Published in final edited form as:

Drug Alcohol Depend. 2007 July 10; 89(2-3): 251–258.

THE IMPACT OF ILLICIT DRUG USE AND HARMFUL DRINKING ON QUALITY OF LIFE AMONG INJECTION DRUG USERS AT HIGH RISK FOR HEPATITIS C INFECTION

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Abstract

Background—Heavy alcohol use, hepatitis C and illicit drug use each have been shown to have negative impacts on health-related quality of life (HRQL). To date, considerations of HRQL have not played a prominent role in the design and measurement of intervention strategies for out-of-treatment at-risk populations.

Methods—Data were collected from out-of-treatment IDUs recruited through street outreach in North Carolina. Multiple linear regression analyses were used to examine the independent effects of HCV status, harmful drinking (AUDIT), and illicit drug use on HRQL (SF-36).

Results—Fifty-one percent of 619 study participants tested HCV-positive; 57% met criteria for harmful or hazardous drinking and 63% reported daily use of hard drugs. HRQL scores for this population were significantly lower than those of the general population. Multiple linear regression analyses demonstrated that harmful levels of alcohol consumption and use of methamphetamine in the past month had the strongest associations with reduced HRQL.

Conclusions—Given the high rates of HCV in most IDU communities, new harm reduction approaches are needed for these populations which focus beyond prevention to the functioning and well-being of those already infected. In particular, reducing heavy alcohol use in addition to slowing HCV progression shows promise for improving HRQL.

Keywords

Health-related quality of life; Hepatitis C; AUDIT; Injection drug use

1. INTRODUCTION

Heavy alcohol consumption and hepatitis C virus (HCV) infection frequently co-occur among illicit drug users (Campbell et al., 2006; Foster et al., 1999; Okoro et al., 2004; Ryan and White, 1996; Spiegel et al., 2005). Illicit drug users who inject drugs (IDUs) place themselves at elevated risk of contracting HCV infection. HCV prevalence among IDUs ranges from 45% to 95% in cities around the world (Dore et al., 2003; Alter, 2002; Miller et al., 2002; Hahn et al., 2001; Hagan, 1998). Heavy alcohol use is also common among IDUs. In a study of young

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HCV-positive IDUs in Baltimore, New York, and Seattle, 37% met criteria for harmful drinking on the Alcohol Use Disorders Identification Test (Campbell et al., 2006). About a quarter of heroin users entering treatment in 2002 reported use of alcohol as a secondary substance (SAMHSA, 2004), and Hillebrand and colleagues (2001) found that 41% of their methadone maintenance patients met DSM-IV criteria for alcohol dependence in the past 12 months. Heavy drinking and complications of alcohol were the main cause of mortality among IDUs prior to HIV (Lowinson et al., 1992), and heroin overdoses have been shown to involve the combined use of opiates and alcohol (Darke and Zador, 1996; Gossop, 1996).

Health-related quality of life (HRQL) provides a subjective measure of an individual's health status and well-being using a series of subscales relating to physical, emotional, mental and social functioning (Ware et al., 1993). Poor HRQL has been associated with higher mortality (Ries et al., 1995) and a greater use of health care services (Connelly et al., 1989; Siu et al., 1993). In addition to their impact on physical health status, heavy alcohol use, HCV infection and illicit drug use have each been shown to negatively affect HRQL (Donovan et al., 2005; Foster et al., 1999).

In a study of discordant (alcoholic and non-alcoholic) male twins, the alcoholic twin reported significantly poorer quality of life on six of the eight subscales of the Short Form (SF)-36 quality of life health survey. In a large study of veterans that examined the moderating effects of psychiatric comorbidities on the relationship between alcohol use and HRQL, a history of alcohol dependence was associated with significantly lower scores on each of the eight SF-36 subscales (Kalman et al., 2004).

Independent of alcohol use, HCV infection alone has also been shown to negatively impact HRQL. In a recent paper reviewing the published literature on the link between HCV and health-related quality of life (Spiegel et al., 2005), 15 studies were identified that had compared health-related quality of life between HCV-seropositive patients and healthy control subjects. Health-related quality of life was measured similarly in all these studies with the SF-36 health survey. SF-36 scale scores for HCV-positive subjects in these 15 studies ranged from 7 to 15 points below the scale scores of healthy control subjects. Despite the lack of a gold standard to which to compare the difference in these scores, the authors reviewed SF-36 scores for patients with other diseases and found only a 3 to 5 point difference.

