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Decreased injecting is associated with increased alcohol consumption among injecting drug users in northern Vietnam

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Abstract

Background—Reducing injecting frequency may reduce the risk of HIV infection and improve health outcomes among injection drug users (IDU). However, the reduction of one risk behavior may be associated with an increase in other risk behaviors, including the use of other risk-associated substances. Our objective was to determine if an association exists between a reduction in injecting and level of alcohol use among IDU.

Methods—We conducted a longitudinal analysis of data collected for a randomized controlled trial examining the efficacy of a peer education intervention in reducing HIV risk among IDU and their network members in Thai Nguyen, Vietnam. Our analysis included active male injectors ($n=629$) who were study participants and attended both baseline and 3-month visits. Frequency of alcohol consumption was assessed as the number of alcoholic drinks in the past 30 days. Change in risk and outcome behaviors was calculated as the difference in frequencies of behaviors between baseline and 3-month follow-up visits. The outcome of interest was concurrent decreased drug injection and increased alcohol consumption.

Results—The mean difference between baseline and 3-month follow-up of alcohol consumption and injection frequency in the past 30 days was 19.03 drinks (93.68 SD) and 20.22 injections (35.66 SD), respectively. Participants who reported reduced injection frequency were almost three

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Conflicts of Interest

All authors declare that they have no conflicts of interest.

times as likely to report increased alcohol consumption (OR 2.8; 95% CI, 2.0, 4.0). The proportion that both decreased injecting and increased alcohol by any amount in the past 30 days was 35.6%. In multivariate analysis higher education was significantly associated with an increase in alcohol and decrease in injecting of any amount.

Conclusion—Male IDU may be at risk for increasing alcohol consumption when they reduce injection frequency. Interventions with male IDU that encourage reduction of injection may need to review specific strategies to limit alcohol consumption.

Keywords

injecting drug use; Vietnam; alcohol use

Introduction

Injecting drug use is associated with significantly increased morbidity and mortality (Centers for Disease Control and Prevention (CDC), 2001; Cherubin & Sapira, 1993; Mathers, et al., 2008; McGinnis & Foege, 1999; Pilon, et al., 2011) worldwide, as well as a disproportionate burden of infection with hepatitis C (HCV), hepatitis B (HBV) and HIV. Reducing injecting frequency may reduce the risk of these blood-borne infections and improve health outcomes among injection drug users (IDU) (Des Jarlais, Casriel, Friedman, & Rosenblum, 1992; Neaigus, et al., 2001). However, the reduction of one risk behavior may be associated with an increase in other risk behaviors, including the use of other risk-associated substances. Risk compensation has been a concern in other areas of HIV prevention including circumcision, antiretroviral therapies and topical microbicides (e.g., PREP) (Eaton & Kalichman, 2007; Gust, et al., 2011; Underhill, Operario, Skeer, Mimiaga, & Mayer, 2010), but to our knowledge, it has been less thoroughly explored with respect to reduction of injection frequency. As IDU decrease their injecting frequency, the uptake or increase of other risk-associated substances can be associated with other detrimental health outcomes. For example, studies have found that non-injecting drug users are at elevated risk of becoming infected with HIV, HBV and HCV via sexual transmission and, possibly, other exposures related to their drug use and other practices (Neaigus, et al., 2007). But it is not known whether switching from injection to non-injection drugs is associated with new health risks. Research has shown that IDU may replace injecting with non-injecting illicit drug use (Des Jarlais, et al., 2007; Topp, Day, & Degenhardt, 2003); whether this occurs with alcohol is less clear.

Detrimental health outcomes associated with excessive alcohol use have been widely documented. Excessive alcohol use increases the risk of many diseases and has a causal relationship with more than 60 different medical conditions as well as an increased risk of accidents and violence (Brismar & Bergman, 1998; Rehm, et al., 2003; Room, Babor, & Rehm, 2005). According to the WHO Global Health Risks Report, excessive alcohol use causes 3.8% of deaths and 5.0% of DALYS (Disability adjusted life years) worldwide (World Health Organization (WHO), 2009). Further, alcohol is a known hepatotoxic agent that can exacerbate liver injury caused by other agents, such as chronic viral hepatitis (Bhattacharya & Shuhart, 2003). The two most common causes of chronic viral hepatitis worldwide are HBV and HCV, blood borne infections that are highly prevalent among IDU

