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Drinking despite health problems among individuals with liver disease across the United States

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Abstract

Background—Heavy drinking is harmful for individuals with liver disease. However, some of these individuals drink despite knowledge of the risks. The current study aims to identify factors underlying drinking despite health problems among individuals with liver disease.

Methods—The current study utilizes a subsample of individuals reporting past-year liver disease and at least one drink in the past year ($n=331$), taken from the National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III), a large nationally representative survey of the United States. Participants reported on drinking despite health problems, symptoms of psychopathology, and family history of alcohol problems in a cross-sectional survey.

Results—Drug use disorders (Adjusted Odds Ratio [AOR] = 2.68), as well as borderline, antisocial, and schizotypal personality disorders (AORs = 2.50–4.10), were associated with increased likelihood of drinking despite health problems among individuals with liver disease, all $p < 0.05$. Any anxiety disorder trended toward significance (AOR = 2.22), $p = 0.06$, but major depressive disorder was not associated with increased risk, (AOR = 0.99), $p = 0.97$. Individuals with a family history of alcohol problems were also more likely to drink despite health problems (AOR = 2.79), $p < 0.05$.

Conclusions—Several types of psychopathology, as well as a family history of alcohol problems, increased the likelihood of drinking despite health problems among individuals with

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Conflict of Interest

No conflict declared

Contributors

JCE led the planning of analyses, and drafted and finalized the manuscript. MS conducted the analyses. DSH contributed to the planning, interpretation, and editing of the manuscript. All authors approve of the submission of this final manuscript.

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liver disease. These findings highlight the need to intervene with heavily drinking individuals with liver disease, who may be drinking due to familial risk and/or comorbid psychopathology.

Keywords

Liver; alcohol; drinking; NESARC; nationally representative; health problems

1. Introduction

Heavy alcohol use can contribute to the development of liver damage (Szabo and Mandrekar, 2016) and can worsen liver damage among those whose liver disease stems from other causes, such as hepatitis C virus infection (American Association for the Study of Liver Diseases and the Infectious Diseases Society of America, 2014). Individuals with liver disease commonly acknowledge that drinking is harmful (Burnham et al., 2014; Flores et al., 2012), suggesting that many individuals with liver disease who drink heavily do so despite knowledge of the danger. Drinking despite awareness of physical harm is clearly problematic and self-damaging, as reflected by the inclusion of this behavior as a criterion for alcohol use disorder in the Diagnostic and Statistical Manual of Mental Disorders–Fifth Edition (DSM- 5): “Alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol” (American Psychiatric Association, 2013). Understanding what leads individuals with medical problems, particularly liver disease, to engage in drinking despite health problems is important, in order to more effectively intervene with this behavior. This topic therefore requires specific study.

It is known that many types of psychopathology (Grant et al., 2015a), as well as a family history of alcohol problems (National Institute on Alcohol Abuse and Alcoholism, 2016), are associated with higher likelihood of alcohol use disorders, and some research shows that continued use despite physical/ psychological problems forms a cohesive factor with other alcohol use disorder symptoms and performs similarly psychometrically to these other symptoms in item response theory analysis (Hasin et al., 2013). These studies might suggest that psychopathology and family history factors underlying alcohol use disorders may also underlie drinking despite health problems in particular. However, other studies suggest that endorsement of this symptom may represent a more *severe* manifestation of alcohol use disorder. One study of national data found that drinking despite problems (including physical/psychological, legal, or social problems) was one of the symptom clusters most robustly associated with heavy and binge drinking (particularly when compared with tolerance and withdrawal clusters) (Dawson et al., 1995), and a second study found drinking despite health problems specifically to be one of the defining features of the most severely affected group of alcoholics in a latent class analysis (Bucholz et al., 1996). Another study, on recovery, found drinking despite health problems to be strongly related to the persistence of alcohol dependence (Gilder et al., 2008). These studies suggest that this item may differ in severity from other alcohol use disorder symptoms, and thus may also differ in its relation to other factors. Given that this symptom involves a behavior with clear medical repercussions, it warrants specific study, particularly in high-risk medical groups such as

individuals with liver disease. However, no studies known to the authors have attempted to identify factors underlying this behavior among individuals with a range of liver diseases.