Relatively fewer studies have examined the relationship between illicit drug use and HRQL. The studies which have addressed this relationship have shown that, similar to alcohol use and HCV infection, illicit drug use is associated with decreased HRQL. One study found that the use of heroin and the frequency of heroin use were associated with pain and poor health (Ryan and White, 1996). Other studies have shown an association between addiction to crack and decreased HRQL (Falck et al., 2000; Falck et al., 2003). In a California study of polydrug users (80% of whom had used crack cocaine in the past 30 days), use of opiates and amphetamines were both shown to contribute negatively to quality of life (Reynolds et al., 2003).

Over the last two decades, HRQL has attracted an ever-increasing amount of interest from clinicians and policymakers who have recognized the value of measuring HRQL to inform patient management and policy decisions. In particular, HRQL has been recognized as an important concept in measuring and managing the impact of chronic disease. To date, however, considerations of HRQL have not played as prominent a role in the design and measurement of intervention strategies for at-risk populations not receiving regular medical care. Arguably, in a high-risk population such as IDUs with a variety of physical and mental health needs, HRQL is likely to seem a less pressing concern. We believe however that incorporating HRQL measures and goals into intervention strategies for these populations may provide participants with more realistic and utilitarian goals which could in turn translate into greater participation

and adherence. The aim of this analysis therefore was to inform potential new harm reduction approaches for high-risk substance abusing populations by determining which of several risk factors, whose independent relationships with HRQL have been established, have the greatest impact on HRQL in an out-of-treatment IDU population.

2. METHODS

2.1 Participants

Participants were recruited between July 2003 and January 2006 in North Carolina using a targeted sampling approach (Carlson et al., 1994; Watters and Biernacki, 1989). Once areas were identified, participants were recruited using traditional street outreach methods, where recovering drug users went into high drug use communities to recruit active drug users and distribute risk reduction materials (e.g., condoms, bleach, water, and educational materials) (Cunningham-Williams et al., 1999). Eligibility criteria for the study included: a minimum age of 18 years; self-reported injecting drug use in the previous 30 days; visible tracks (injection marks) and/or a urine specimen positive for heroin (morphine), cocaine, or methamphetamine; no formal substance abuse treatment in the previous 30 days; and current residence in one of the two counties in which the study was conducted.

After preliminary screening in the field, prospective participants were referred to a project office where final eligibility was determined and informed consent was provided. To minimize under-reporting of sensitive behaviors, data collection was performed using Audio Computer Administered Self Interviews (ACASI) (Perlis et al., 2004). The interviews included sections on socio-demographics, alcohol and drug use, injecting practices, substance abuse treatment, sexual behavior, health status, and health-related quality of life.

Upon completion of the initial interview, participants were randomized to either a 6-session motivational intervention or a 6-session educational intervention designed to modify behaviors which may increase the probability of infection, transmission, or progression of HIV, HCV, or HBV. Following the first intervention session, participants were offered testing for antibodies to HIV, hepatitis C virus (HCV), and hepatitis B virus (HBV). Baseline data were collected across two visits, which were completed about one week apart. Participants received their test results (HIV, HCV, and HBV) and post-test counseling following completion of data collection at the second visit. Follow-up interviews were scheduled for six and twelve months after enrollment to provide data for evaluating intervention effects. All activities were approved by RTI International's Office of Research Protection and Ethics.

Although there were a total of 855 out-of-treatment IDUs who completed the first part of the two-part intake interview for this study, this report is based on analysis of a subset of study participants with complete data; 146 (17%) were excluded because they did not return for their second interview, 47 (5%) who completed the second interview were excluded because we did not have valid HCV test results for them and 43 (5%) were excluded because they had excessive missing data on one of the SF-36 scales or they had missing data on the AUDIT or another variable in the models. A comparison, using chi-squared and t-test analyses, of the drug use and demographic characteristics between the 236 individuals who were dropped from this analysis due to incomplete data and the 619 individuals comprising this analytic sample revealed no significant differences with regards to age, educational level, or gender. Individuals in the two groups were also equally likely to have ever used crack, methamphetamine and speedball. Individuals dropped from the analysis due to insufficient data were however significantly less likely at the $p < 0.05$ level to be HCV positive, African-American, unemployed, or homeless at the time of the interview or to report ever having been in prison, substance abuse treatment, physically or sexually abused. Individuals dropped from the

analysis were also significantly less likely at the $p < 0.05$ level to report harmful levels of drinking or to have ever used cocaine, or heroin.