(Nelson, et al., 2011). Along with alcoholic liver disease, these viruses are responsible for most cases of liver cirrhosis, hepatocellular carcinoma, and end-stage liver disease (Balasubramanian & Kowdley, 2005). It is estimated that around 10 million IDU are HCV positive and around 1 million are HBV positive (Nelson, et al., 2011). Prevalence estimates of HCV infection exceed 50% in most IDU populations, and can range as high as 95%; prevalence of chronic HBV is estimated at 8.4% (Buchanan & Latkin, 2008). East Asia, and Southeast Asia have among the largest populations of IDU infected with viral hepatitis (Nelson, et al., 2011).

In Vietnam, in 2010, 146,731 of IDU were known to governmental authorities (Ministry of Labour Invalids and Social Affairs (MOLISA), 2009). IDU account for over 75% of HIV cases in Vietnam and HIV prevalence among IDU is approximately 30% (Ministry of Health Vietnam Administration of HIV/AIDS Control, 2009). Although national data are not available, in a study in Bac Ninh province in northern Vietnam, rates of HIV infection, HCV infection and a history of HBV infection were 42.4%, 74.1%, and 80.9%, respectively (Quan, et al., 2009). In Hanoi, Clatts et al (2010) found that for IDU injecting 4 years or less at baseline, the mean time to HCV seroconversion from onset of injecting was 1.2 years (Clatts, Colon-Lopez, Giang le, & Goldsamt, 2010).

In Vietnam, illegal drug use is a highly stigmatized “social evil” which is associated with mandatory rehabilitation in government detoxification centers (DTCs). This reality, in concert with large-scale HIV prevention efforts targeting IDU, have generated intense social and political pressure to reduce injecting drug use (Socialist Republic of Viet Nam, 2006). At the same time, alcohol use is normative in Vietnam, where it is used to celebrate, to socialize and to facilitate business. Alcohol is also accessible in terms of price and availability in Vietnam. There is no drinking age and rice wine, a fermented rice drink with a high ethanol content (18-25%) and the most popular drink in Vietnam, is cheap, largely self-produced, and available in food or coffee shops with no limits on quantity (Giang, Allebeck, Spak, Van Minh, & Dzong, 2008). High levels of ethanol are associated with a greater risk of cirrhosis (Bellentani, Scaglioni, Ciccia, Bedogni, & Tiribelli, 2010). In a recent study in Vietnam, about one-third of respondents had had at least one drink of alcohol per week and about 18% were classified as drinking alcohol to excess (Health Policy and Strategy Institute, 2009; World Health Organization (WHO), 2002a, 2002b).

In this study, we considered whether IDU who reduced their injecting frequency altered their consumption of alcohol differently than IDU who did not reduce their injecting frequency. Specifically, we wanted to assess the potential association between a reduction in injecting and an increase in drinking, in a three-month time frame among male IDU in northern Vietnam and to explore factors associated with a simultaneous decrease in injecting and increase in drinking.

Methods

We analyzed data from a randomized controlled trial examining the efficacy of a behavioral intervention in reducing HIV risk among IDU and their network members in Thai Nguyen Province, Vietnam. Thai Nguyen is a province 50 miles from Hanoi. The trial enrolled and

followed networks of IDU. Each network was comprised of an index participant and at least one network member. Eligibility criteria for index participants were a) being 18 years or older; b) having injected drugs in the past 3 months; c) having HIV-negative antibody test results; and d) being able to recruit at least one eligible network member. Eligibility criteria for network members were 1) being 18 years or older; and 2) having injected drugs with or had sexual intercourse with their index participant in the past 3 months. Network members were not required to be HIV-negative. Eligible networks were randomized to either intervention arm or control arm (1:1 ratio) in blocs of consecutively accrued networks (block size range, 12-24). Index participants, who, with their networks, were assigned to the intervention arm attended a series of six weekly intervention sessions where participants were instructed in methods of harm reduction, communication skill-building, role-playing and problem-solving activities.

