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Those harmed by others' drinking in the US population are more depressed and distressed

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Abstract

Introduction and Aims—Harms from second-hand smoke were instrumental in enacting tobacco controls. Documenting negative impacts of harms from others' drinking (also called second-hand effects of drinking) is vital to increase political will for optimal alcohol policies. We assessed associations between harms from others' drinking and depression in a national sample of US adults.

Design and Methods—Using the landline sample from the 2010 National Alcohol Survey ($n = 5,388$), weighted logistic regression models adjusting for alcohol problems in family of origin, respondent drinking pattern (volume and heaviest drinking), poverty, and other demographics were used to analyze associations between experiencing harms from others' drinking in the last 12 months with mild to moderate depression (CES-D8; $\alpha = .92$; using cut point 8) and current distress.

Results—Past 12-month family/marital harms, financial troubles, and vandalized property attributed to others' drinking each was associated with higher depression scores (all $p < .001$). In a combined model, all harms other than assaults remained highly significant. Similar patterns were found for current distress, but with some specific differences due to measurement and analytic approaches chosen also evident.

Discussion—Findings suggest recently experiencing particular harms from others' drinking significantly affects mental health (both depression and distress). This confirms in a US population results recently reported in Australasian samples.

Conclusions—Studies that quantify the extent to which heavy drinkers victimize others are important for alcohol policy.

Keywords

Alcohol drinking; drinking behavior; harm to others; population survey; depression

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Introduction

Heavy drinking adversely affects not only the drinker, but also other people, whose reports of such harms have been (until recently) understudied, particularly in the US [1]. Alcohol's harm to others (AHTO, used hereafter), has been termed alternatively alcohol externalities [1], passive drinking, collateral damage from drinking, and second hand effects [2]. After an early innovative single-city study [3], which stimulated some Canadian studies [4, 5], little work was done in the US on alcohol-related harms except on college campuses [6, 7]. Recently, the US National Alcohol Survey (NAS) provided overall prevalence estimates of different types of AHTO and the personal characteristics, including the victim's own drinking patterns, that predict such harms [1]. The NAS showed differential effects by gender, of neighborhood disadvantage on rates of experiencing family harms (family/marital and financial problems) versus more stranger-linked harms (assault and vandalism) [8]. While women, as often noted, experienced more harms in the family context (likely from partners' heavy drinking) and men more stranger-inflicted harms, in disadvantaged neighborhoods, US women reported more stranger harms and men more family harms relative to harms experienced in more affluent neighborhoods. Women in the disadvantaged areas still had higher levels of the family harms than men, however.

By analogy with the role second-hand smoke played in motivating tobacco controls, documenting the extent of the harms stemming from second-hand effects of alcohol [2] could influence legislators [9] and build public pressure for enacting and enforcing more effective alcohol policies. Lending some supporting to this perspective, in the US general population, those who report experiencing more types of AHTO tend to show greater support for stronger alcohol controls [10, 11].

To build the evidence base on deleterious impacts of AHTO that could influence policy development [12] we clearly need to rely not just on the number of different types of harms but to assess the actual impact on victims in metrics such as reductions in quality of life, mental health, and financial and time costs. Intangible cost metrics such as these have seldom been used to estimate impact of AHTO involving others' heavy drinking and are not well established [13].

Impacts of some kinds of harms have been broadly studied before (e.g. Fetal Alcohol Spectrum Disorder [14–16]; drinking driving [17–20]; and certain aspects of interpersonal violence [21, 22]), and work quantifying the severity of a range of specific AHTO has begun in recent studies in Australia and New Zealand. Yet few US studies have taken account of intangible costs for victims, one exception being a recent study of costs of underage drinking [23]. We know that excessive drinking can victimize partners and families [24], cause child abuse or neglect [25] and cost people other than the drinker time, money, and peace of mind [26]. Indeed, by impacting other people's quality of life [27] and mental health [28], and lowering health status or causing injuries [29], some estimate the full social costs of alcohol may be double [30] those incurred by the drinker alone [31]. Still, work quantifying impacts on quality of life and mental health of those affected by others' drinking, especially alcohol-related family victimization (including child neglect and abuse) and injuries inflicted by drinking strangers, is in its early stages [32–34] with little done in the US to date.

The aim of this paper is to use the latest US population survey with AHTO questions, the 2010 NAS [1], and for each of four different harms, compare levels of depression and distress of those harmed versus not harmed by another's drinking, controlling for various important personal characteristics, including the respondent's own drinking pattern.