2.2 Measures

The Alcohol Use Disorders Identification Test (AUDIT) was used to assess alcohol-related problems and the probable need for alcohol treatment (Saunders et al., 1993). The AUDIT is a 10-item self-administered screening instrument which asks about drinking patterns and history, and is designed to identify people whose drinking may be harmful to their health. The range of scores is 0 to 40, with scores from 8 to 13 classified as hazardous and scores greater than 13 classified as harmful. The reliability and sensitivity of this tool in identifying hazardous or harmful drinking among drug users have been validated (Skipsey et al., 1997).

Health-related quality of life was measured using the 36-Item Short Form Health Survey developed for the Medical Outcomes Study (SF-36). The SF-36 is a self-reported quality of life questionnaire designed to measure current (in the last four weeks) health status. The 36 items assess 8 subscales of functioning: (1) physical functioning; (2) role limitations caused by physical problems; (3) bodily pain; (4) general health perceptions; (5) vitality; (6) social functioning; (7) role limitations resulting from emotional problems; and (8) general mental health (Ware et al., 1993).

SF-36 scales were used as continuous dependent variables. Scores on each of the subscales range between 0 and 100 with higher scores denoting better perceived health and functioning. The SF-36 has been validated in a wide range of populations, including alcohol and drug users (Daepfen et al., 1998; Falck et al., 2000; Falck et al., 2003; Stein et al., 1998).

Respondents were asked about their use of a variety of hard drugs over the last 30 days. Specifically, they were asked to report the number of days within the last 30 that they had smoked crack by itself, used powdered cocaine by itself, used heroin by itself, injected speedball, injected crack, injected heroin and smoked crack at the same time, and used methamphetamine. We created indicators for any use of each of these drugs during the past 30 days as well as an indicator for use of at least one hard drug (i.e. heroin, crack, powdered cocaine, or methamphetamine) on a daily basis during the past 30 days. Respondent's age was analyzed as a continuous scale and we took into account whether respondents had been in a substance abuse treatment program in the past six months.

2.3 Analysis

All data analyses for this paper were performed using SAS statistical software (SAS Institute Inc., 2002–2003). We compared study participants' average SF-36 subscale scores to the mean SF-36 subscale U.S. general population norms. T-tests were used to compare mean scores on each of the SF-36 subscales for the binomial variables of interest. Analysis of variance (ANOVA) tests were used to compare differences in mean SF-36 subscale scores across variables of interest with more than two response categories. Eight separate multiple linear regression analyses were conducted to simultaneously assess the effects of hazardous and harmful drinking, HCV status and illicit drug use on each of the eight dimensions of health-related quality of life while adjusting for demographic characteristics (age, race and sex). In this paper, standardized beta coefficients have been presented in order to simplify comparisons between the variables of interest.

3. RESULTS

The study sample was 64% non-Hispanic African American, 27% non-Hispanic white, and 9% other (Table 1). Seventy-five percent were male and the mean age was 41 years. Thirty-

two percent had not completed high school or a GED, 72% were currently unemployed, and 38% considered themselves to be homeless at the time of the baseline interview. Sixty-four percent reported ever having been in substance abuse treatment, 56% reported ever being in prison and 33% reported ever having been physically or sexually abused. At intake, 7% tested positive for HIV and 51% tested positive for HCV.

As shown in Table 2, 72% of the study sample reported drinking alcohol in the past 30 days, and 17% reported drinking daily during this time period. Fifty-seven percent of the study sample met criteria for harmful or hazardous drinking on the AUDIT. Eighty-six percent of this study sample reported using more than one hard drug during the past 30 days. The largest number reported using heroin (82%) followed closely by crack (80%) and powdered cocaine (79%). A significantly smaller number of individuals reported use of methamphetamine during the past 30 days (12%).

On average, study sample participants reported injecting 24 different times during the past 30 days and 29% admitted to sharing needles or injection equipment during this time. The mean numbers of days of use of alcohol, heroin, crack, powdered cocaine, and methamphetamine in the last 30 days are also shown in the third column of Table 2. Participants in this sample reported using alcohol a mean of 12 days and heroin a mean of 12 days in the last 30 days.