Data Collection

All participants were followed-up at 3-month intervals for 1 year or exceptionally (if lost to follow-up within the first year) to the end of the study (up to 3 years). In each of the baseline and follow-up visits, participants were tested for HIV antibody and administered a face-to-face interview using a structured questionnaire. The questionnaire included questions on demographics, alcohol use, drug use, sharing and disinfecting injection equipment, number of sex partners and condom use. Blood specimens were tested for HIV antibody. All participants were compensated 50,000 VND (equivalent of \$3.50) for their time and transportation, and were provided with pre-and post-test HIV and sexually transmitted diseases counseling and appropriate referrals. The research protocol, questionnaire, and consent forms were reviewed and approved by the Thai Nguyen Center for Preventive Medicine IRB and the Johns Hopkins Bloomberg School of Public Health IRB.

Outcome and risk factors

Our analytic sample (N=629) consisted of all participants who attended both the baseline and 3-month visits and reported any injection in the past 3 months at baseline. Our analysis focused on the first three months of the trial when injecting risk dropped dramatically. Injecting risk remained constant at 6 and 12-month follow up. Frequency of alcohol consumption was assessed as the number of alcoholic drinks the participant drank in the past 30 days. Injecting frequency was initially assessed as the number of times the participant injected drugs in the past 3 months; however, in order to analyze alcohol consumption and injecting behaviors using the same time metric of 30 days, injecting frequency in the past 3 months was divided by 3 in order to serve as a proxy for injecting frequency in the past 30 days. Change in risk and outcome behaviors was calculated as the difference in frequencies of behaviors between baseline and 3-month follow-up visits. The outcome of interest was the simultaneous decrease in drug injection and increase in alcohol consumption, and this outcome variable was constructed such that if the participant reported both a decrease in injection and an increase in alcohol consumption, they were coded as "1"; all other participants were coded as "0".

All risk factors that were assessed for this analysis were measured at baseline and three months and included: sociodemographic characteristics (e.g., marital status, education level,

age, and employment status); injecting behaviors (e.g., needle/syringe sharing, sharing of other injecting behaviors, number of other people injected with, pooling money with others to buy injection drugs, injection duration, and overdose); alcohol use (e.g., age of first drink, frequency and severity of alcohol use); sexual behaviors (e.g., most recent time had sex, condom use at most recent sex, and number of lifetime sexual partners); incarceration history; self-perceived HIV risk; and depression as measured using the Center for Epidemiologic Studies Depression Scale (CES-D) (Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). CES-D score was assessed using two different cutoffs, 23 and 16. The cutoff of 23 is often used for the general population (Radloff, 1977), and the cutoff of 16 has previously been used to assess depression in marginalized populations including IDU (Perdue, Hagan, Thiede, & Valleroy, 2003).

Statistical analysis

Frequency distributions and descriptive statistics were used to characterize the sample at baseline. The association between decreasing injection and increasing alcohol consumption from baseline to the 3-month follow-up visit was initially compared using logistic regression. We conducted exploratory analysis to assess changes in number of times consumed alcohol and injected drugs (mean and sd, median) between baseline and 3 month follow-up. In order to explore whether these differences followed similar trends with longer follow-up, we also assessed the differences of these behaviors between 3-month and 6-month visits.

Alcohol-related behaviors of participants were compared at baseline and 3 months using Stuart-Maxwell chi-squared tests. In order to identify covariates that were independently associated with the simultaneous decrease in injecting and increase in alcohol use, we used logistic regression. Potential correlates were first assessed for association with alcohol substitution in bivariate models, using generalized estimating equations with an independent working covariance matrix to obtain robust standard errors in order to account for clustering within network members. Multivariate models included all covariates associated with alcohol substitution at the level of $p \leq 0.10$ in bivariate analysis, as well as those hypothesized to be associated with alcohol substitution regardless of statistical significance, and also adjusted for exposure to the intervention. Interactions were examined on the basis of previous literature and a priori hypotheses by including product terms in regression models. Interactions were assessed between the injection behavior variables and the following variables: education level, age, employment, sexual variables, and depression. We conducted three parallel analyses using three different cutoffs to define meaningful changes in injecting and alcohol consumption (“any”, “5 or more injections and drinks”, and “10 or more injections and drinks”). We controlled for the exposure to the intervention, but inclusion of this variable did not appreciably change the odds ratio or significance of other variables in the final model. All analyses were conducted using STATA software version 11.2 (StataCorp, 2009) and R (R Development Core Team, 2010).

