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Perceived risk for severe outcomes and drinking status among drug users with HIV and Hepatitis C Virus (HCV)

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Abstract

Objective—Among drug users with HIV and Hepatitis C Virus (HCV) infections, heavy drinking can pose significant risks to health. Yet many drug users with HIV and HCV drink heavily. Clarifying the relationship of drug-using patients' understanding of their illnesses to their drinking behavior could facilitate more effective intervention with these high-risk groups.

Method—Among samples of drug users infected with HIV (n=476; 70% male) and HCV (n=1145; 81% male) recruited from drug treatment clinics, we investigated whether patients' perceptions of the risk for severe outcomes related to HIV and HCV were associated with their personal drinking behavior, using generalized logit models. Interactions with co-infection status were also explored.

Results—HIV-infected drug users who believed that HIV held highest risk for serious outcomes were the most likely to be risky drinkers, when compared with those with less severe perceptions, $\chi^2(6)=14.19$, $p<0.05$. In contrast, HCV-infected drug users who believed that HCV held moderate risk for serious outcomes were the most likely to be risky drinkers, $\chi^2(6)=12.98$, $p<0.05$.

Conclusions—In this sample of drug users, risky drinking was most common among those with HIV who believed that severe outcomes were inevitable, suggesting that conveying the message that HIV always leads to severe outcomes may be counterproductive in decreasing risky drinking

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in this group. However, risky drinking was most common among those with HCV who believed that severe outcomes were somewhat likely. Further research is needed to understand the mechanisms of these associations.

Keywords

HIV; Hepatitis C; Alcohol; Drinking; Severity; Perceived Risk

1. Introduction

Drug-using individuals face many health risks, including HIV and Hepatitis C Virus (HCV)¹ (Degenhardt, Hall, Warner-Smith, & Lynskey, 2004) infections. Although heavy drinking can compromise liver health in any population, the potential for liver-related morbidity and mortality is already elevated in those with HIV (Barve et al., 2010) and HCV (National Medical Association, 2015), making heavy drinking more likely to be harmful for drug users with these infections. To mitigate alcohol-related harm among drug users with HIV and/or HCV, alcohol interventions are needed that are relevant and efficacious for these populations. In order to develop such interventions, understanding the factors underlying heavy drinking in these groups is important. Yet, currently, little is known about the relation between HIV- and HCV-infected drug users' perceptions about their health conditions and their drinking behavior. Patients' perceptions regarding the severity of their disease, including their perceived risk for poor outcomes associated with the disease, may be particularly relevant to engagement in heavy drinking. The idea that perceived severity may motivate reduced drinking is consistent with the Health Belief Model, which proposes that recognizing the severity of a health concern is a necessary (but not sufficient) antecedent to health behavior change (Rosenstock, 1974). However, the reverse may also be true, such that those who find their condition more severe or hopeless may be more likely to engage in risky behaviors such as drinking without restraint because they perceive themselves to have poor control over their health outcome.

Associations between perceptions about disease severity with engagement in health behaviors have been studied since early in the HIV epidemic, primarily in the context of predicting HIV testing and risk reduction among those uninfected. Some such studies have shown support for the predictive utility of perceived HIV severity in predicting HIV preventive behaviors (Rosenstock, Strecher, & Becker, 1994). Relatedly, as many who become infected with HIV continue to perceive HIV as a severe infection (Gao, Nau, Rosenbluth, Scott, & Woodward, 2000; Wutoh et al., 2005), perceived severity has also been used to understand engagement in health maintenance behaviors among those already infected with HIV. For example, perceived severity has been used to predict medication adherence, with mixed results (Aversa & Kimberlin, 1996; Gao et al., 2000; Holstad, Pace, De, & Ura, 2006).

In addition to the HIV population, perceived severity and its link to health maintenance behaviors have also been studied among patients with HCV, as many patients infected with