The first two rows of Table 3 provide a comparison between the average subscale functioning scores for this study population and the U.S. general population mean subscale scores. The average subscale scores for this study population were significantly below that of the U.S. general population subscale scores for each of the eight SF-36 subscales. The largest point difference was for the mental health subscale on which respondents' average score was 29 points below the U.S. general population score. The smallest difference in scores was eight points lower on the vitality subscale.

Table 3 also provides a comparison of the average subscale scores for participants with and without HCV, and with differing reports of drug and alcohol involvement in the recent past. Respondents testing positive for HCV reported statistically significantly lower SF-36 subscale scores on five of the eight subscales. Those who used any methamphetamine and those who reported harmful levels of alcohol consumption reported significantly lower scores on all eight subscales, users of heroin scored significantly lower on six subscales, cocaine users scored significantly lower on four subscales and users of crack scored significantly lower on only one subscale. In addition, those who reported using hard drugs on a daily basis during the past 30 days reported significantly lower scores on five of the subscales. Participants who reported having received substance abuse treatment in the past six months reported statistically significantly lower quality of life scores on four of the eight subscales.

Multiple linear regression analyses were used to simultaneously assess the effects of HCV status, levels of alcohol use, and frequency and type of hard drug use in the past 30 days while controlling for age, race and sex. Only three variables were significantly associated with health-related quality of life scores for each of the eight SF-36 subscales. Male gender was associated with significantly higher scores for each of the eight SF-36 subscales whereas methamphetamine use in the past 30 days and harmful drinking according to the AUDIT were both associated with significantly lower scores for each of the eight SF-36 subscales. Specifically, respondents reporting harmful levels of drinking reported HRQL scores that were between 0.11 units less on the vitality subscale and 0.17 units less on the general health subscale, and respondents reporting use of methamphetamine reported a decrease in HRQL subscale score of between 0.08 units on the general health scale and 0.21 units on the physical functioning scale. With the exception of the physical functioning subscale, reports of harmful

drinking had a stronger association with a decrease in HRQL score than did the use of methamphetamine.

Daily use of hard drugs and use of powdered cocaine and crack in the past 30 days were not significant in any of the models. Heroin use was associated with decreased physical functioning and role physical subscale scores. Having HCV had a significant association with decreased physical functioning, general health and vitality but did not have a significant effect on any of the other subscales of functioning.

4. DISCUSSION

In our sample population of out-of-treatment IDUs, many of whom are infected with HCV and report harmful levels of alcohol consumption, we find that HRQL scores are significantly lower than have been recorded in the general population. In particular, the 29-point difference on the mental health subscale raises a red flag in terms of a reservoir of unmet mental health needs in this population. In addition, we find that the factors that have the greatest impact on HRQL are levels of alcohol consumption and any use of methamphetamine in the past month.

Crack and powdered cocaine did not have significant associations with HRQL on any of the subscales and heroin and HCV status only had significant associations with decreased HRQL on two and three of the eight subscales, respectively. These results suggest that in a population with multiple risk factors, as is typical among out-of-treatment IDUs, certain illicit drugs may have a greater impact than others on HRQL and that HCV may play a less central role in affecting HRQL than in other groups.

The negative impact of alcohol use on all subscales of HRQL is consistent with the findings of other studies. Notable in this study, however, is the fact that alcohol has a more significant effect on HRQL than any of the other reported drugs or infection with hepatitis C. Given its relative affordability as well as greater social acceptability, alcohol may be used more frequently and/or in greater quantities than the other drugs, though we cannot confirm this with our data. In this population, the average number of days used alcohol out of the past 30 (12 days) was nearly the same as the average number of days used heroin (12 days) and crack (11 days). Nonetheless, average number of days used is neither a particularly precise measure nor does it tell us about frequency within a day or quantity used at each episode.

It is also possible that alcohol use is a marker for depression. In the literature, alcohol has consistently been linked with depression although it has not been established whether those who are depressed use alcohol to self-medicate or whether use of alcohol leads to depression (Hasin and Grant, 2002; Haynes et al., 2005; Kuo et al., 2006). Regardless of the causal direction, some of the lowered HRQL functioning scores may be reflecting that alcohol is a central nervous system depressant.