Results

Among 935 participants enrolled in the trial at baseline, 642 returned for 3-month follow-up, of whom 629 injected in the past 3 months at baseline. We compared the characteristics of those who returned for the three-month visit to those who did not. Participants who missed the three-month visit were more likely to be married, under 28 years of age, and unemployed. They were also more likely have two or more life time sexual partners. Of 629 participants, 2 reported extreme amounts of alcohol consumption recorded for the past 3 months; because these 2 values were major outliers in the data, we excluded them from the assessments of alcohol consumption in the past 30 days, including the bivariate and multivariate analyses. We also excluded from these analyses 3 values that were data errors due to being out of the range of possible values for the variable describing the number of days the person drank alcohol in the past 30 days.

The mean age of participants was 33 years (SD = 6.12). Just over half were single and 40% had some or completed a secondary level of education (Table 1). Almost half had had sex within the past month and of these 61% had not used a condom the last time they had sex. Forty-four percent had CESD < 23. Approximately a quarter had started injecting less than 3 years ago and 68% had shared injecting equipment in the past (Table 2). Heroin was the primary drug of injecting at both baseline and 3-month follow-up (99.8% and 80.8% respectively). At baseline, among those who injected, 4.3% injected amphetamine in the past 3 months, and at 3-month follow-up, 3.3% injected amphetamine. Among participants, 10.7% used non-injecting drugs at baseline decreasing to 9.2% at the 3-month visit; this difference was not significant ($p=0.3507$; data not shown).

The vast majority (96%) had ever had alcohol at baseline (Table 2). The proportion that drank every day in the past 3 months increased from 21% at baseline to 29% at the 3-month follow-up (p -value < 0.0001). Similarly, the proportion that drank five or more drinks on days that alcohol was consumed increased from 19% to 26% (p -value = 0.04). In Figure 1, the concentration of points in the upper left quadrant suggests that the majority of participants both decreased injecting frequency and increased alcohol between baseline visit and follow-up 1.

The vast majority of our sample decreased injecting drug use between baseline and three-month follow-up. There was a significant association between decreasing injecting and increasing alcohol drinks in the past 30 days from baseline visit to follow-up visits. Participants who reported reducing the frequency of injecting were almost three times as likely to also report increased alcohol consumption (OR 2.8; 95% CI, 2.0, 4.0).

To assess the stability of these trends, we extended our analysis to the 6-month follow-up period and found that decreases in injecting and increases in alcohol consumption remained static (data not shown).

The mean difference between baseline and 3-month follow-up in frequency of alcohol consumption or injection in the past 30 days was 19.03 drinks (93.68 SD) and -20.22 injections (35.66 SD), respectively (data not shown). The proportion of participants that both decreased injecting and increased alcohol: by any amount, by 5 injections and 5 drinks and

by 10 injections and 10 drinks in the past 30 days were 35.6%, 31.7% and 29.4%, respectively.

In bivariate analysis, higher education was significantly associated with an increase in any amount of alcohol use and decrease in any injection, and marginally significantly associated with changes by 5 or more injections and drinks. Having overdosed in the past (any and changes of 5 or more) and having had more recent sex (changes of 5 or more) were significantly associated with increased substitution. Having had 2 or more lifetime sexual partners (changes of 5 or more) was associated with a marginally significant increased risk of substitution (data not shown). In multivariate analysis, we controlled for variables significantly different between participants who did versus who did not return at the 3-month visit (i.e., marital status, age, employment status, pooling money to buy drugs to inject, sharing any other injection equipment, and CESD score using cutoff of 23).

In this analysis, higher education and lifetime overdose remained significant for any amount, and having had more recent sex remained significant for changes of 5 or more (Table 4).