Methods

Data and Sample

The 2010 US National Alcohol Survey (NAS) is a national population survey of adults (aged 18+) that used random digit dialed, computer assisted telephone interviewing. The 2010 NAS used dual-frame (landline and mobile phone) sampling, which provided coverage of 97.5% of the US households [35]. Over-samples of Latino/Hispanic and African American respondents and 13 small population states were included. Reverse directory look up allowed advance mailings to about 50% of the respondents. Non-response was minimized by using multiple, largely unlimited callbacks and refusal conversion attempts. Bilingual interviewers conducted interviews in Spanish when needed or requested. A respondent was chosen in households using a Kish randomization scheme.

The analytic sample includes 6,957 landline telephone interviews (excluding 1,012 mobile-phone cases due to missing questions on AHTO on the mobile-phone interview). The possible analytic sample includes landline cases with no missing data, so the actual numbers included are lower (for depression as dependent variable, $n = 5,590$). The AAPOR 4 cooperation rate for the survey was 49.9% for the landline sample, a rate not untypical of telephone surveys [36]. Non-response in telephone surveys is generally deemed less biasing than in face-to-face surveys, because hang-ups, the largest basis for non-response, often occur before the topic of the survey has been broached. Earlier methodological work on interview modes related to the NAS migration from face-to-face to telephone interviewing found no significant difference in national estimates of mean alcohol intake based on interview mode, in spite of lower telephone response rates [37, 38]. Data were weighted to the general population of the US using the 2010 Census, by age, sex, ethnic group and geographic area. The Institutional Review Board approved the survey.

Measures

Of six AHTO items [1] from the 1989 Canadian Alcohol and Other Drug Survey [39], four are used here: family problems or marital difficulties; financial trouble; pushed, hit or assaulted; and property vandalized. Here we use harm exposures during the prior 12-months, since the time frame for impact is current. Although for analyses items were considered individually, they fall into two domains represented by 2-items each as used in a study of neighborhood effects on harms [8]. These areas included *Family-related Harms* consisting of family or marriage, and financial harms ($r = .45$) and *Aggression-related Harms* involving assault and vandalism ($r = .32$). The items in each area involve one more-widely and one less-widely endorsed item (see Table 1).

Depression was assessed using an 8-item Center for Epidemiologic Studies Depression scale (CES-D8). The 20-item CES-D [40] was designed as a self-report measure of depression for

general populations; items assess symptoms of depression experienced in the past week. The brief version contained 5 negatively-worded (feeling depressed, sad, being bothered by things that usually don't bother you, lonely, and having restless sleep) and 3 positively-worded (scored inversely: feeling happy, hopeful about future, and enjoying life) items, selected based on factor analyses in an earlier NAS that included the 20-item scale [41]. Response scales ranging from 0 "rarely or none of the time" to 3 "most or all of the time" and all items scored such that higher scores indicated greater depression (CES-D8 range: 0–24; mean = 4.40, SD 4.65; Cronbach's alpha = .92). On the full CES-D, the standard cut point of 16 and above indicates mild to moderate depression [42]; a roughly equivalent cut point of 8 and above for the CES-D8 was chosen, as an indicator of at least mild to moderate depression on the CES-D8, based on an analysis of the 1995 NAS with all CES-D items. By this criterion, 19% of respondents were classified with at least mild to moderate depression.

We also used a single item to assess current degree of distress. It read: "How much distress are you currently experiencing in your life?" Responses were 0 "none", 1 "not much", 2 "some", and 3 "a great deal". As a dichotomous indicator we chose reporting at least some distress (vs. not much or none). By this criterion 43% were classified as being somewhat distressed. Psychological distress is a broader concept than depression, with three main forms (1) malaise; (2) depression; and (3) anxiety [43]. Measures of distress may be particularly useful for general population surveys intended to screen for mental illness [44] or for cross-national epidemiological mental health studies [45].

Personal and demographic characteristics included as controls were: respondent's gender, age, marital status (married/cohabiting versus other), employment status (employed versus not), education (high school diploma or less versus at least some higher education), a dummy variable indicating household income below the 2008 poverty line, two dummy variables indicating Hispanic and Black/African American, in each case versus other groups, mostly Euro-Americans. As the experience of depression may be associated both with AHTO and the respondent's own alcohol use [46, 47], we included past-year volume assessed by the 12-month combined alcoholic beverages Graduated Frequency (GF) measure [48, 49] and pattern of intake, assessed by 12-month maximum [50, 51]. To allow for potentially nonlinear relationships, volume was categorized into 9 levels from 0 (no drinking, reference), >0–1 drink, >1–2 drinks, etc., up to 14+ drinks/week, on average. Maximum on any day in the prior year taken as the mid-point of each of 9 respondent-provided categories (0–reference, 1, 2, 3, 4, 5–7=6, 8–11=9.5, 12–23=18, and 24+=25 drinks). Averse childhood experiences, especially alcohol problems in the family when growing up, have been found associated with risk of depressive disorders in adulthood [52]. We therefore included a dichotomous variable 'lived with or had a blood relative with a history of alcohol problems', and 'number of first degree relatives with a history of alcohol problems.'

