risk than those entering MTPs and should be a focus of sex-risk reduction interventions, even if they are not interested in treatment at that time.

Keywords

HIV; methadone; sex risk; longitudinal

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DECLARATION

The authors report no conflict of interest. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Drug Abuse or the National Institutes of Health.

1. INTRODUCTION

While there is substantial evidence that methadone treatment is associated with reductions in a variety of drug-related HIV risk behaviors, its impact on sex risk behaviors is less certain [1]. Addressing HIV sex risk among methadone patients has taken on increased importance, as the proportion of newly admitted methadone patients who do not inject drugs has increased [2]. Some research has found that newly admitted methadone treatment program (MTP) patients report a decrease during treatment in some HIV sex-risk behaviors, including a decrease in the number of sex partners, a decrease in the frequency of transactional sex [3, 4] and a decrease in the frequency of unprotected sex [5]. These reductions in HIV sex-risk could be attributable, in part, to less frequent drug use and intoxication, which could lead to having fewer sexual partners and fewer episodes of exchanging sex for money or drugs. It is also possible that the well-known effect of methadone on reducing libido and sex act frequency plays a role [6]. In contrast, other research has found low rates of condom use among methadone patients [7].

The present study compares status at baseline and change over 12 months in HIV sex-risk behaviors among a group of out-of-treatment heroin-dependent adults who were not seeking treatment compared to a group of newly admitted MTP patients. We hypothesized that the in-treatment group as compared to the out-of-treatment group would experience significantly greater reductions in sex-risk behaviors over time.

2. METHODS

2.1. Participants

This two group longitudinal cohort study was conducted in Baltimore, Maryland between November 2004 and November 2007. The in-treatment group was recruited by research assistants (RAs) upon admission into one of the six MTPs. Inclusion criteria were: (1) being at least 18 years old and (2) meeting US federal criteria for methadone maintenance, which include at least one year of opioid dependence. The second group consisted of out-of-treatment individuals recruited from the streets through targeted sampling [8], a systematic approach in which geographic areas are identified that are likely to contain hidden populations, within which sampling is then conducted. Inclusion criteria for the out-of-treatment group included being: (1) at least 18 years old; (2) opioid dependent during the year prior to study enrollment (and hence eligible for MTP admission); and (3) neither enrolled in nor seeking drug treatment in the past year. The study was approved by the Friends Research Institute Institutional Review Board and all participants provided written informed consent.

2.2. Procedures

All participants completed assessments at baseline and at 6- and 12-months post-baseline. They were paid \$20 for completing the baseline assessment and \$30 for completing each follow-up, which were administered by trained RAs in a private and confidential setting (either at the MTP or at the offices of Friends Research Institute).

2.3. Measure: AIDS Risk Assessment

Participants were administered the AIDS Risk Assessment (ARA) at baseline and 6 and 12 months post-baseline. The ARA is a brief questionnaire whose items assess HIV drug-use risk and HIV sex risk over the 30-day period prior to the interview [9]. These items are similar in content to other HIV risk assessment instruments such as the Risk Assessment Battery [10]. The ARA has been used to measure the change in risk over time associated with an HIV risk reduction intervention [11], psychological functioning [12, 13], standard methadone treatment [3, 14], and interim methadone treatment [15]. For the purposes of this paper, we limited our examination to the past 30-day sex-risk items only.

2.4. Statistical Analysis

Initial analyses involved simple comparisons of the in- and out-of-treatment groups on all demographic and control variables using one-way analysis of variance for continuous variables and χ^2 tests of independence for categorical variables. Race, gender, age, and, at baseline, past 30 day cocaine use [yes vs. no] and injection drug use [yes vs. no] were used as control variables in all analyses.

Responses to 3 of the 10 HIV sex-risk behavior items were coded as continuous variables (frequency of having sex, number of sex partners, and frequency of unprotected vaginal sex) because of their wide range of responses with few “0” responses. Six of the 10 items had a large number of “0” responses, and hence were recoded as binary (0 = zero; 1 = one or more times). The 10th item, unprotected anal sex, was so rarely endorsed at all time points, regardless of associated risk behavior level, that it was dropped from the analyses.

The relationship between the Group (In- vs. Out-of-treatment) and HIV risk behaviors was determined using a Generalized Linear Mixed Model (GLMM) approach for each of the continuous ARA HIV risk behaviors and a Generalized Estimating Equations (GEE) approach for each of the binary ARA HIV risk behaviors. An *F*-test statistic is reported for the GLMM analyses, while a Wald χ^2 test statistic is reported for the GEE analyses. Because one of the primary interests of the study was on baseline differences between the Groups, as it would reflect on the extent to which the in-treatment group might differ from the out-of-treatment group when they were entering treatment, tests of the simple main effect of Group at baseline were conducted, regardless of whether or not the Group X Time interaction was significant.