Although methamphetamine use has been associated with a variety of physical and mental health problems, this study is one of the first to demonstrate a negative association between methamphetamine use and HRQL. Despite its stimulating effects, the literature on methamphetamine use indicates that methamphetamine users frequently report high levels of co-occurring psychiatric symptoms, particularly depression (Peck et al., 2005; Sommers et al., 2006; Zweben et al., 2004; Semple et al., 2005). Similar to alcohol, the causal relationship between methamphetamine and depression has not been established (Kalechstein et al., 2000) although it appears that depressive symptoms figure particularly prominently during withdrawal from methamphetamine use (McGregor et al., 2005; Rawson et al., 2002). Methamphetamine use has also been shown to impact a variety of self-reported and objective

physical health measures, which could in turn affect HRQL (Greenwell and Brecht, 2003; Anglin et al., 2001; Alberston et al., 1999).

We were surprised to find that substance abuse treatment is associated with significant decreases in some dimensions of HRQL. This finding is consistent with earlier studies showing that those who are depressed or who have more serious drug dependence may be more likely to seek treatment (Zule and Desmond, 2000; Zule et al., 2003). Substance abuse treatment forces individuals to sever ties with friends and relatives who also use, which is likely to significantly impact patterns of socialization in the short term possibly explaining the gaps in social functioning scores.

Several important caveats accompany these findings. Certain methodological characteristics of our study should be noted. For one, the cross-sectional nature of our data does not allow us to make any causal statements regarding HRQL scores. Second, as noted in the methods section the individuals included in this analytic sample were significantly different in several respects from those who were dropped from the analysis. The differences between these two groups indicate that those who were included in this analysis were more likely to be heavier drinkers and have more substantial histories of substance abuse which may have affected our findings. Nonetheless to the extent that those who were dropped from the sample were more likely to be employed and less likely to be homeless, HCV positive or have a history of prison or substance abuse treatment, the individuals in our analytic sample may be those who are less connected to services and more at risk for poor health and HRQL outcomes.

Finally, we recognize that the R^2 s on our models are relatively small, indicating that there are other factors that we did not control for that affect HRQL in our study population. For instance, we know that a substantial proportion of our study participants has a history of physical or sexual abuse which could contribute to reduced mental health and has been shown to be correlated with decreased HRQL (McDonnell et al., 2005). Nonetheless the models were designed specifically to assess the effects of drug use, alcohol use and HCV status on HRQL such that other explanatory variables were deliberately omitted.

Our findings have notable implications for intervention strategies targeting out-of-treatment IDUs, especially those with HCV. Currently, most harm reduction for IDUs focuses on prevention of new HCV and HIV infections. Yet given that HCV prevalence is already between 45 – 95% in most IDU communities, new harm reduction approaches are needed which focus more broadly on those who may already be living with HCV and are likely to be contending with problem drinking and substance use.

These findings also have important implications for HCV treatment among substance-using out-of-treatment individuals especially in light of the fact that HCV treatment guidelines have only recently been expanded to allow for the treatment of HCV-infected illicit drug users. The fact that HCV is associated with decreases in some dimensions of HRQL in this study population bolsters the argument for HCV treatment being made available to illicit drug users. Yet in a recent study to assess the impact of alcohol use on HCV treatment outcomes, Anand and colleagues (2006) found that alcohol use within the past year was associated with a significantly higher rate of treatment discontinuation and a trend toward a significantly lower sustained viral response rate. Thus to the extent that the high rates of hazardous (18%) and harmful (37%) drinking among this sample of out-of-treatment IDUs are similar in other out-of-treatment substance abusing populations, this would argue against out-of-treatment drug users as being an ideal population for HCV treatment.

Clearly there is a need for interventions targeting reductions in alcohol use among out-of-treatment IDUs. The physical health benefits of alcohol reduction, particularly for those

infected with hepatitis C, are well-established. Research has shown that relatively low amounts of alcohol use (70 grams to 139 grams alcohol/week) in hepatitis C patients have been associated with significantly increased serum HCV RNA levels and increased histological activity (Pessione et al., 1998). In addition, the strong independent association of alcohol use and reduced HRQL in this analysis raises the possibility that reducing alcohol use could be marketed to out-of-treatment at-risk populations as a behavior that is likely to improve not only their physical health but also their quality of life with respect to feelings of well-being, and daily social and physical functioning.

