

ORIGINAL ARTICLE

Alcohol Use During the Great Recession of 2008–2009

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Abstract — **Aims:** The aim of this study was to assess changes in alcohol use in the USA during the Great Recession. **Methods:** Drinking participation, drinking frequency, drinking intensity, total alcohol consumption and frequency of binge drinking were assessed in a nationally representative sample of 2,050,431 US women and men aged 18 and older, interviewed between 2006 and 2010. **Results:** The prevalence of any alcohol use significantly declined during the economic recession, from 52.0% in 2006–2007 to 51.6% in 2008–2009 ($P < 0.05$), corresponding to 880,000 fewer drinkers (95% confidence interval [CI] 140,000 to 1.6 million). There was an increase, however, in the prevalence of frequent bingeing, from 4.8% in 2006–2007 to 5.1% in 2008–2009 ($P < 0.01$), corresponding to 770,000 more frequent bingeers (95% CI 390,000 to 1.1 million). Non-Black, unmarried men under 30 years, who recently became unemployed, were at highest risk for frequent bingeing. **Conclusion:** During the Great Recession there was an increase in abstinence from alcohol and a rise in frequent bingeing.

INTRODUCTION

The economic recession beginning in December 2007 (NBER, 2010), commonly known as the ‘Great Recession’ (Krugman and Wells, 2010), was accompanied by a rise in US unemployment from 4.6% in 2007 to a peak of 10% in October 2009 (BLS, 2012). Since the start of the recession, alcohol-related emergency room visits and hospitalizations increased in a few locales (Eliason and Storie, 2009; Burke and Alpert, 2010). Some health departments therefore anticipated that alcohol-related health problems would require increased medical and public health attention during this period (Burke and Alpert, 2010). Their concerns were based on evidence that binge drinking has been found to be correlated with deteriorating macroeconomic conditions (Dee, 2001; Dávalos *et al.*, 2011) both among individuals experiencing job loss (Catalano *et al.*, 1993) and among those who remain employed (Dee, 2001). Yet some other agencies proposed reducing or eliminating alcohol abuse programs in response to budgetary shortfalls (Doward, 2011; Huffington Post, 2011), citing alternative data that previous economic downturns and unemployment peaks have been associated with significant declines in alcohol use (Ruhm and Black, 2002) and other health risks (Ruhm, 2000; Ruhm, 2005; Tapia Granados, 2005).

This conflicting evidence about the relationship between economic and employment changes to alcohol use led the National Institutes of Health to call for research into how the ongoing economic crisis has influenced drinking rates and patterns (NIH, 2010). Several competing hypotheses have been proposed: an ‘uncovering’ hypothesis arguing that potentially abusive drinkers will be frightened out of drinking by the threat of job loss if they continue to drink; an ‘income-effect’ hypothesis, which suggests that alcohol consumption will decrease during economic downturns as less income is available to purchase alcohol and a ‘provocation’ hypothesis positing that heavy alcohol use will increase

during the recession as people cope with insecurity and stress related to real or threatened job loss, or other recession-linked exposures like foreclosures (Catalano, 1997). These hypotheses imply specific predictions about the changes in drinking that would be expected during the recession. The uncovering hypothesis predicts a reduction in the frequency and intensity of drinking among working-age people. The income hypothesis predicts reductions in alcohol use throughout the population, but particularly among lower-income people who would be most sensitive to income losses. Finally, the provocation hypothesis predicts an increase in the frequency and intensity of drinking, manifesting in an increase in the frequency of binge drinking.

To inform the debate between these alternative hypotheses, changes in drinking patterns during the Great Recession were assessed using a nationally representative sample of over 2 million US adults. We assessed drinking behaviors along several dimensions: drinking participation, drinking frequency (the number of drinking days), drinking intensity (the number of drinks on drinking days), total alcohol consumption and frequency of binge drinking. In contrast to industry reports that measure total consumption of different alcoholic beverages, we are able to assess changes across the full distribution of drinking behaviors, ranging from abstinence to frequent binge drinking. In doing so, we document some of the potential human costs of the Great Recession and provide evidence that can guide clinicians and policy makers in targeting resources toward populations at highest risk.