Six- and 12-month follow-up data were available for 89% and 91%, respectively, for the in-treatment group, and for 85% and 81%, respectively, for the out-of-treatment group. In order to control for the possibility of Type I error due to the number of analyses performed, α was set at .01.

3. RESULTS

3.1. Participants

As shown in Table 1, the combined groups (*N*=515) had a mean age of 41.5 years (*SD*=8.0), 23.5% were married, 74.8% were Black and 24.3% were White, while 54.4% were male.

Less than 2% of participants reported not using heroin at baseline (i.e., they were prescription opioid users). There were no significant differences between Groups on these demographic variables or on their level of education (all values of $p > .01$). However, there were significant demographic differences across the six treatment programs such that the participants from one program located in Baltimore's suburbs were younger ($F(5, 345) = 11.44, p < .001$) and more likely to be white ($\chi^2(5) = 32.49, p < .001$) than participants from the other sites.

3.2. Sex Risk Behavior Change: In- versus Out-of-Treatment Groups

At baseline, the out-of-treatment group reported significantly higher sex risk behaviors compared with the in-treatment group on mean number of sex partners ($p < .001$) and frequency of sex ($p = .001$). The groups did not significantly differ on any other baseline sex-risk behaviors (all values of $p > .01$) (see Table 2).

As shown in Table 2, four of the items for which there were no significant Group X Time interactions (which are shown in Table 3 and described below) did show significant main effects for Group, including engaging in unprotected sex ($p = .006$); unprotected sex with someone other than the primary partner ($p = .004$); unprotected transactional sex ($p < .001$); and unprotected oral sex ($p = .010$). The in-treatment participants reported engaging in more unprotected sex ($M = .52; SE = .03$) and more unprotected oral sex ($M = .24; SE = .02$) than the out-of-treatment group on these two risk behaviors ($M = .41; SE = .04$ and $M = .15; SE = .03$, respectively). In contrast, the out-of-treatment participants reported more unprotected sex with other than primary partners ($M = .09; SE = .02$) and more unprotected transactional sex ($M = .06; SE = .02$) than the in-treatment group on these two risk behaviors ($M = .05; SE = .01$ and $M = .01; SE = .01$, respectively).

As shown in Table 3, there was a significant Treatment Group X Time interaction effect for the item "How many people did you have any kind of sex with during the past month?" ($p < .001$). The simple main effect for Group at each time-point showed that the out-of-treatment group consistently reported having sex with more people than the in-treatment group (all $ps < .001$ for baseline, 6-months, and 12-months).

There was also a significant Treatment Group X Time interaction effect for the item "How many times did you have sex during the past month?" ($p = .007$). The simple main effect for Group at each Time revealed that the out-of-treatment compared with the in-treatment group reported significantly more sexual encounters at baseline ($p = .001$) but not at 6 ($p = .37$) or 12 months ($p = .65$).

Finally, for the item "How many times did you have sex without a condom while you or your partner were high?" there was a significant Group X Time interaction effect ($p = .007$). The simple main effect for Group at each Time revealed that the out-of-treatment group compared to the in-treatment group reported a significantly higher frequency of unprotected sex while under the influence of drugs at 6 months ($p = .002$) but not at baseline ($p = .97$) or 12 months ($p = .095$).

3.3. Analysis for Participants Who Remained In- or Out-of-Treatment for the Entire 12 Month Follow-Up Period

To better assess the impact of methadone treatment on sex-risk behaviors, we conducted a supplementary analysis using data from the subsample of 300 participants (drawn from the total sample of 515) who did not change their treatment status during the course of the year. The subsample consisted of the group of participants who were out of treatment at baseline and remained out at both follow-ups ($n=89$) and the group of participants who were enrolled in MTPs at baseline and remained in treatment at both follow-ups ($n=211$). The findings were quite similar to those obtained from the full sample reported above, with significant Group X Time interactions for two of the items: the number of sex partners ($F(1, 295)= 5.41$, $p=.01$) and the frequency of sex while high ($\chi^2(2)= 14.16$, $p=.001$). In contrast to the analysis of the full sample, the Group X Time interaction for frequency of sex in the past month was no longer significant at follow-up ($F(2, 295)= 1.40$, $p>.01$).