Analyses

For considering whether or not the individual reported sufficient symptoms to indicate mild to moderate depression, we used binary logistic regressions estimating the dichotomized CES-D8 indicator with full models including all the identified covariates. We estimated

these models with indicators for the 12-month experience of each AHTO item entered together and then, in four separate parallel models, each harm entered alone. We assessed whether or not AHTO was associated with at least some distress with identical logistic regression models. As a sensitivity analysis, because the original distress item had four ordinal levels, we similarly estimated the influence of the each of the four AHTOs using ordinal logistic regression. All analyses were implemented in SPSS V18 [53].

Results

Table 1 provides the prevalence of experiencing each of the four included harms attributed to others' drinking on a lifetime and past 12-months basis and provides prevalences of the two dependent variables. While on a lifetime basis being pushed, hit or assaulted is the most common (23%), with family/marriage problems next (18%), on a 12-month basis family/marriage harms are just slightly more common than assaults (3.9% versus 3.4% respectively). In the last 12 months, having property vandalized (2.6%) was a bit more endorsed than financial troubles (1.9%), due to another's drinking.

Table 2 presents a summary of the logistic regression model used to estimate the association of experiencing the harms with mild to moderate depression, controlling for personal characteristics. In this model, all four harms were included together, and three were highly significant (all p s < .001). Assaults in this model had no significant relationship to depression. However, as shown in Table 3, when each AHTO item was entered separately into the model predicting depression scores, all four, including assaults, are highly significant. The adjusted odds ratios (AORs) indicate substantially increased risk of experiencing at least mild to moderate depression associated with exposure to AHTO.

Next we examined the odds of experiencing some or a great deal of distress; section (A) of Table 4 provides key results of the model where all four harms were entered simultaneously, whereas the bottom half (B) presents results when for AHTO variables entered separately. When entered simultaneously, three attained significance at least the p < .01 level, while assaults did not (p = .54). Curiously, in contrast to the depression result, those with financial harms were less likely to be distressed with an AOR of 0.42, (p < .01). Other AORs ranged from 1.7 for family/marriage harms, to 2.3 for having property vandalized by another drinker, with 95% confidence intervals (CIs) as shown in the table. When each AHTO variable is entered individually in four models, all except financial troubles were significant, with AORs for family problems and assaults at 1.5 (p s < .05), and property vandalized having a higher AOR of about 2.1 (p < .0001).

Finally, as a sensitivity analysis, we estimated distress in an ordinal regression including all 4 response levels; summary results are given in Table 5. The results where AHTO indicators were entered together, are somewhat different than the dichotomized distress models presented in Table 4. In contrast, for the combined AHTO analysis, financial trouble was the most predictive of distress with a positive relationship (AOR=5.3, p < .0001), being assaulted in the last 12 months was associated with significantly more current distress than family harms, which did not attain significance. Again, in contrast to the dichotomized distress analyses, having property vandalized in the combined analysis was also not

significant. However, similarly to the depression findings in Table 3, taken one at a time, in all instances being exposed to each of the harms from others' drinking was associated with significantly more distress than not being harmed.

Discussion

Results in general show an increase in current depression and distress associated with exposure to harms from others' drinking, after controlling for a wide range of personal characteristics. As expected, alcohol problems among first degree blood relatives tended to affect current depression while respondents' heavier current drinking pattern (defined by 12-month volume and maximum categories) also increased AHTO. Gender, and ethnicity had minimal influence in combined harm analyses, but being married/living with a partner, employed, having higher education, or living above the poverty line, were all significantly negatively associated with depression, and younger age to a lesser extent. These plausible results suggest adequate control was achieved for the logistic analyses.

It is at least mildly depressing to be harmed by others' drinking using an appropriate cut-point on a brief version of the CES-D. When all four harms are modeled together, most AORs associated with harm exposure were substantial, with financial troubles attributed to another's drinking having the highest AOR. It is not surprising that having financial troubles due or ascribed to another's drinking (likely a heavy drinker in the family), is the most depressing harm. Interestingly, having property vandalized by drinking others is the next most depressing incident; this could incur some monetary costs and involve a sense of violation. Family/marriage problems and aggression from drinking others also elevate risks of experiencing mild to moderate depression. Depression and mental health problems have been documented in spouses of heavy drinkers/alcoholics [54, 55], and in instances where both marital and financial problems occur.