MATERIALS AND METHODS

Study design and population

Data on self-reported alcohol use were taken from the Behavioral Risk Factor Surveillance System (BRFSS), a monthly, state-based, cross-sectional survey of women and men aged 18 and older from the 50 US states, the District of

Columbia and Puerto Rico (BRFSS, 2011). Respondents were selected through stratified-random sampling of households with landline telephones with a subsequent random sampling of adults within contacted households. Participants were interviewed using validated computer-assisted telephone interviews concerning medical history, lifestyle and health practices. For this analysis, survey years 2006 through 2010 were used, reflecting a sample of 2,050,431 adults. BRFSS surveys prior to 2006 employed a set of alcohol use questions that are not directly comparable with those used in more recent survey years and were therefore excluded. Survey responses were weighted to adjust for sampling design, including non-response and coverage, so as to represent the overall demography of the US adult population (BRFSS, 2011). Demographic characteristics of the sample are tabulated in the Online Appendix (Supplementary data, Table S1).

Alcohol use assessment

Alcohol use was assessed using five questions (BRFSS, 2011). Respondents were asked if they had consumed at least one drink of any alcoholic beverage during the past 30 days. Those who had consumed any alcohol were then asked to report the number of days in the month on which they drank (between 1 and 30) and the average number of drinks they consumed on days when they drank, which was censored at 60. The total number of drinks per month was calculated as the product of these two variables and was censored at 450, following Ruhm and Black (2002). To create indicators for different levels of alcohol consumption, we scaled the definitions used by Centers for Disease Control and Prevention to the 30-day recall period utilized by BRFSS (Schoenborn and Adams, 2010). Light drinking was defined as 12 or fewer drinks per month; moderate drinking was defined as >12–30 drinks per month for women and >12–60 drinks per month for men and heavy drinking was defined as >30 drinks per month for women and >60 drinks per month for men. Respondents were also asked about the frequency of binge drinking which, consistent with international usage, the BRFSS defines as the number of episodes in the past 30 days when the individual had five or more drinks on a single occasion (for men) or four or more drinks on an occasion (for women). Frequent bingeing was defined as four or more bingeing episodes during the past 30 days (Schulenberg *et al.*, 1996). The BRFSS questions on alcohol consumption were identical in each survey wave, apart from one clarifying statement introduced in 2008 for converting a 40 ounce beer and two-shot cocktail drink into three and two drinks, respectively (BRFSS, 2011). While it would be interesting to examine the concurrent use of other substances, such as illicit drugs, these are not included in the BRFSS.

Statistical analysis

Temporal changes in drinking behavior during the recession were first described non-parametrically. We estimated ‘moving average’ local kernel regression models to assess how drinking outcomes evolved with a quarter of survey interview. Models were estimated with a bandwidth of 2.5 and used BRFSS survey weights. To test whether there were statistically significant changes in drinking behavior during the Great Recession, behaviors in the two survey years

before the recession were compared with those in the two years during which the nation was in recession—2006–2007 vs. 2008–2009—using multivariate ordinary least squares (OLS) regression models. Standard errors were adjusted for the BRFSS’s stratified cluster sampling design. Data from 2010 were omitted from the analysis as the recession technically ended in mid-2009 (NBER, 2010). Regression models controlled for age and sex in 5-year cohort clusters, as well as race/ethnicity (Black, non-Black Hispanic and non-Black/non-Hispanic), educational attainment (less than high school, high school graduate, some college and college graduate), marital status (married, divorced, widowed, separated, never married, a member of an unmarried couple or refused) and indicators for whether the respondent was a veteran, whether the respondent lived with children under 18, and the respondent’s state of residence. The month in which the interview occurred was included in all models to account for seasonal variations in drinking patterns.