The current study examines psychopathological and family history factors in their relation to drinking despite health problems in a sample of individuals with liver disease. In the past, such variables have shown associations with drinking specifically after liver transplantation (Rustad et al., 2015). In this investigation, we address drinking despite health problems more broadly, among individuals with liver disease more generally. These associations are examined using a large, nationally representative sample of adults in the United States who reported liver disease in the past year.

2. Material and methods

2.1 Participants and procedures

The National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III) is a nationally representative in-person interview study of 36,309 adults age 18 and older, residing in households and selected group quarters (Grant et al., 2014; Grant et al., 2015a). Data collection occurred in 2012–2013. Participants were selected through multistage probability sampling, involving sampling counties or groups of contiguous counties (primary sampling units), groups of Census-defined blocks within these counties (secondary sampling units), and households within these groups (tertiary sampling units). Eligible adult respondents were selected from these households, with Hispanic, Black and Asian individuals oversampled. The household response rate was 72%, and the person-level response rate was 84%, yielding an overall response rate of 60.1%. Data were adjusted for nonresponse and weighted to represent the U.S. civilian population based on the 2012 American Community Survey (Bureau of the Census, 2013). All respondents provided informed consent, and the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and Westat Institutional Review Boards approved all study procedures.

Within the NESARC-III dataset, we restricted our sample to those reporting both (a) any liver disease in the past year and (b) at least one drink in the past year. Regarding the liver disease specification, all participants were asked to report whether they experienced certain medical problems in the past 12 months, including cirrhosis of the liver, liver cancer, and any other form of liver disease. These categories were collapsed, yielding a sample reporting any liver disease in the past 12 months. A single liver disease category was created to maintain homogeneity in affected organ and danger of alcohol, while still maximizing sample size. Regarding the past-year drinking specification, only past-year drinkers had data available on past-year drinking despite health problems. The exclusion of past-year abstainers from this analysis avoids possible confounding from previous abstinence-focused treatments (such as Alcoholics Anonymous), and excludes individuals whose religious or moral upbringing prohibits any alcohol involvement, providing an estimation of effects free of the influence of these potentially confounding variables.

2.2 Measures

The NESARC-III utilized the NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule-5 (AUDADIS-5), a computer-assisted interview that assesses alcohol and drug use; alcohol, drug and psychiatric disorders; functioning; and selected medical conditions and use of medical services. All psychiatric and substance use disorders were assessed according to the DSM-5 (American Psychiatric Association, 2013).

2.2.1 Demographics—Participants reported gender (male or female), ethnicity (categorized as White non-Hispanic, Black non-Hispanic, any other race non-Hispanic, or Hispanic), age (four categories: 18–29, 30–39, 40–49, and 50+), and education (less than high-school, high school graduate, or some college or higher).

2.2.2 Alcohol use—Participants reported on their typical and maximum drinking quantity, as well as their typical drinking frequency and binge drinking frequency, in the past 12 months. Quantity items were reported in number of standard drinks; frequencies were reported using eleven-point scales ranging from every day to never in the last year.

2.2.3 Alcohol use disorder—Alcohol use disorder (AUD) symptoms were assessed using the AUDADIS-5. Consistent with the DSM-5, two or more symptoms were required to meet criteria for AUD. The AUDADIS-5 AUD diagnosis has demonstrated good reliability ($K=0.62$; $ICC=0.85$) (Grant et al., 2015b) and validity ($K=0.62$; $ICC=0.85$) (Hasin et al., 2015a).