¹HCV = Hepatitis C Virus

HCV also perceive HCV to be a serious health condition (Constant et al., 2005), although less severe than AIDS (Castera, Constant, Bernard, de Ledinghen, & Couzigou, 2006b). Although perceived severity of hepatic disease did not predict engagement in antiviral therapy among Hepatitis B and C patients in one study (Chen, Liu, & Perng, 2013), other studies found perceived HCV severity to relate to clinic retention (Lu, Huang, & Chu, 2010) and lifestyle changes (e.g., changes in diet and sexual behavior) (Castera, Constant, Bernard, de Ledinghen, & Couzigou, 2006a) among individuals with HCV. The associations between perceived HCV severity and lifestyle changes in particular suggests that perceived HCV severity may also be useful in predicting heavy drinking among HCV patients. However, to our knowledge, no studies have addressed the association of perceived disease severity with drinking in either HCV or HIV populations, despite increasing recognition of alcohol's detrimental effects on the health of these groups (American Association for the Study of Liver Diseases and the Infectious Diseases Society of America, 2014; Bryant, Nelson, Braithwaite, & Roach, 2010). Further, whether co-infection with both HIV and HCV moderates the associations between disease perceptions and drinking behavior is also unknown but important to study, as co-infected patients face the individual and interactive risks of drinking associated with both infections, and thus face a poorer prognosis, made much worse by heavy drinking. Moderation analyses could indicate whether having this common and serious comorbidity affects the associations between disease perceptions and risky drinking.

To address these gaps in the literature, we examined the associations between perceptions regarding the risk for serious outcomes due to HIV and HCV with recent alcohol consumption in a large, cross-sectional study of drug users recruited from detoxification and methadone maintenance programs. Specifically, we investigated whether HIV-infected drug users' perceptions about how often HIV leads to serious outcomes were associated with whether these individuals abstained, drank moderately, or drank heavily. We also investigated whether HCV-infected drug users' perceptions about how often HCV leads to serious outcomes were associated with whether these individuals abstained, drank moderately, or drank heavily. Finally, within both samples, we explored HIV/HCV co-infection status as a potential moderator of the association between perceived risk for serious outcomes and drinking behavior.

2. Material and Methods

2.1 Participants

Participants were recruited from detoxification and methadone maintenance programs in New York City between 2005-2013 for an ongoing, large, serial cross-sectional study of HIV risk factors in drug users (Des Jarlais, Arasteh, & Friedman, 2011). Inclusion criteria for the larger study required participants to have reported use of heroin, cocaine, and/or amphetamines within the past six months (Des Jarlais, McKnight, Arasteh, Feelemyer, Perlman, Hagan, Dauria, et al., 2014). After providing informed consent, all participants completed face-to-face interviews and had blood tests to determine HIV and HCV infection status, as described previously (Des Jarlais, McKnight, Arasteh, Feelemyer, Perlman, Hagan,

& Cooper, 2014). The study was approved by the Institutional Review Board at Beth Israel Medical Center.

For the current study, we analyzed two subsamples. First, we analyzed 476 drug users who tested positive for HIV, and who responded to items about perceived risk for serious outcomes related to HIV and about drinking. Second, we analyzed 1145 drug users who tested positive for HCV, and who responded to items about perceived risk for serious outcomes related to HCV and about drinking.

2.2 Measures

Perceived risk for severe outcomes related to HIV/HCV. All patients with HIV were asked: “How many people who have the HIV virus do you think will become seriously ill?” Similarly, all patients with HCV were asked: “What percent of people who have hepatitis C do you think will become seriously ill?” Response options for both items were: None, A few (1-25%), About half (26-74%), Most (75-99%), or All. Responses were treated as categorical.

2.2.1 Alcohol consumption status—Participants were asked to report on their typical weekly consumption of beer, wine, and hard liquor in the past six months. Each beverage type was assessed separately, and participants were asked to report their number of drinks in a typical week. The values were then summed to yield total drinks in a typical week. Consistent with prior research using this sample (Arasteh & Des Jarlais, 2009; Arasteh, Des Jarlais, & Perlis, 2008), these responses were used to categorize participants as abstainers (no drinks in a typical week), moderate drinkers (one or more drinks per week but below risky drinking thresholds), or risky drinkers (more than fourteen drinks per week for men; more than seven drinks per week for women), consistent with published guidelines from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (National Institute on Alcohol Abuse and Alcoholism, 2015).

2.3 Analysis Plan

Descriptive information was first generated. Then, generalized logit models were conducted to determine the relationships between perceived risk for severe outcomes related to HIV/HCV and the three-level drinking outcome (abstainer, moderate drinker, risky drinker) in the HIV and HCV subsamples. These analyses used Proc Logistic, with glogit specification, in SAS version 9.3 (SAS Institute Inc, 2011). Specifically, in the HIV subsample, we investigated the association between perceived risk for severe outcomes related to HIV and drinking category, controlled for age, sex, race, education, and lifetime injection drug use status. An exploratory interaction analysis was then conducted to investigate whether this association was moderated by HCV co-infection status. Then, in the HCV subsample, we investigated the association between perceived risk for serious outcomes related to HCV and drinking category, also controlling for age, sex, race, education, and lifetime injection drug use status. An exploratory interaction analysis was conducted to investigate whether this association was moderated by HIV co-infection status. For significant main effects (evidenced by significant Wald chi square values in the generalized logit models), the odds ratios of being a moderate drinker or risky drinker (as

opposed to an abstainer) were examined for the different severity groups (using the most extreme severity group as the reference group).