Discussion

Promoting the reduction of injecting drug use is generally considered an important method of limiting HIV and HCV transmission risk (Neaigus, et al., 2006; Neaigus, et al., 2001; Sibthorpe & Lear, 1994; Steensma, Boivin, Blais, & Roy, 2005). In our sample of 629 IDU, a large proportion of the subjects across study arms reduced their injecting drug use in the 3-month follow-up. Other randomized controlled trials of HIV risk reduction behavioral interventions among IDUs (Latkin, Sherman, & Knowlton, 2003; Purcell, et al., 2007), and the general population ("Results of the NIMH collaborative HIV/sexually transmitted disease prevention trial of a community popular opinion leader intervention," 2010) have observed decreases in risk behaviors or disease outcomes across both arms. Our study suggests that being in a trial and/or participating in HIV testing and counseling may have reduced injecting risk behaviors. In Vietnam, the government and international organizations have devoted considerable resources to HIV injecting risk reduction messaging, perhaps priming individuals who inject drugs for change. Relatively easy access to cheap needles at local pharmacies in Vietnam may have further supported behavioral change in injecting practices (Go, et al., 2012) across both intervention and control.

However, our study of male IDU in Vietnam suggests that there may be unanticipated consequences when IDU reduce their drug injection. We found that a decrease in injecting drugs was accompanied by an increase in drinking alcohol at three-month follow-up. Thirty-five percent of participants reported a decrease in injecting and an increase in alcohol use and 29% reported a decrease in injecting and an increase in alcohol use of 10 or more times in the past 30 days. As we noted, the vast majority of our sample decreased injecting drug use between baseline and three-month-follow-up. Among those who decreased alcohol consumption, 51% had decreased injecting; yet, among those who increased alcohol consumption, 73% had decreased injecting. Therefore, although both those who increased and decreased alcohol had a majority who decreased injecting behaviors, those who increased alcohol consumption were significantly more likely to have had decreased

injection compared to those who decreased alcohol consumption. A prolonged increase in alcohol use has potentially severe consequences among IDU, where prevalence rates of HBV and HCV are particularly high.

In addition to potential health risks, alcohol use may also increase HIV risk. Excessive alcohol use can increase unsafe sexual behavior and consequent HIV transmission (Braithwaite, et al., 2007; Chersich & Rees, 2010; Freiberg, et al., 2010; Hendershot & George, 2007; Justice, et al., 2010; Parry, Rehm, Poznyak, & Room, 2009). Increased alcohol use is associated with an increased number of sexual partners (Morrison, et al., 2003; Woolf-King & Maisto, 2011), as well as condom failures and an increased incidence of sexually transmitted infections (STI) (Bryant, 2006; Carlson, Johnson, & Jacobs, 2010; Van Tieu & Koblin, 2009). In our study, men who increased alcohol use and decreased injecting were more likely to be currently sexually active with more than 2 lifetime partners, supporting the literature on alcohol and sexual behaviors (World Health Organization (WHO), 2005).

Our research suggests that some male IDU may be especially vulnerable to increased use of alcohol when trying to reduce injection drug use. Participants in our study who overdosed in the past were significantly more likely to increase alcohol use as they decreased use of injection drugs. In addition, those who had a longer duration of injecting and who ever shared a needle/syringe at baseline were more likely to increase alcohol and decrease injecting drug use, though these associations did not attain statistical significance. These injecting variables are suggestive of individuals who may be more heavily addicted and enmeshed in the drug using culture, and therefore may be more likely to rely on alcohol in order to decrease injecting.

In developed countries, including the US, lower SES is associated with excessive drinking (Droomers, Schrijvers, & Mackenbach, 2004). Less is known about alcohol consumption patterns in developing country settings. In the Vietnamese context, IDU with higher socio-economic status (as indicated by higher education) may be more socially integrated thereby making it easier for them to switch to a more culturally accepted behavior.

Since there are no standard thresholds for a meaningful decrease in injecting or increase in drinking alcohol, we explored a range of thresholds of change in the past 30 days, with the highest threshold (10>more) applying to the about a third of the participants. Our analyses identified variables associated with any decrease in injecting and increase in drinking and changes of 5 or more in injecting and drinking, including education, overdose and sexual activity; participants who changed 10 or more were a different risk group with characteristics not measured in our study.