2.2.4 Drinking despite a health problem—The AUD criterion addressing drinking despite health problems was evaluated individually, as our primary outcome. Specifically, participants were asked: “In your entire life, did you EVER...Continue to drink even though you knew it was causing you a health problem or making a health problem worse?” Participants responded “yes” or “no.” Those who reported “yes” were asked “Did this happen in the last 12 months?,” and again given response options of “yes” or “no.” A past-year timeframe was used for the drinking despite health problems variable in the current analyses, to maintain consistency with past-year assessment of liver disease.

2.2.5 Other mental health disorders—Participants were assessed for cannabis, cocaine, stimulant, sedative/tranquilizer, hallucinogen, inhalant/solvent, club drug, opioid, and heroin use disorders, summarized as any drug use disorder; major depressive disorder; panic disorder, social phobia, specific phobia, and generalized anxiety disorder, summarized as any anxiety disorder; and schizotypal, borderline, and antisocial personality disorders, considered separately. Certain disorders were collapsed, as indicated (i.e., any drug use disorder; any anxiety disorder) to enhance power, and due to lack of hypotheses regarding differences between specific diagnoses. Personality disorders were considered separately, given conflicting research, with some suggesting that borderline, antisocial, and schizotypal all significantly relate to persistent alcohol dependence (Hasin et al., 2011), and newer research suggesting that schizotypal personality disorder demonstrates a weaker and nonsignificant association with alcohol use disorder in the NESARC-III (Grant et al., 2015a). Past-year timeframes were used for drug, depressive, and anxiety disorders, in order

to match the timeframe for assessment of liver disease and drinking despite health problems; however, only lifetime data were available for personality disorders. Test-retest reliability of binary AUDADIS-5 diagnoses for these disorders has been fair ($\kappa=0.40\text{--}0.54$) (Grant et al., 2015b), as has validity when compared to semi-structured clinical assessments ($\kappa=0.22\text{--}0.66$) (Hasin et al., 2015a; Hasin et al., 2015b). Reliability and validity have generally been higher with dimensional representations of the disorders (reliability: Intra-class correlations [ICC]=0.45–0.80 (Grant et al., 2015b); validity: ICC = 0.19–0.91 (Hasin et al., 2015a; Hasin et al., 2015b)).

2.2.6 Family history—Participants reported whether a range of family members had a history of being an alcoholic or problem drinker. For the current definition, family history was considered positive when such a history was reported for any biological parent and/or sibling.

2.3 Analysis Plan

First, basic descriptive information was summarized for the sample (demographics, liver disease type, drinking despite health problems). Second, individuals who did versus did not endorse drinking despite health problems were compared regarding prevalence of AUD and level of alcohol consumption, as a validity check to confirm that this symptom indicates problematic drinking. Chi-square tests and t-tests were used for these analyses. Third, demographic (age, sex, race, education) factors underlying drinking despite health problems were evaluated using logistic regressions; odds ratios (ORs), 95% confidence intervals (95% CIs), and p-values are presented. Fourth, mental health disorders (drug use disorder; major depressive disorder; any anxiety disorder; and borderline, schizotypal, and antisocial personality disorders), and family history of alcohol problems, were evaluated for their associations with drinking despite health problems. These analyses were conducted using logistic regressions, both with and without control for demographic (age, sex, race, education) covariates. Results are presented using ORs, adjusted odds ratios (AORs), 95% CIs, and p-values. All analyses were performed in SUDAAN software (RTI International, Research Triangle Park, North Carolina), which properly adjusts standard errors for the complex survey design through the use of Taylor series linearization.

3. Results

3.1 Descriptive characteristics

In this liver disease sample, participants were primarily male (52.6%), and white (67.5%), with an average age of 51.3 (s.e. =1.04; range: 18–88; 56.7% age 50 or older); the majority had at least some college education (60.5%) (Table 1). Of these respondents, 28.2% had cirrhosis, 5.6% had liver cancer, 2.1% had both cirrhosis and liver cancer, and 64.2% had any other form of liver disease (Table 1). A significant minority, 20.6%, reported drinking despite health problems in the past year.