Prospective studies are needed to determine if reductions in alcohol or other illicit drug use lead to improved HRQL. Additional studies also are needed to assess the relative value and salience of HRQL to at-risk populations. If reductions in alcohol or other drug use improve HRQL and the perceived benefits of improved HRQL exceed the perceived benefits of alcohol or drug use, then it will be incumbent upon the public health community to broaden intervention and treatment strategies for substance dependent populations so as to address this population's HRQL concerns.

ACKNOWLEDGEMENTS

The authors would like to thank William Meyer for his helpful comments on the manuscript. This study was supported by grant RO1 DA13763-01A2 from the National Institute on Drug Abuse.

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Table 1

Baseline demographic characteristics of 619 injecting drug users recruited for a Hepatitis C intervention in Raleigh and Durham, NC between July 2003 and January 2006.

	N (%)	Mean (SD)
Average Age		41 (9)
Race		
African-American (non-Hispanic)	393 (63)	
White	167 (27)	
Other	59 (10)	
Gender		
Male	465 (75)	
Female	154 (25)	
Educational Level		
Less than High School	196 (32)	
High School or GED	270 (44)	
More than High School	153 (25)	
Unemployed	446 (72)	
Homeless	234 (38)	
Ever been in Prison	346 (56)	
Ever been in Substance Abuse Treatment	399 (64)	
Ever been Physically or Sexually Abused	202 (33)	
HIV +	41 (7)	
HCV +	318 (51)	

Table 2

Alcohol and other drug use behaviors past 30 days among 619 injecting drug users recruited for a Hepatitis C intervention in Raleigh and Durham, NC.

	N (%)	Mean Days of Use (SD)
Alcohol use		
Any alcohol	451 (72)	12 (12)
Daily alcohol	107 (17)	
Alcohol use classification*		
Not hazardous or harmful drinking* (AUDIT scores < 8)	263 (43)	
Hazardous drinking (AUDIT scores from 8–13)	112 (18)	
Harmful drinking (AUDIT scores > 13)	244 (39)	
Other Drug use		
Daily hard drug use**	390 (63)	
More than one hard drug	532 (86)	
Heroin	511 (82)	12 (13)
Crack	500 (80)	11 (11)
Powdered cocaine	494 (79)	8 (9)
Methamphetamine	74 (12)	1 (5)
Total number of injections		24 (35)
Any direct or indirect sharing of needles or injection equipment	178 (29)	

* The AUDIT classification system is for healthy people. However, lower levels of alcohol use may be harmful for people with chronic HCV infection.

** Hard drugs use defined as use of heroin, crack, powdered cocaine or methamphetamine.

Table 3

Comparison of mean SF-36 "Subscale scores among the U.S. general population to mean scores among 619 injecting drug users recruited for a Hepatitis C intervention in Raleigh and Durham, NC and by study participants' HCV status and drug and alcohol use indicators.

	N	Physical Functioning	Role-Physical	Bodily-Pain	General Health	Vitality	Social Functioning	Role-Emotional	Mental Health
U.S. General Population Mean Scores		83.3 ***	82.5 ***	71.3 ***	70.9 ***	58.3 ***	84.3 ***	87.4 ***	75.0 ***
Study Population Mean Scores		68.9	62.6	56.7	57.6	50.7	58.4	60.8	46.0
HCV									
Negative	303	73.4 ***	66.2 **	59.6 *	61.7 ***	53.2 **	60.3	63.2	46.4
Positive	316	64.4	58.9	53.5	53.5	48.1	56.3	58.3	45.5
Drinking									
Non-Harmful	263	72.9 **	66.4 **	60.5 **	60.3 **	51.5 *	62.4 **	65.0 ***	48.4 **
Hazardous	112	70.4	65.3	59.0	60.3	54.5	60.3	64.1	47.1
Harmful	244	63.4	56.9	50.8	53.2	47.7	52.8	54.5	42.9
Heroin Use past 30 days									
No	106	77.8 **	73.8 ***	62.7 *	60.5	55.7 *	63.9 *	68.2 **	48.9
Yes	513	66.9	60.1	55.2	57.0	49.6	57.2	59.2	45.4
Cocaine Use past 30 days									
No	127	73.5	69.5 **	61.6 *	57.9	50.6	64.3 *	67.2 **	48.4
Yes	492	67.6	60.6	55.2	57.5	50.6	56.8	59.1	45.3
Crack use past 30 days									
No	110	69.5	65.5	60.6	57.7	51.0	64.3 *	64.8	48.8
Yes	509	68.6	61.8	55.6	57.6	50.6	57.0	59.8	45.4
Meth Use past 30 days									
No	545	71.3 ***	64.0 **	58.4 ***	58.4 *	51.6 **	60.0 ***	62.1 **	46.8 **
Yes	74	50.3	52.0	42.7	51.7	43.2	46.1	50.8	39.9
Number of days hard drug use past 30 days									
Zero to 7 days	46	76.2	67.0 *	58.1	59.7	52.4 **	65.2 *	65.0 *	48.9 *
8 - 29 days	132	69.9	68.7	60.5	59.8	55.7	62.7	66.2	48.9
Every day	441	67.7	60.1	55.2	56.7	48.9	56.3	58.6	44.8
Substance Abuse Treatment past 6 months									
Yes	85	62.9	56.3	45.2 ***	54.7	43.6 **	47.4 ***	53.1 *	43.4
No	534	69.7	63.4	58.2	57.9	51.7	60.0	61.9	46.4