As noted, compared to being depressed, experiencing distress represents a broader construct including anxiety [43] and results in this regard differ somewhat. Of the four harms, having property vandalized by drinking others seems most distressing, consistently so in both combined and individual harm analyses (as true for depression). The relative severity of the harms may differ based on method (the analytic technique and the specific variables implementing depression and distress), as highlighted by the sensitivity analysis retaining all distress levels. While for the dichotomous implementation (at least some distress) financial troubles due to another's drinking were paradoxically associated with lower distress in the combined harms model (showing the same direction though not significantly for the individual harm analysis), financial troubles showed a strong positive association with distress in the ordinal logistic regression including four distress levels. This cautions that measurement and analytic variations can lead to drastically different conclusions. Conversely, results for the dichotomized distress measure here were quite similar to those based on the CES-D8 summative scale in OLS regression models (results not shown). We have greater confidence in results proving more robust to methodological differences.

One limitation is differing time frames of measures, especially the drinking and AHTO items referenced to the prior 12 months, contrasted with the CES-D8 assessing the prior

week and distress “current” experiences. However, a possible benefit is that depression and distress were likely being assessed following, rather than before, experiencing an alcohol-related harm.

Additionally, because these results are based on cross-sectional data, caution in interpretation is warranted. We cannot assure a causal influence or directionality to the associations found, yet the counterfactual alternative that more depression leads to more AHTO seems a bit implausible. It does not seem likely that more depressed individuals would attract more harms from drinking others than less depressed people. Rather, relationships are consistent with the hypothesis that recently experiencing several harms from others who were drinking significantly negatively affects one’s current mental state and level of distress.

Our US results confirm and extend from the Australasian AHTO studies. One paper [27] had as its main focus the negative impact of the respondents’ relationships with heavy drinkers on their personal well-being [56] and health-related quality of life, assessed by the EuroQol-5D [32, 57] as found too by [58]. Another article [28] focused on impacts on harms from other drinkers on a 1-item mental well-being indicator and, separately, an item ‘depression or anxiety’, from the EuroQol-5D (highly correlated). In this study, reporting at least one heavy drinker in one’s social circle including family, friends and co-workers was significantly negatively associated with self-reported anxiety or depression.

One strength of the present study is its use of a short, 8-item form of a well-validated and widely used epidemiological measure of depression, the CES-D [40, 59, 60]. We observe that 12-month exposures to different types of harms are associated with varying risks of experiencing at least mild to medium depression and distress, with financial troubles from someone else’s drinking showing strongest impact in several analyses and having property vandalized also showing similar associations. Remaining to be studied further are effects on depression of combinations of harms, and use of epidemiologically stronger ways of controlling for confounding by personal characteristics, including the possible use of propensity score matching [61–62].

In conclusion, we note that studies that quantify the extent to which heavy drinkers victimize others are important for policy development. Prevalences of various kinds of AHTO are needed but should be augmented by understandable estimates of impacts; unless significant and substantial harms associated with others’ heavy drinking can be empirically quantified, the AHTO agenda will yield little in support of stronger alcohol policies. Although we argue that findings such as those assembled here are plausibly useful to the alcohol policy community, we still must demonstrate how best to bring such evidence of alcohol’s second-hand impacts into the policy making arena, as well as what are the best policy levers and prevention strategies to reduce the extent of collateral damage from heavy drinking others on family members, friends, strangers and the community (in addition to those aimed at mitigating harms incurred within and by the heavy drinkers to themselves).

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Table 1

Prevalence of Specific Harms from Others' Drinking and Outcomes in the US General Population (Weighted Sample)

Verbatim Item Content	Ever %	12 Month %	Available n ^a
<u>Aggression-related Harms</u>			
Been pushed, hit, or assaulted by someone who had been drinking?	22.6	3.4	6,509
Had your property vandalized by someone who had been drinking?	9.4	2.6	6,480
<u>Family-related Harms</u>			
Had family problems or marriage difficulties due to someone else's drinking?	17.6	3.9	6,662
Had financial trouble because of someone else's drinking?	8.9	1.9	6,659
<u>Depression (CES-D8)</u>			
Mild to Moderate (8)		19.3	5,590
<u>Distress</u>			
A great deal		12.9	5,678
Some		32.6	
Not much		30.8	
None		23.7	