3.2 Drinking despite health problems and alcohol involvement

All results supported the validity of the drinking despite health problems variable (Table 2). Specifically, nearly all liver disease individuals who reported drinking despite health

problems met criteria for AUD (97%), as compared with only one in ten (10.5%) individuals who did not endorse this item, $p<0.0001$. Drinking quantity was higher among those who reported drinking despite health problems than among those who did not, $p<0.0001$, as was maximum amount consumed, $p<0.0001$. Similarly, those who reported drinking despite health problems reported drinking more frequently, $p<0.0001$, and binge drinking more frequently, $p<0.0001$.

3.3 Demographic factors underlying drinking despite health problems

None of the demographic characteristics were associated with drinking despite health problems ($ps>0.05$) (Table 3).

3.4 Mental health and family history factors underlying drinking despite health problems

For analyses of mental health and family history factors underlying drinking despite health problems, see Table 4. A past-year drug use disorder was associated with greater likelihood of drinking despite health problems (OR=2.78 [95% CI: 1.36–5.66]), an association that remained significant with control for demographic covariates (AOR=2.68 [95% CI: 1.24–5.78]), $ps<0.05$. Major depressive disorder was not associated with drinking despite health problems in either uncontrolled (OR=1.04 [95% CI: 0.49–2.20]) or controlled (AOR=0.99 [95% CI: 0.44–2.21]) models, $ps>0.90$, and any anxiety disorder was only marginally associated with increased likelihood in uncontrolled (OR=1.90 [95% CI: 0.95–3.80]), $p=0.069$, and controlled (AOR=2.22 [95% CI: 0.97–5.06]), $p=0.057$, models. All personality disorders were associated with increased likelihood of drinking despite health problems. Borderline personality disorder evidenced the largest odds ratios of any specific personality disorder in both sets of analyses (OR=4.04 [95% CI: 2.08–7.82]; AOR=4.10 [95% CI: 1.95–8.63]; $ps<0.001$), followed by antisocial (OR=3.72 [95% CI: 1.65–8.35]; AOR=3.39 [95% CI: 1.47–7.83]; $ps<0.01$), and finally schizotypal (OR=2.67 [95% CI: 1.15–6.20]; AOR=2.50 [95% CI: 1.11–5.62]; $ps<0.05$). Family history was also associated with increased drinking despite health problems in both uncontrolled (OR=2.94 [95% CI: 1.40–6.14]) and controlled (AOR=2.79 [95% CI: 1.28–6.06]) models, $p<0.05$.

4. Discussion

The current study suggests that, among individuals with liver disease, those with comorbid mental health disorders, particularly drug use disorders and personality disorders, were more likely to drink despite health problems. Those with anxiety disorders were marginally more likely to drink despite such problems, but surprisingly, major depressive disorder evidenced no effect. Individuals with a family history of alcohol problems were also more likely than their non-affected peers to engage in this risky behavior. Demographic variables did not relate to drinking despite health problems or alter mental health or family history effects when included as control covariates.

The findings that psychopathology and family history relate to drinking despite health problems among individuals with liver disease are consistent with the literature on drinking after liver transplantation (Rustad et al., 2015), but this study is novel in that it addresses individuals with varied liver diseases in the general population. These associations are also

consistent with the broader literature demonstrating that psychopathology (Grant et al., 2015a) and family history (National Institute on Alcohol Abuse and Alcoholism, 2016) are associated with alcohol use disorder in the general population. However, the specific types of psychopathology that related to this behavior in the current study varied slightly from the types of psychopathology found to relate to alcohol use disorder more generally. Many similarities exist: any drug use disorder, antisocial personality disorder, and borderline personality disorder relate to both alcohol use disorder generally and to this symptom in particular, with any anxiety disorder demonstrating marginal effects for both (Grant et al., 2015a). However, major depressive disorder has been found to be associated with alcohol use disorder generally, but was not associated with drinking despite health problems in this liver-disease sample, and schizotypal personality disorder was associated with drinking despite health problems in our liver disease sample but was not found to underlie alcohol use disorder in the general population (Grant et al., 2015a). Taken together, these findings suggest that externalizing disorders may be the most robust factors underlying both disordered drinking and drinking despite health problems, and that schizotypal disorder may evidence some unique utility for understanding drinking despite health problems among individuals with liver disease (perhaps due to a disconnect from reality that disrupts one's ability to evaluate risks).