To test whether changes in drinking during the recession could be explained by the increase in unemployment or income loss, in subsequent models we added individual-level employment status (employed, self-employed, unemployed >1 year, unemployed <1 year, homemaker, student, retired, unable to work and refused) and household income, as assessed at the time of the survey. Changes in drinking behaviors were also assessed for subgroups defined by age, sex, education and employment status. Finally, predictive, multivariate logistic models were used to identify those groups at highest risk for drinking and frequent bingeing during the recession. First, we estimated a predictive model for 2008–2009 using detailed socioeconomic and demographic characteristics. Secondly, we estimated a predictive model for 2006–2009, including only demographic predictors and interacting these predictors with an indicator for 2008–2009. For each predictor, the exponentiated coefficient on the interaction term can be interpreted as the ratio of the odds ratio in 2008–2009 to the odds ratio in 2006–2007; this provides a measure of the relative change in the predictive value of that demographic covariate during the recession. All models used BRFSS weights and standard errors were adjusted for survey design.

RESULTS

Alcohol use, levels and frequency during the Great Recession

Figure 1 displays smoothed quarterly estimates of the national prevalence of ‘any drinking’ and ‘frequent bingeing’. At the start of the recession, the prevalence of any drinking declined slightly, from 52.0% in 2006–2007 to 51.6% in 2008–2009 (risk difference = –0.39%, $P < 0.05$, Table 1). However, there was a 7.2% increase in the prevalence of frequent bingeing: from 4.8% (95% confidence interval [CI] 4.6–4.9) in 2006–2007 to 5.1% (95% CI 5.0–5.2) in 2008–2009 (risk difference = 0.34%, $P < 0.01$, Table 1). These changes in behavior appear to have been temporary, with rates returning to near-2007 levels by 2010 (Fig. 1). Although the percentage point changes are small, when applied to the 2008 adult population of 228 million, they correspond to 880,000 fewer drinkers (95% CI 140,000–1.6 million) and 770,000 more frequent bingeers (95% CI

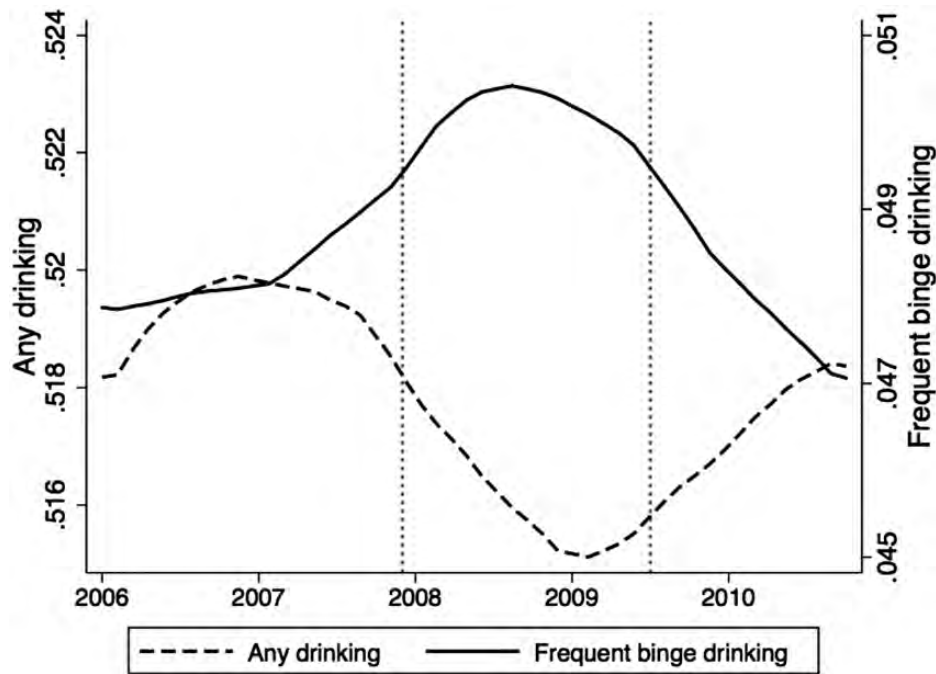


Fig. 1. Drinking behaviors in the USA, 2006–2010. Drinking behaviors are: any drinking in the last 30 days, and at least four binge episodes in the last 30 days. Crude trends in the proportion of US adults reporting each drinking behavior are estimated by local kernel regression, smoothed across the quarter of survey visit, with a bandwidth of 2.5. Estimates are weighted using the BRFSS final weights. The vertical lines represents the beginning and end of the recession in December 2007 according to the National Bureau of Economic Research.