Summary of Logistic Regression Model Predicting Mild to Moderate Depression using All Four Alcohol's Harm to Others

Table 2

	Adjusted Odds Ratio	Wald Statistic	P	95% CI
Intercept	0.267	45.04	<.0001	
Respondent Sex (Female)	1.115	1.686	=.194	(0.496, 1.315)
Black verses whites and others	0.979	0.031	=.861	(0.772, 1.412)
Hispanic verses whites and others	0.916	0.499	=.480	(0.718, 1.169)
Age	1.006	4.830	<.05	(1.001, 1.011)
Currently Married/Living with someone	0.622	31.57	<.0001	(0.527, 0.734)
Income below the 2008 Poverty Line	1.857	36.35	<.0001	(1.518, 2.270)
Employed vs. unemployed	0.675	20.15	<.0001	(0.568, 0.801)
Higher Education vs. High School or less	0.641	26.89	<.0001	(0.541, 0.758)
lived with parent/relative with alcohol problems	0.998	0.000	=.987	(0.826, 1.207)
number first degree relatives - alcohol problems	1.182	9.421	<.01	(1.062, 1.316)
Volume from GF (standard drinks/week)-overall	*	35.80	<.0001	
Maximum in any day in past 12 months-overall	**	28.69	<.001	
AHTO Items Together in Same Model				
Family problems or marital difficulties	1.894	11.64	<.001	(1.312, 2.732)
Financial trouble	2.036	7.043	<.001	(1.204, 3.441)
Pushed, hit or assaulted	0.928	0.110	.740	(0.595, 1.446)
Property vandalized	2.953	23.35	<.0001	(1.903, 4.582)

* All levels of Volume significantly different from 0=Abstain;

** All levels of Maximum significantly different from 0=Abstain

Table 3

Summary of Logistic Regression Models Predicting Mild to Moderate Depression using each AHTO item Separately*

	Adjusted Odds Ratio	Wald Statistic	P	95% CI
<u>AHTO Items: Each in Separate Models</u>				
Family problems or marital difficulties	2.545	33.94	<<.0001	(1.859, 3.488)
Financial trouble	4.120	38.39	<<.0001	(2.633, 6.448)
Pushed, hit or assaulted	2.010	13.34	<.001	(1.382, 2.924)
Property vandalized	3.794	45.80	<<.0001	(2.579, 5.582)

* Control variables in all models are the same as those in Table 2

Table 4

Summary of Logistic Regression Models Predicting at least Some Distress using Alcohol's Harm to Others items*

	Adjusted Odds Ratio	Wald Statistic	P	95% CI for AOR
<u>A. AHTO Items Together in Same Model</u>				
Family problems or marital difficulties	1.665	7.241	<.01	(1.149, 2.413)
Financial trouble	0.422	8.427	<.01	(0.236, 0.756)
Pushed, hit or assaulted	1.130	0.374	=.54	(0.764, 1.671)
Property vandalized	2.296	13.81	<<.0001	(1.481, 3.558)
<u>B. AHTO Items Each in Separate Models</u>				
Family problems or marital difficulties	1.495	5.784	<.05	(1.076, 2.050)
Financial trouble	0.854	0.409	=.54	(0.526, 1.386)
Pushed, hit or assaulted	1.533	5.521	<.05	(1.073, 2.189)
Property vandalized	2.165	14.10	<<.0001	(1.448, 3.239)

* Control variables in all models are the same as those in Table 2

Table 5

Summary of Ordinal Logistic Regression Models Predicting Distress Levels using Alcohol's Harm to Others items*

	Adjusted Odds Ratio	Wald Statistic	P	95% CI for AOR
<u>A. AHTO Items Together in Same Model</u>				
Family problems or marital difficulties	1.459	2.982	.08	(0.950, 2.239)
Financial trouble	5.254	32.006	<<.0001	(2.956, 9.337)
Pushed, hit or assaulted	2.396	12.346	=.001	(1.399, 3.986)
Property vandalized	1.073	0.074	.79	(0.643, 1.795)
<u>B. AHTO Items Each in Separate Models</u>				
Family problems or marital difficulties	3.050	39.137	<<.0001	(2.217, 4.586)
Financial trouble	6.875	61.972	<<.0001	(4.255, 11.112)
Pushed, hit or assaulted	3.310	27.752	<<.0001	(2.119, 5.165)
Property vandalized	2.751	19.574	<.001	(1.758, 4.310)

* Control variables in all models are the same as those in Table 2