The current study is subject to certain limitations. First, cirrhosis, liver cancer, and other liver disease were collapsed. Although this limits our ability to discern possible differential patterns between the different conditions, sample sizes did not allow for their individual consideration, and the combined sample was consistent in the affected organ and the relevance of avoiding alcohol. Second, past-year abstainers were omitted, which restricted our sample size as well as the variability in our drinking variables. However, only past-year drinkers had data on drinking despite health problems. This restricted sample also avoids the confounding of past abstinence-focused treatment or moral/religious objections to alcohol, and thus provides a conservative estimate of effects. Third, a single item was used to assess drinking despite health problems, instead of a full scale. However, it is unclear whether more items would have actually been helpful in assessing this very specific construct; and as an alcohol use disorder symptom it is often assessed directly as a single question in clinical care. Fourth, the treatment of mental health disorders may be relevant in understanding mental health factors underlying drinking despite health problems. The psychopathology variables that did not reach significance in the current study—mood and anxiety disorders—are disorders with substantial rates of treatment ((National Institute of Mental Health, 2017a, b)); such treatment may have weakened their disruption, including their associations with dangerous drinking behavior. In contrast, personality disorders' treatment efficacy is less established (Bateman et al., 2015) and treatment utilization more unknown (National Institute of Mental Health, 2017c). Future research should address the potential role of treatment in these associations. Finally, while alcohol use disorder may mediate the association of mental disorders with drinking despite health problems, mediation analyses were not possible in our cross-sectional dataset. Future research using prospective data should explore this issue. However, exploratory analyses examining alcohol use disorders as *moderators* of mental health and family history effects evidenced no significant interactions. Despite these limitations, use of the NESARC-III is a strength, as it is large, recent,

nationally representative dataset, that assesses psychopathology according to current diagnostic criteria, i.e., DSM-5. Further, the current study is novel in that it assesses an important but understudied construct (drinking despite health problems) in an important medically ill sample.

In sum, the current study demonstrates that individuals with liver disease who suffer from drug use disorders, personality disorders, and possibly anxiety disorders, as well as those who have a family history of alcohol problems, are more likely to engage in drinking even though it causes them physical harm. Psychopathology may therefore not only create suffering in itself, but may also relate to these individuals' choices to drink despite known risk. Providers working with liver disease patients should be aware of these risk factors, and may consider referrals for additional support for drinkers who suffer from these conditions or who have a family history of alcohol problems, in order to help them receive appropriate care and to help them regulate their drinking.

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Highlights

- We study predictors of drinking despite health problems in those with liver disease.
- We use a nationally representative sample of individuals with liver disease.
- Drug use and personality disorders predict drinking despite health problems.
- A family history of alcohol problems predicts drinking despite health problems.
- Liver disease patients with some psychiatric comorbidities may drink despite risks.

Table 1

Characteristics of the past-year liver-disease sample.