Several limitations of our study should be noted. Because our analysis explores an increase in alcohol and decrease in injecting across the same time period, it is difficult to identify which behavior led to the other. Our intervention was designed to decrease injecting and we found that participation in the trial decreased injecting across both intervention and control arms between baseline and the 3-month follow up (Go, et al., 2012)). This trend was consistent across time-staggered cohorts suggesting that reductions in injecting drug use

were not due to secular trends (e.g., increases in alcohol consumption). Our approach assumes a lag time of up to 3 months between reduced injecting and potentially compensatory alcohol use, which is reasonable since acute symptoms of heroin withdrawal occur almost immediately (peak in 24-48 hours) (Chang & Kosten, 2005; Kosten & O'Connor, 2003; Sigmon, et al., 2012). Our findings are based on self-reported behavior. Self-administered questionnaires were not feasible because a significant proportion of the study population was illiterate. Although audio-computer assisted techniques (ACASI) have been shown to increase the validity of sensitive, self reported behaviors in certain setting (Des Jarlais, et al., 1999; Turner, et al., 1998), it may not be appropriate among less educated, less literate populations (Edwards, et al., 2008; "The feasibility of audio computer-assisted self-interviewing in international settings," 2007; Gregson, Zhuwau, Ndlovu, & Nyamukapa, 2002; Lara, Strickler, Olavarrieta, & Ellertson, 2001; Potdar & Koenig, 2005). We decided not to use ACASI for a number of reasons. First, ethnographic data in our current study found that IDU in Thai Nguyen had not had exposure to computers and are mistrustful of them. Second, ACASI does not give the opportunity to build rapport and probe on psychosocial dimensions such as depression. Finally, in our current study, IDU have been forthcoming about their injecting and sexual risks and do not appear to give socially desirable answers during face-to-face interviews. There is substantial evidence for the validity of face-to-face interview data from injecting drug users, including studies that used HIV infection as the criterion for validity (Des Jarlais, et al., 1994; Des Jarlais, Friedmann, Hagan, & Friedman, 1996). To minimize social desirability bias, we conducted face-to-face interviews with same-sex interviewers who were trained extensively in non-judgmental interviewing techniques. Because our participants were sampled from Thai Nguyen province, findings may not be generalizable to settings beyond northern Vietnam. Enrollment criteria, recruitment methods and study procedures may also limit generalizability. For example, all participants received HIV VCT after the baseline questionnaire, which encourages individuals to reduce or stop injection drug use. Finally, it is possible that some external event such as a change in accessibility of drugs or alcohol could have had an impact on our results although we are unaware of any such occurrence in Thai Nguyen throughout the duration of our study. Furthermore, since participants were enrolled in blocks over a one year period, the increase in alcohol consumption were unlikely to be due to temporal historical events e.g., warm weather.

Results from our study suggest that increased alcohol consumption may be a real risk that male IDU encounter when they reduce the frequency of injections. HIV risk reduction interventions with IDU may need to explore the potential role of alcohol use and abuse and may want to review with IDU specific strategies to limit alcohol consumption including spacing drinks, alternating alcoholic drinks with nonalcoholic beverages, setting a limit on consumption, or finding alternative activities that do not include substance use, such as sports (Benton, et al., 2004; Delva, et al., 2004; Glassman, Werch, & Jobli, 2007; Martens, Ferrier, & Cimini, 2007; Martens, Pederson, Labrie, Ferrier, & Cimini, 2007; Martens, et al., 2004; Sugarman & Carey, 2007). Like many developing countries, information about alcohol abuse and alcohol consumption-related problems is less pervasive in Vietnam (Huu Bich, et al., 2009). Programs that target male IDU should increase awareness of the direct (e.g., liver disease, accidents, violence, psychiatric conditions, and interpersonal conflict)

and indirect (e.g., increased sexual risk behaviors, increasing risk to overdose from mixing alcohol with heroin) harms associated with alcohol use.

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Figure 1. Change in # days consumed alcohol (y-axis) by Change in # days injected drugs (x-axis), in past 3 months: **Visit2 – Visit1 = (3 months – Baseline)**.

Table 1

Sociodemographic characteristics of participants who injected at baseline.