3. Results

3.1 Descriptive information

Descriptive information for the HIV- and HCV-infected subsamples is presented in Table 1. In each sample, participants were mostly male, minority, in middle adulthood, and with less than a high school education. There were substantial levels of co-infection of HIV and HCV. Among drug users in each sample, most believed that severe outcomes were moderately likely, while very few believed that none would have serious outcomes. Due to the very small number of participants who perceived no risk of serious HIV or HCV outcomes, this category was combined with the category “A few” for both variables in all analyses. In both HIV and HCV samples, most drug users either abstained from alcohol or drank at risky levels, with fewer moderate drinkers.

3.2 HIV sample

Among drug users infected with HIV, perceived risk for serious outcomes was associated with drinking category, $\chi^2(6)=14.19$, $p<0.05$. Visual examination of the data suggested that those who believed all would get sick evidenced the most risky drinking patterns (Figure 1). This group was therefore used as a reference group for between-group comparisons. Compared to those who believed that all would become ill, the other groups did not differ in their likelihood of being a moderate drinker instead of an abstainer (Odds Ratios [ORs] 0.38-0.63, non-significant; see Table 2). However, compared with those who believed that all would become ill, the other groups were significantly less likely to be risky drinkers than abstainers (ORs=0.24-0.42, $ps<0.05$, see Table 2). The association between perceived risk for serious outcomes and drinking category did not differ between HIV mono-infected and HIV/HCV co-infected patients, $\chi^2(6)=2.94$, $p=0.82$.

3.3 HCV sample

Among drug users with HCV, perceived risk for serious outcomes was associated with drinking category, $\chi^2(6)=12.98$, $p<0.05$. Visual examination of the data suggested that those who thought none or a few would have severe HCV outcomes had the least risky drinking patterns (Figure 2). This group was therefore used as the reference group for between-group comparisons. When compared with the group who thought none or a few would have severe HCV outcomes, the other groups did not differ in their likelihood of being a moderate drinker rather than an abstainer (ORs= 0.56-1.07, non-significant; see Table 3). However, when compared with those who thought that none or a few would have severe HCV outcomes, those who thought that about half would have such outcomes were more likely to be risky drinkers (OR=1.56, 95% CI = 1.16, 2.10, $p<0.01$). The association between perceived risk for serious outcomes and drinking category did not differ between HCV mono-infected and HIV/HCV co-infected drug users, $\chi^2(6)=7.70$, $p=0.26$.

4. Discussion

4.1 Discussion of study findings

In our HIV-infected drug-using sample, the belief that HIV inevitably leads to severe outcomes was associated with the most risky drinking. However, in our HCV-infected drug using sample, those who believed that about half of those with HCV would have severe outcomes had the highest level of risky drinking. To our knowledge, this study is the first to examine the relation between perceived risk for severe outcomes related to HIV and HCV and alcohol consumption among drug users with these infections.

Results differed by type of alcohol involvement (moderate drinking versus risky drinking) and by population (HIV versus HCV). The nuanced nature of these findings is not surprising given conflicting findings on the importance of severity perceptions to health behaviors in prior HIV (Aversa & Kimberlin, 1996; Gao et al., 2000; Holstad et al., 2006) and HCV (Castera et al., 2006a; Chen et al., 2013; Lu et al., 2010) studies. However, the associations between perceived risk for serious outcomes and drinking level were significant for both HIV- and HCV- infected samples, suggesting that this perception is relevant to drinking in these samples, despite a recent review claiming that severity may not be a useful component of the Health Belief Model (Carpenter, 2010).