Liver disease sample (n=331)	
Demographics	% (s.e.)
Age	
18–29	5.9 (1.4)
30–39	13.7 (2.5)
40–49	23.7 (2.9)
50 +	56.7 (3.7)
Education	
Less than high school	13.8 (2.13)
High school graduate	25.7 (2.78)
Some college or higher	60.5 (3.72)
Sex	
Male	52.6 (2.7)
Race/Ethnicity	
White, non-Hispanic	67.46 (3.2)
Black, non-Hispanic	9.15 (1.65)
Other, non-Hispanic	7.34 (1.65)
Hispanic, any race	16.05 (2.54)
Type of liver disease	
Cirrhosis	28.18 (2.60)
Liver Cancer	5.57 (1.39)
Cirrhosis and Liver Cancer	2.05 (0.88)
Any other form of liver disease	64.20 (2.83)
Drinking despite health problems	20.6% (2.6)

Table 2

Alcohol involvement by drinking despite health problems among individuals with past-year liver disease (n=331).

	Drinking despite health problems (n=66)		No drinking despite health problems (n=265)	p-value ^a
Alcohol use disorder				
Prevalence	97.0% (2.0)		10.5% (2.3)	<.0001 *
Alcohol consumption	<i>M(s.d.)</i>		<i>M(s.d.)</i>	
Drinking quantity	6.2 (0.75)		2.5 (0.18)	<.0001 *
Maximum quantity	12.1 (1.5)		4.2 (0.28)	<.0001 *
Drinking frequency ^b	8.1 (0.34)		4.8 (0.21)	<.0001 *
Binge frequency ^b	6.3 (0.65)		1.4 (0.20)	<.0001 *

Note.

^a Comparisons were conducted using chi-square tests and t-tests.

^b Frequency values: 10=Every day; 9=Nearly every day; 8=3 to 4 times a week; 7=2 times a week; 6=Once a week; 5=2 to 3 times a month; 4=Once a month; 3=7 to 11 times in the last year; 2=3 to 6 times in the last year; 1=1 to 2 times in the last year; 0=Never in the last year (value of 0 used only for binge frequency because all participants report at least one incident of past-year drinking).

* p<0.0001

Table 3

Demographic factors underlying drinking despite health problems among individuals with past-year liver disease (n=331).

	Unadjusted Odds Ratio (95% CI)	p- value
Sex		
Female (vs. Male)	0.57 (0.30–1.07)	.081
Education		
High school (vs. Less than high school)	0.95 (0.36–2.55)	.5581
Some College (vs. Less than high school)	0.70 (0.31–1.61)	
Race/Ethnicity		
Black (vs. White)	2.10 (0.83–5.35)	.4795
Other (vs. White)	1.22 (0.41–3.66)	
Hispanic (vs. White)	1.20 (0.59–2.46)	
Age		
30–39 (vs. 18–29)	1.25 (0.33–4.76)	.8118
40–49 (vs. 18–29)	1.06 (0.26–4.30)	
50+ (vs. 18–29)	0.83 (0.22–3.10)	

Table 4

Mental health and family history factors underlying drinking despite health problems among participants with past-year liver disease (n=331).

	Unadjusted Odds Ratio (95% CI)	p-value	Adjusted Odds Ratio ^a (95% CI)	p-value
<i>Mental health disorders</i>				
Drug use disorder (past-year)	2.78 (1.36–5.66)	.0053 **	2.68 (1.24–5.78)	.0125 *
Major depressive disorder (past-year)	1.04 (0.49–2.20)	.9149	0.99 (0.44–2.21)	.9737
Any anxiety disorder (past-year)	1.90 (0.95–3.80)	.0691	2.22 (0.97–5.06)	.0574
Borderline personality disorder (lifetime)	4.04 (2.08–7.82)	.0001 ***	4.10 (1.95–8.63)	.0003 ***
Schizotypal personality disorder (lifetime)	2.67 (1.15–6.20)	.0230 *	2.50 (1.11–5.62)	.0275 *
Antisocial personality disorder (lifetime)	3.72 (1.65–8.35)	.0017 **	3.39 (1.47–7.83)	.0046 **
<i>Family history</i>				
Family history of alcohol problems	2.94 (1.40–6.14)	.0046 **	2.79 (1.28–6.06)	.0102 *

^a Adjusted for age, sex, ethnicity, and education.

* p<0.05,

**

p<0.01,

p<0.001.