Table 1. Changes in alcohol use, levels and frequency during the Great Recession, between 2006–2007 and 2008–2009

Outcomes: drinking behaviors	Group	<i>N</i>	Mean in 2006–2007	Difference 2008/2009–2006/2007 ^a	Percent change	Estimated change in number of drinkers, in '000s, (95% CI)
Prevalence rates						
Abstinence from drinking	All	1,570,597	48.0%	0.39%* (0.17%)	0.8	880 (140–1620)
Light drinking ^b	All	1,542,309	29.2%	–0.87%** (0.16%)	–3.0	–1990 (–2700 to –1290)
Moderate drinking ^b	All	1,542,309	16.7%	0.39%** (0.13%)	2.3	900 (320–1480)
Heavy drinking ^b	All	1,542,309	5.1%	0.20%* (0.08%)	3.9	450 (90–810)
Any binge drinking	All	1,553,192	15.3%	0.01% (0.13%)	0.1	20 (–600–560)
Frequent binge drinking ^b	All	1,553,192	4.8%	0.34%** (0.09%)	7.1	770 (390–1140)
Consumption levels						
Drinks per month	All	1,542,309	11.1	0.27* (0.11)	2.5	
Drinks per month	Drinkers	731,225	21.8	0.79%** (0.21)	3.6	
Drinking days per month	Drinkers	743,422	8.1	0.25%** (0.04)	3.1	
Average number of drinks on days drank	Drinkers	740,982	2.5	0.01 (0.02)	0.4	
Binging episodes	Drinkers	742,108	1.2	0.06%** (0.02)	5.2	

^aDifferences in drinking levels were estimated in weighted multivariate OLS regression models. Robust standard errors are in parentheses. Models include controls for 5-year age-by-sex categories, education, race/ethnicity, veteran status, children in the household, pregnancy, ever smoker, marital status, state of residence and survey month.

^bLight drinking: 12 or fewer drinks per month; moderate drinking: >12–30 drinks per month if female and >12–60 drinks per month if male; heavy drinking: >30 drinks per month if female and >60 drinks per month if male; frequent binge drinking: four or more times per month.

* $P < 0.05$.

** $P < 0.01$.

390,000–1.1 million) during the recession. No changes were observed in the proportion of respondents reporting any bingeing.

Overall levels of consumption rose significantly in spite of reductions in the prevalence of alcohol use (Table 1). There was an increase in the total number of drinks consumed per month (0.27 additional drinks per month, $P < 0.05$), with the

rise in consumption among drinkers (0.79 additional drinks per month, $P < 0.01$) outweighing the observed increase in abstinence. This rise in consumption was primarily attributable to an increase in the overall number of drinking days per month of 3.2% ($P < 0.01$). There was no significant change in the average number of drinks per drinking day ($P = 0.47$).

Figure 2 displays the crude percentage point change in the levels of total monthly alcohol consumption between 2006–2007 and 2008–2009. There is clear evidence of a spreading out of the drinking distribution, with a decline in light drinking and an increase both in abstinence and in moderate and heavy drinking. Regression-adjusted estimates are presented in Table 1. In 2006–2007, 29.2% of the US adult population were classified as light drinkers, consuming 1–12 drinks in the previous 30 days. During the recession, there was a 0.87% point reduction in light drinking, equivalent to a 3.0% decline. However, this decline in light drinking coincided with a 2.3% increase in moderate drinking and a 4.2% rise in heavy drinking.

Employment, income and alcohol use

If recession caused changes in drinking patterns primarily through the loss of employment or earnings, controlling for employment status and household income would reduce the estimated effect size of the recessionary period. Adjusting for household-income and individual-employment status did not substantially modify the estimated trends in alcohol use. In general, coefficients declined in magnitude, but none by more than 25% (Supplementary data, Table S2). In subgroup analysis, similar changes in drinking behaviors were observed for the employed and unemployed (Supplementary data, Table S3). These findings suggest a role for alternative pathways.

Subgroup analysis

The observed increase in frequent binge drinking appeared to be proportional across subgroups, with the exception of older respondents, among whom there was no change (Supplementary data, Table S3). However, there was substantial heterogeneity in the trends in abstinence, with larger declines in ‘any drinking’ among younger respondents, women and individuals with less than a college degree. No decline in ‘any drinking’ was observed among older respondents or college graduates, who would be less income constrained.