Variable	N	%
Overall	629	100.0
Males	616	97.9
Marital status		
Single/Live-in	320	50.9
Married	222	35.3
Widowed/Separated/Divorced	87	13.8
Education		
None or primary school	69	11.0
Some or completed secondary school	254	40.4
Some or completed high school	200	31.8
Vocational school	74	11.8
At least some university	32	5.1
Age at baseline		
<28 years	142	22.6
28-31	151	24.0
32-36	184	29.3
>=37	152	24.2
Employment status, at baseline		
Working full-time (>=30 hrs/wk)	383	60.9
Working part-time	82	13.0
Unemployed/Other	164	26.1
When was the most recent time you had sex?		
Within the past month	281	47.1
1-3 months	57	9.5
3-6 months	50	8.4
Over 6 months	209	35.0
The most recent time you had sex,did you or your partner use a condom?		
No	365	61.1
Yes	232	38.9
Number of lifetime sexual partners		
None	217	34.7
1 partner	260	41.6
2+ partners	148	23.7
Do you think you are at risk of HIV?		
No	158	25.1
Yes	368	58.5
Don't know	90	14.3
Not applicable/Already infected	13	2.1
CESD score: 23		

Variable	N	%
CESD < 23	276	43.9
CESD ≥ 23	353	56.1

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Table 2

Baseline alcohol consumption and injection characteristics of participants who injected at baseline.

Variable	Baseline		3-Month Follow-Up		Chi-square
	N	%	N	%	p-value ***
Overall	629	100.0	629	100.0	
Have you ever drunk alcohol?					
No	28	4.5	n/a		
Yes	601	95.5			
In the past 3 months, on average, how often did you drink alcohol?	n=629				
None	177	28.1	139	22.1	<0.0001
Less than once/wk	186	29.6	133	21.1	
1-2 days/wk	78	12.4	94	14.9	
3-4 days/wk	34	5.4	50	8.0	
5-6 days/wi	22	3.5	30	4.8	
Everyday	132	21.0	183	29.1	
In the past 3 months, on days that you drank alcohol, how many drinks (cups or glasses) did you usually have?	n=450 *		n=490		
1 drink	76	16.9	90	18.4	0.04
2 drinks	138	30.7	140	28.6	
3-4	150	33.3	131	26.7	
5+	86	19.1	129	26.3	
In the past 3 months, have you ever drunk enough to get drunk or stay drunk?	n=452		n=490		
Rarely or never	344	76.1	388	79.2	0.24
Less than half the time	92	20.4	76	15.5	
About half the time	9	2.0	11	2.2	
More than half the time	4	0.9	10	2.1	
Always/almost always	3	0.7	5	1.0	
In the past 30 days, how many days have you drunk alcohol?	n=451 **		n=488 **		
0 days	21	4.7	12	2.5	0.002
1-2	91	20.2	60	12.3	
3-6	109	24.2	106	21.7	
7-29	109	24.2	148	30.3	
30	121	26.8	162	33.2	
Number of days injected, past 3 months	n=629		n=629		
0-3 days	1	0.2	148	23.5	<0.00001
4-29	41	6.5	82	13.0	
30-79	113	18.0	113	18.0	
80-89	20	3.2	25	4.0	
90	454	72.2	261	41.5	

Variable	Baseline		3-Month Follow-Up		Chi-square
	N	%	N	%	p-value***
Ever shared needle/syringe (received), at baseline					
No	539	85.7			
Yes	90	14.3			
Ever shared other injection equipment, at baseline					
No	198	31.5			
Yes	431	68.5			
Ever overdosed in lifetime					
No	530	84.3			
Yes	99	15.7			

n/a: Not applicable because this question was only asked at baseline.

* Excludes participants who had baseline values recorded as ≥ 50 drinks of alcohol on the days they drank (i.e., extreme values).

** Excludes participants who had recorded values that were out of the data range for this question (i.e., values > 30 days).

*** Chi-square p-value calculated using the Stuart-Maxwell Test.

Table 3

Association between decreasing injections and increasing alcohol consumption, from Baseline to 3-month FU, controlling for baseline daily alcohol use and baseline daily injection drug use, using GEE estimates with semi-robust standard errors

Variable	N	Increased No. Alcoholic Drinks by <u>ANY</u> amount, past 30 days		
		n (row%)	OR (95% CI)	p-value
Overall	624	303 (48.3)		
Decreased no. injections by <u>ANY</u> amount, past 30 days				
No	240	81 (33.8)	Ref.	
Yes	384	222 (57.7)	2.8 (2.0, 4.0)	< 0.0001

Table 4

Multivariate associations¹ for substitution between past 30 days of Visit 1 (baseline) & Visit 2 (3-months), among those who injected at baseline (at the specified amount) using GEE estimates with independent correlation matrix and semi-robust standard errors.