4. DISCUSSION

The present study contrasted the HIV sex-risk behaviors of a group of street-recruited, opioid-dependent adults who were not seeking drug abuse treatment with those behaviors of a group of opioid-dependent adults entering one of the six MTPs. The out-of-treatment group reported significantly greater HIV sex risk on two of the sex risk items at baseline. This underscores the greater risk borne by out-of-treatment individuals and the potential importance of engaging these individuals in risk reduction interventions. The significant reduction in HIV risk found for the in-treatment group over time in terms of frequency of unprotected sex with a partner while the participant or partner was high is encouraging and consistent with other research [3, 4, 13, 16].

Unfortunately, there were a number of HIV sex-related risk factors that did not change significantly over time for those in treatment compared to those out of treatment, including condom use with a main or casual partner. A number of studies of methadone treatment also found little or no change in condom use after methadone treatment entry [16–18]. This is of concern since many methadone patients may have partners who are also at risk for contracting or spreading HIV and most MTPs provide only brief education sessions about HIV transmission without particular skills building exercises, such as role playing or practicing condom use through the use of models [19]. Fortunately, sex risk behavior has been shown to be amenable to change through gender-specific skills training interventions [20, 21], which have the potential to be more widely adopted in the future. Given the importance of risky sexual behaviors in transmitting HIV, MTP programs should routinely provide interventions for reducing sex risk behaviors, including condom use, as a routine component of methadone treatment.

Because this was a naturalistic cohort study, it was possible that individuals who started the study by entering methadone treatment were no longer in treatment at the 6- and 12-month follow-up, and that those starting the study while out of treatment, subsequently entered treatment at follow-ups. Surprisingly, when the data were analyzed by treatment status consistency, limited to those persons who remained either in or out of treatment for the entire 12-month period, changes in HIV sex-risk behaviors did not differ greatly compared

to the analyses by their original grouping. The reasons for this finding are not clear, although it is possible that it could be attributable to the participants providing socially acceptable responses to the RAs or regression to the mean.

To reduce the impact of the HIV epidemic, the WHO has recommended scaling up access to HIV prevention treatment and care, including access to opiate agonist treatment [22]. The present study findings that the out-of-treatment group is at greater HIV sex risk than the in-treatment group underscores the need to increase the percentage of out-of-treatment individuals entering treatment and to explore means of providing sex risk reduction to those not interested in seeking drug abuse treatment.

4.1. Limitations

Since this was not a random assignment study, a limitation in the study was that, while no differences were found in demographic characteristics assessed, there may have been baseline differences between the two samples beyond their interest in entering methadone treatment, although this difference, in and of itself, was also an important finding. Treatment entry may have also represented motivation to change other facets of one's life; therefore decreased sex risk may not have been solely attributable to the treatment process for the in-treatment group. This study did not have HIV testing data and therefore rates of seroconversion could not be compared. It is possible that participants underreported their high risk behaviors due to low social desirability [23], although research has found that self-reported HIV risk behavior by intravenous drug users are generally reliable [24].

4.2. Conclusions

Methadone treatment was found to be associated with a reduction in some, but not all, sex-related HIV risk behaviors. Efforts should be made to increase the rate of entry into opiate agonist treatments, including methadone, to reduce the percentage of out-of-treatment individuals. Sexual risk reduction should be a focus of prevention efforts for newly enrolled methadone patients and targeted outreach efforts should be focused on out-of-treatment individuals.

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Table 1.Demographic differences between in- and out-of-treatment samples at baseline ($N = 515$)

Variable	Total Sample ($N = 515$)	In-Treatment Sample ($n = 351$)	Out-of-Treatment Sample ($n = 164$)	Test Statistic	p
Male, n (%)	280 (54.4%)	187 (53.3%)	93 (56.7%)	$\chi^2(1) = .53$	.47
Race, n (%)				$\chi^2(1) = .16$	.69
Black	385 (74.8%)	260 (74.1%)	125 (76.2%)		
White	125 (24.3%)	87 (24.8%)	38 (23.2%)		
Other	5 (1.0%)	4 (1.2%)	1 (0.6%)		
Married, n (%)	121 (23.5%)	39 (23.1%)	25 (33.8%)	$\chi^2(1) = .01$	.91
Mean age (SD)	41.5 (8.0)	41.2 (8.2)	41.9 (7.7)	$F(1, 513) = .86$	.35
Mean no. years of education (SD)	11.2 (1.7)	11.2 (1.6)	11.0 (1.7)	$F(1, 513) = 1.23$	.27

Note: Test statistic for Race was obtained by collapsing data into two categories: White ($n = 125$) v. Black/Other ($n = 390$).

Table 2.

Sex risk behaviors in the past 30 days: Test statistics, *p* values, means and standard errors (*SE*) for Group (In-Treatment vs. Out-of-Treatment) main effect and baseline simple main effects.