Our results suggest that, in drug users with HIV, belief that a serious outcome is inevitable is associated with risky drinking behaviors, perhaps due to belief that personal engagement in health behaviors would be futile in resisting the course of an inevitable disease. This may also suggest that HIV patients who know that HIV is serious may not recognize the potential detrimental impact of alcohol on their disease progression, and may drink to cope with their disease or in an attempt to enjoy their remaining health. If true, this could indicate a need to improve provider communication or to better understand patient acceptance of information about alcohol. Yet, in the HCV-infected sample, those who believed that about half would have severe outcomes had the highest level of risky drinking. Why HCV-infected individuals with moderate perceived risk were most likely to drink at risky levels is somewhat surprising, as moderate risk perceptions could be theorized to be the most adaptive (as they mix some optimism with realistic acknowledgment of the potential for poor outcomes). HCV patients who were most convinced of the potential for severe illness (i.e., those who believe all will become ill) did not evidence the highest likelihood of risky drinking (as was true for HIV), perhaps because they recognized and attempted to avoid further detrimental effects of heavy drinking. Yet, those with HCV who thought that none or a few would become ill evidenced the least risky drinking patterns. Perhaps these more optimistic patients believed that lifestyle factors such as reducing heavy drinking could help many patients avoid severe illness. It is worth noting that, across samples, the groups with the highest levels of alcohol use had the most accurate perceptions of HIV and HCV disease risk. In the absence of treatment, essentially all persons with HIV infection will develop serious illness, and, again, in the absence of treatment, only a modest percentage of persons with HCV infection will develop serious disease. Our findings that having the most accurate information about developing serious illness for both HIV and HCV are associated with the most risky drinking suggests that possession of accurate disease information alone does not

lead to maximizing pro-health behaviors, and more intervention than simple education about their condition is needed. Better understanding of the reasons for different patterns of results between HIV and HCV patients requires further study, perhaps using qualitative methods such as interviewing HIV and HCV patients with different risk perceptions about their attitudes toward drinking.

This study is subject to certain limitations. First, all data were collected at substance use clinics in New York City, requiring additional study elsewhere before conclusions can be generalized to different geographical areas, and rural/suburban environments. Second, results are cross-sectional, limiting causal inference about whether perceptions lead to drinking, or vice versa. Although individuals seem likely to alter their drinking behavior according to their perceptions about their disease, the possibility also exists that patients may alter their reported beliefs to be consistent with their behavior (Festinger, 1957; Heshmat, 2015; Littrell, 1991; Miller, 2015). Third, disease perceptions were assessed with single questions. Multi-item measures may have produced more information, but were not available in this dataset. Given that we are aware of no previous studies to date that have investigated the association between perceived risk for severe outcome and drinking in HIV- and HCV-infected drug users, this study provides important initial findings in need of further research. Fourth, alcohol use was self-reported, and thus may be subject to under-reporting. However, self-report of drinking is used frequently and generally considered valid (Del Boca & Darkes, 2003; Del Boca & Noll, 2000). Also related to alcohol measurement, alcohol use was measured on a weekly basis, precluding study of more specific measures of drinks per occasion, frequency, and binge drinking; however, this measure has been validated through demonstrations of expected associations with HIV sexual risk behaviors in previous research (Arasteh et al., 2008). Nonetheless, future research should include more comprehensive assessment of drinking. Finally, although it would have been preferable to use the same reference group in HIV and HCV analyses, use of different reference groups was necessary in order to distinguish the patterns of findings and reduce the chances of type II error. If future data are conducive to using consistent reference groups, this may yield results that are more easily comparable between groups. Despite these limitations, the study demonstrates several strengths, including the importance of studying factors underlying heavy drinking among HIV- and HCV-infected drug users, the large sizes of our subsamples, and our consideration of possible differing associations between mono-infected and co-infected patients.

4.2 Conclusions

This study demonstrates that, in samples of drug users with HIV and HCV, perceived risk of severe HIV or HCV outcomes was related to level of alcohol consumption. Drinking was most risky among HIV-infected drug users who believed that all would have serious HIV outcomes, and among HCV-infected drug users who believed that about half would have severe HCV outcomes. Our findings suggest that, when attempting to intervene with the drinking of HIV-infected drug users, conveying the message that HIV always leads to severe outcomes may be counterproductive in producing initiative to decrease risky drinking if such beliefs lead to feelings of the inevitability of illness and lack of personal autonomy to change their course. A more promising approach may be to acknowledge the challenges

faced while also inspiring hopefulness about the potential for more positive outcomes, bringing attention to their personal behavior as an important determinant in their health. To the extent that heavy drinking among HIV patients who perceive the disease as severe is due to inadequate understanding of the dangers of alcohol, clear and consistent messaging from providers about alcohol-related risks may decrease risky drinking in this group. Regarding the findings for HCV, additional qualitative research to understand the reason that those with moderate risk perceptions drank most heavily could better inform the specific treatment approach needed. Additional research in these areas could further elucidate the patient motivations behind these associations, further clarifying the reasons for heavy drinking among HIV and HCV-infected patients.