Characteristics of frequent binge drinkers during the Great Recession

During the recession, frequent binge drinkers were more likely to be male, under 30, not married, non-Black and without a college degree. Frequent bingeing was associated with higher household income and also with being unemployed for <1 year (Table 2). Compared with the characteristics that predicted frequent bingeing before the recession, we observed a relative increase in the odds of frequent bingeing among persons ages 25–34 and 55–59 years during the recession (Supplementary data, Table S4). Aside from age, there were no other significant changes in the demographic predictors of frequent bingeing during the recession.

DISCUSSION

During the Great Recession, the rates of abstinence from alcohol increased among US adults. However, total alcohol consumption also increased, driven by a rise in the number of moderate and heavy drinkers and a decline in the number of light drinkers. Most concerning was a large rise in the prevalence of frequent binge drinking of 7.2% relative to baseline levels. These changes were statistically and epidemiologically significant: the estimates imply that 770,000 adults became frequent bingers during the recession, even as 880,000 stopped drinking altogether. The rise in frequent bingeing was observed for both employed and unemployed respondents, suggesting that factors other than job loss were driving these changes.

This study finds significant evidence of a widening of the drinking distribution during the Great Recession. This polarization of drinking behaviors likely reflects countervailing forces at work. On the one hand, the increase in abstinence from drinking is consistent with the ‘income-effect’ hypothesis: lower expected income may have led some individuals to reduce consumption. Yet, not all populations were equally affected. The greatest rise in abstention was observed among young respondents and individuals with less than a college education, both groups with lower incomes who may be more sensitive to changes in expected income. On the other hand, the rise in frequent bingeing and total alcohol

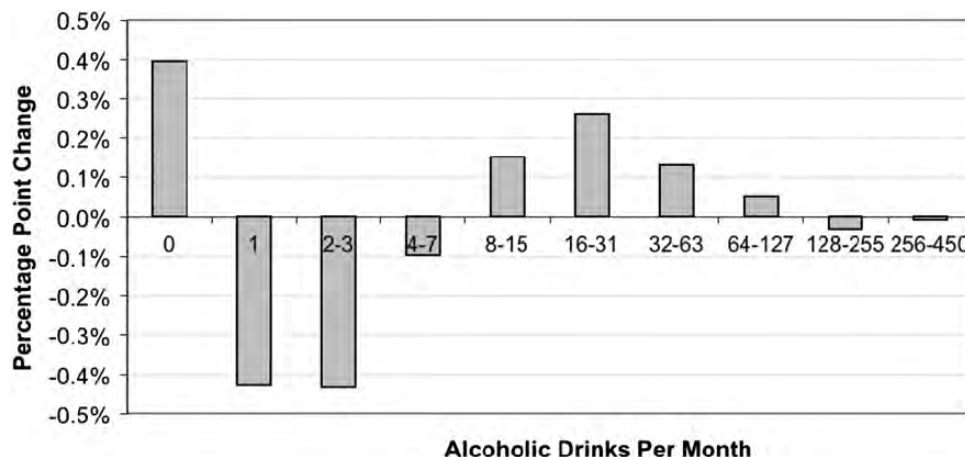


Fig. 2. Change in the distribution of alcoholic drinks consumed in the past 30 days, from 2006–2007 to 2008–2009. Data are reported on a percentage point scale, where the unit is 1% of the US adult population; the data sum to zero across the categories of alcohol consumption.

Table 2. Sociodemographic predictors of frequent binge drinking during the Great Recession