^a SF-36 stands for the 36-item short form survey instrument from the Medical Outcomes Study (Stewart & Ware, 1992).

* p < 0.05
 ** p < 0.01
 *** p < 0.001

Table 4

Results of multiple linear regression analyses to test HCV status, AUDIT score and drug use as predictors of SF-36^a subscale score among 619 injecting drug users recruited for a Hepatitis C intervention in Raleigh and Durham, NC while controlling for age, race, sex, and substance abuse treatment.

	Physical functioning ^a	Role physical ^a	Bodily pain ^a	General health ^a	Vitality ^a	Social functioning ^a	Role emotional ^a	Mental health ^a
HCV Positive	-0.11 [*]	-0.07	-0.05	-0.10 [*]	-0.09 [*]	-0.07	-0.07	-0.05
Hazardous drinking - AUDIT score 8-13 ^b	-0.05	-0.03	-0.03	-0.04	0.02	-0.03	-0.02	-0.03
Harmful drinking - AUDIT score >13 ^b	-0.13 ^{**}	-0.13 ^{**}	-0.14 ^{**}	-0.17 ^{**}	-0.11 [*]	-0.14 ^{**}	-0.15 ^{**}	-0.16 ^{***}
Used hard drugs every day past 30 days	0.01	-0.04	-0.01	-0.02	-0.06	-0.04	-0.04	-0.03
Used powdered cocaine past 30 days	-0.02	-0.06	-0.04	-0.001	0.01	-0.05	-0.06	-0.04
Used crack past 30 days	0.04	0.01	-0.01	0.04	0.03	-0.04	-0.01	-0.02
Used heroin past 30 days	-0.08 [*]	-0.10 [*]	-0.05	-0.02	-0.05	-0.03	-0.06	-0.03
Used methamphetamine past 30 days	-0.21 ^{***}	-0.09 [*]	-0.14 ^{***}	-0.08 [*]	-0.10 [*]	-0.12 ^{**}	-0.09 [*]	-0.09 [*]
Control Variables								
Age (years)	-0.15 ^{***}	-0.11 [*]	-0.15 ^{***}	-0.16 ^{***}	-0.02	-0.03	-0.05	0.06
Male	0.11 ^{**}	0.08 [*]	0.14 ^{***}	0.17 ^{***}	0.16 ^{***}	0.15 ^{***}	0.11 ^{**}	0.20 ^{***}
Non-Hispanic white ^c	0.07	0.01	-0.07	-0.19 ^{***}	-0.21 ^{***}	-0.02	-0.0005	-0.10 [*]
In Substance Abuse Treatment during past 6 months	-0.08 [*]	-0.07	-0.11 ^{**}	0.01	-0.03	-0.09 [*]	-0.06	-0.005
R ²	0.14	0.09	0.11	0.13	0.13	0.09	0.07	0.11

^a SF-36 stands for the 36-item short form survey instrument from the Medical Outcomes Study (Stewart & Ware, 1992).

^b compared to respondents who scored 7 or less on the AUDIT

^c compared to African-Americans and other racial groups

* p < 0.05

** p < 0.01

*** p < 0.001