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Highlights

- We investigated HIV/HCV disease perceptions and heavy drinking in drug users.
- Drug users with HIV who think severe disease is inevitable drank most heavily.
- Drug users with HCV who think severe disease is moderately likely drank most heavily.

Figure 1. Perceptions regarding risk for severe illness by drinking category among drug users with HIV (Unadjusted proportions).

Figure 2. Perceptions regarding risk for severe illness by drinking category among drug users with Hepatitis C Virus (HCV) (Unadjusted proportions).

Table 1

Descriptive information for HIV and Hepatitis C Virus (HCV) infected subsamples.

	Individuals with HIV (n=476)	Individuals with HCV (n=1145)
	M (s.d.)	M (s.d.)
Age	43.95 (7.38)	43.13 (9.31)
Years of education	11.09 (2.12)	11.10 (2.20)
	%	%
Gender		
Male	69.75%	81.05%
Female	29.41%	18.60%
Transgender	0.84%	0.35%
Ethnicity		
Black	59.45%	27.86%
Latino/Latina	32.56%	47.16%
White	6.30%	22.27%
Other	1.68%	2.71%
Lifetime injection drug use status		
Positive	35.71%	79.74%
HIV/HCV co-infection status		
Positive	43.80%	15.94%
Perceived risk for severe illness ^a		
None will become seriously ill	3.36%	1.27%
A few (1-25%) will become seriously ill	27.29%	34.39%
About half (26-74%) will become seriously ill	30.87%	41.18%
Most (75-99%) will become seriously ill	20.81%	16.56%
All will become seriously ill	17.67%	6.61%
Drinking status		
Abstainer	28.99%	48.03%
Moderate Drinker	11.97%	8.65%
Risky Drinker	59.03%	43.32%

Note.

^aGroups were those who responded: None, A few (1-25%), About half (26-74%), Most (75-99%), or All to the questions “How many people who have the HIV virus do you think will become seriously ill?” (for HIV patients) or “What percent of people who have hepatitis C do you think will become seriously ill?” (for HCV patients).

Table 2

Odds ratios: Likelihood of being a moderate drinker or risky drinker (as opposed to an abstainer) for HIV patients with different views on the risk for severe illness associated with HIV.

	Adjusted Odds Ratio	95% Confidence Interval	p-value
Moderate Drinker (vs. Abstainer)			
None/A few vs. All ^a	0.626	0.212, 1.849	0.40
About half vs. All ^a	0.377	0.124, 1.146	0.09
Most vs. All ^a	0.456	0.133, 1.559	0.21
Risky Drinker (vs. Abstainer)			
None/A few vs. All ^a	0.318	0.141, 0.713	<0.01 *
About half vs. All ^a	0.243	0.108, 0.546	<0.001 *
Most vs. All ^a	0.422	0.180, 0.990	0.047 *

Note.

* Indicates significance at $p < 0.05$. Odds ratios are adjusted for age, sex, race, education, and lifetime injection drug use status.

^a Groups were those who responded: None or A few (1-25%), About half (26-74%), Most (75-99%), or All to the question "How many people who have the HIV virus do you think will become seriously ill?"

Table 3

Odds ratios: Likelihood of being a moderate drinker or risky drinker (as opposed to an abstainer) for HCV patients with different views on the risk for severe illness associated with HCV.

	Adjusted Odds Ratio	95% Confidence Interval	p-value
Moderate Drinker (vs. Abstainer)			
About half vs. None/A few ^a	1.072	0.657, 1.746	0.78
Most vs. None/A few ^a	0.555	0.256, 1.203	0.14
All vs. None/A few ^a	0.704	0.232, 2.131	0.53
Risky Drinker (vs. Abstainer)			
About half vs. None/A few ^a	1.559	1.156, 2.102	<0.01 *
Most vs. None/A few ^a	1.378	0.942, 2.016	0.099
All vs. None/A few ^a	1.456	0.847, 2.501	0.17

Note.

* Indicates significance at $p < 0.05$. Odds ratios are adjusted for age, sex, race, education, and lifetime injection drug use status.

^a Groups were those who responded: None or A few (1-25%), About half (26-74%), Most (75-99%), or All to the question "What percent of people who have hepatitis C do you think will become seriously ill?"