Variable	Group		In-treatment Group	Out-of-treatment Group
	Test Statistic	<i>p</i>	Mean (<i>SE</i>)	Mean (<i>SE</i>)
<i>Sex Risk Behaviors</i>				
How many people had sex with [†]	<i>F</i> (1, 494) = 42.55	<.001	.924 (.13)	2.17 (.18)
Baseline	<i>F</i> (1, 508) = 31.73	<.001	1.52 (.28)	3.56 (.40)
How many times had sex [†]	<i>F</i> (1, 514) = 3.49	.062	7.95 (.51)	9.38 (.73)
Baseline	<i>F</i> (1, 508) = 10.56	.001	9.00 (.78)	12.84 (1.11)
Unprotected sex [yes vs. no] [*]	$\chi^2(1) = 7.57$	.006	.52 (.03)	.41 (.04)
Baseline	$\chi^2(1) = 2.32$	.128	.54 (.03)	.46 (.05)
Unprotected sex with non-main partner [yes vs. no] [*]	$\chi^2(1) = 8.09$	.004	.05 (.01)	.09 (.02)
Baseline	$\chi^2(1) = 2.21$	.137	.06 (.02)	.10 (.03)
Unprotected sex with injection drug user [yes vs. no] [*]	$\chi^2(1) = 0.83$	.362	.03 (.01)	.04 (.02)
Baseline	$\chi^2(1) = 0.01$	.939	.07 (.02)	.07 (.03)
Unprotected sex with crack user [yes vs. no] [*]	$\chi^2(1) = 3.00$	.083	.08 (.01)	.12 (.02)
Baseline	$\chi^2(1) = 2.17$	.141	.11 (.02)	.17 (.04)
Unprotected sex while high [yes vs. no] [*]	$\chi^2(1) = 6.33$	.012	.24 (.02)	.32 (.04)
Baseline	$\chi^2(1) = 0.00$	.969	.43 (.03)	.43 (.05)
Unprotected transactional sex [yes vs. no] [*]	$\chi^2(1) = 13.33$	<.001	.01 (.01)	.06 (.02)
Baseline	$\chi^2(1) = 2.94$	.086	.03 (.01)	.07 (.03)
How many times unprotected vaginal sex [†]	<i>F</i> (1, 516) = 0.97	.326	5.68 (.47)	4.97 (.68)
Baseline	<i>F</i> (1, 508) = 0.36	.549	6.21 (.71)	6.86 (1.01)
Unprotected oral sex [yes vs. no] [*]	$\chi^2(1) = 6.66$	.010	.24 (.02)	.15 (.03)
Baseline	$\chi^2(1) = 1.84$	.175	.26 (.03)	.20 (.04)

* Dichotomous variable coded as follows: 0 = never, 1 = 1 or more times.

† Continuous variable.

Note: α set at .01. *SE* = Standard Error.

Table 3.

Test statistics, *p* values, means and standard errors (*SE*) for items with significant Group (In-Treatment vs. Out-of-Treatment) X Time interaction effects.

Variable	Group X Time Test Statistic	<i>p</i>	In-treatment Group <i>Mean (SE)</i>	Out-of-treatment Group <i>Mean (SE)</i>
<i>Sex Risk Behaviors</i>				
How many people had sex with [†]	<i>F</i> (2, 448) = 11.51	<.001		
Baseline	<i>F</i> (1, 508) = 31.73	<.001	1.15 (.28)	3.56 (.40)
6 month	<i>F</i> (1, 392) = 17.95	<.001	.77 (.13)	1.62 (.20)
12 month	<i>F</i> (1, 468) = 11.50	.001	.85 (.10)	1.34 (.14)
How many times had sex [†]	<i>F</i> (2, 487) = 5.05	.007		
Baseline	<i>F</i> (1, 508) = 10.56	.001	9.00 (.78)	12.84 (1.11)
6 month	<i>F</i> (1, 465) = 0.80	.371	7.37 (.68)	8.28 (.98)
12 month	<i>F</i> (1, 459) = 0.21	.648	7.47 (.64)	7.03 (.95)
Unprotected sex while high [yes vs. no] [*]	χ^2 (2) = 9.91	.007		
Baseline	χ^2 (1) = 0.00	.969	.43 (.03)	.43 (.05)
6 month	χ^2 (1) = 9.67	.002	.17 (.03)	.31 (.05)
12 month	χ^2 (1) = 2.78	.095	.18 (.03)	.25 (.05)

* Dichotomous variable coded as follows: 0 = never, 1 = 1 or more times.

† Continuous variable.

Note: α set at = .01. *SE* = Standard Error. Test statistics and means (*SE*) for baseline, 6-month, and 12-month are those associated with tests of simple main effects.