Variable	Decreased No. Injections & Increased No. Alcoholic Drinks by ANY amount, past 30 days		Decreased No. Injections & Increased No. Alcoholic Drinks by 5 or more amount, past 30 days		Decreased No. Injections & Increased No. Alcoholic Drinks by 10 or more amount, past 30 days	
	Bivariate OR (95% CI)	Multivariate OR (95% CI)	Bivariate OR (95% CI)	Multivariate OR (95% CI)	Bivariate OR (95% CI)	Multivariate OR (95% CI)
Education						
None or Primary	Ref.	Ref.	Ref.	Ref.	Ref.	n/a
Secondary	1.4 (0.8, 2.6)	1.5 (0.8, 2.7)	1.4 (0.7, 2.5)	1.6 (0.8, 3.1)	1.5 (0.8, 2.7)	
High school	1.3 (0.7, 2.3)	1.2 (0.7, 2.3)	1.2 (0.6, 2.2)	1.3 (0.7, 2.4)	1.0 (0.6, 1.9)	
Vocational school	1.3 (0.6, 2.7)	1.2 (0.6, 2.6)	1.1 (0.5, 2.3)	1.0 (0.4, 2.2)	1.0 (0.4, 2.1)	
At least some university	3.6 (1.5, 8.9)**	4.2 (1.7, 10.6)**	2.4 (0.96, 6.1)*	2.8 (1.1, 7.5)**	1.2 (0.5, 3.3)	
Ever shared needle/syringe (received)						
No	Ref.	n/a	Ref.	n/a	Ref.	Ref.
Yes	1.4 (0.9, 2.3)		1.5 (0.9, 2.5)		1.6 (0.99, 2.7)*	1.4 (0.9, 2.4)
Ever overdosed in lifetime						
No	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Yes	1.6 (1.1, 2.5)**	1.6 (1.00, 2.5)*	1.7 (1.1, 2.7)**	1.5 (0.9, 2.5)*	1.5 (0.97, 2.5)*	1.3 (0.9, 2.2)
When was the most recent time you had sex?						
Within past month	Ref.	n/a	Ref.	Ref.	Ref.	n/a
1-3 months	1.7 (0.9, 3.0)		1.8 (1.01, 3.3)**	2.1 (1.1, 3.9)**	1.4 (0.8, 2.6)	
4-6 months	1.3 (0.7, 2.5)		1.3 (0.7, 2.3)	1.6 (0.8, 3.0)	1.0 (0.5, 2.0)	
Over 6 months	0.9 (0.6, 1.3)		0.8 (0.6, 1.3)	1.7 (0.6, 4.2)	0.9 (0.6, 1.4)	
Number of lifetime sexual partners						
None	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
1 partner	1.3 (0.9, 1.9)	0.99 (0.6, 1.6)	1.2 (0.8, 1.9)	1.3 (0.5, 3.5)	1.1 (0.7, 1.7)	0.9 (0.5, 1.5)
2+ partners	1.5 (0.98, 2.3)*	1.3 (0.8, 2.1)	1.6 (1.03, 2.6)**	2.0 (0.7, 5.5)	1.5 (0.9, 2.4)*	1.3 (0.8, 2.1)
Exposure to Intervention at 3-month visit						
No	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.

Variable	Decreased No. Injections & Increased No. Alcoholic Drinks by ANY amount, past 30 days		Decreased No. Injections & Increased No. Alcoholic Drinks by 5 or more amount, past 30 days		Decreased No. Injections & Increased No. Alcoholic Drinks by 10 or more amount, past 30 days	
	Bivariate OR (95% CI)	Multivariate OR (95% CI)	Bivariate OR (95% CI)	Multivariate OR (95% CI)	Bivariate OR (95% CI)	Multivariate OR (95% CI)
Yes	0.7 (0.5, 1.05) *	0.7 (0.5, 1.05) *	0.8 (0.5, 1.1)	0.8 (0.5, 1.2)	0.8 (0.5, 1.1)	0.7 (0.5, 1.1)

* p<0.10;
** p<0.05

I Controlling for: baseline daily alcohol use, baseline daily injection drug use, the variables indicated in Table 4 as having a p-value of 0.10 or less, marital status, age, employment status, pooling money to buy drugs to inject, sharing any other injection equipment, and CESD score using cutoff of 23