Predictor	Adjusted odds ratio (95% CI) ^a
Wage-employed	1.00, reference group
Self-employed	1.08 (0.99–1.18)
Unemployed (>1 year)	0.92 (0.78–1.08)
Unemployed (<1 year)	1.17* (1.04–1.31)
Homemaker	0.62** (0.54–0.70)
Student	0.77** (0.67–0.88)
Retired	0.76** (0.69–0.83)
Unable to work	0.47** (0.41–0.55)
Household income 0–25 K	1.00, reference group
Household 25–75 K	1.41** (1.30–1.53)
Household income 75 K+	1.77** (1.61–1.94)
Age 18–29	1.00, reference group
Age 30–49	0.59** (0.55–0.63)
Age 50–64	0.30** (0.28–0.33)
Age 65+	0.12** (0.11–0.14)
Female (vs. male)	0.41** (0.39–0.43)
Black (vs. non-Black)	0.81** (0.72–0.90)
Hispanic (vs. non-Hispanic)	0.93 (0.84–1.04)
Less than high school	1.00, reference group
High school graduate	1.07 (0.96–1.19)
Some colleges	1.05 (0.94–1.17)
College graduate	0.85** (0.76–0.95)
Married (vs. not married)	0.62** (0.58–0.66)
Veteran (vs. non-veteran)	1.00 (0.93–1.08)
Any children <18 in the household	0.78** (0.73–0.82)
Pregnant (vs. not pregnant)	0.08** (0.04–0.16)
Ever smoker (vs. never smoker)	3.2** (3.1–3.4)

^aAdjusted odds ratios were estimated in multivariate weighted logistic regression models for the 2008–2009 BRFSS, $n = 801,207$. Models included state and month fixed effects and indicators for missing employment or income data.

* $P < 0.05$.

** $P < 0.01$.

consumption provides evidence for the ‘provocation’ hypothesis: job insecurity, the threat of loss of a home or life savings or other recession-linked exposures may have led to the greater use of alcohol as a coping mechanism among a subpopulation. During the recession, frequent binge drinking was highest among non-Black, unmarried men under 30 years who were unemployed for <1 year. These results are consistent with the existing literature, indicating that single men and the recently unemployed are most likely to drink excessively during economic crises (Luoto *et al.*, 1998). Further, we note that the odds of frequent binge drinking rose particularly among persons aged 25–34 and 55–59 years, age groups that are highly vulnerable to unemployment and job insecurity during recessionary periods. We found no evidence of an ‘uncovering’ effect, in which higher-risk drinkers reduced consumption due to the threat of job loss during the recession.

Our findings markedly differ from prior US work observing a reduction in binge drinking and a narrowing of the drinking distribution during past economic downturns (Ruhm and Black, 2002). While this analysis cannot pinpoint the precise reasons for this divergence, one possibility is that the Great Recession was much more severe than the business-cycle fluctuations that have been the subject of previous studies (Dee, 2001; Ruhm and Black, 2002). Our results, however, are consistent with evidence from a recent analysis of individual-level panel data, which found that problem

drinking increased when state unemployment rose (Dávalos *et al.*, 2011). These findings are also consistent with the well-documented positive association between economic crisis and other stress-related health outcomes, such as suicide (Ruhm, 2000; Tapia Granados, 2005; Stuckler *et al.*, 2009; Stuckler *et al.*, 2010), including evidence from current economic downturn (Reeves *et al.*, 2012). The polarization of drinking patterns observed in this study has important implications for officials monitoring the population-level trends in alcohol consumption: aggregate statistics on the number of drinkers or drinks consumed may conceal meaningful changes in higher-risk drinking behavior, such as the prevalence of frequent binge drinking.

The use of the BRFSS, a large, nationally representative telephone survey, has several limitations. First, the repeated cross-sectional survey design means that, although it is possible to describe aggregate changes over time, it is not possible to follow-up individual respondents longitudinally. We have adjusted for changes in sample composition using BRFSS survey weights and by controlling for sociodemographic covariates; uncertainty resulting from sampling variability is captured in our standard errors and CIs. Secondly, there is potential for sampling bias, as the BRFSS excludes institutionalized US resident populations and persons without access to landline telephones, such as homeless populations, military conscripts and college students who may use alcohol more heavily, as well as people who may choose not to have a landline telephone or may not be able to afford one. Intoxication at the time of survey recruitment may also inhibit participation in the interview. Additionally, BRFSS surveys do not capture people under the age of 18, who have been observed to increase their alcohol use and to engage in more frequent heavy drinking during the periods of economic distress (Arkes, 2007; Mossakowski, 2008). Thus, it is unlikely that the BRFSS captures the most serious cases of problem drinking and alcohol abuse, particularly those at greatest risk of hospitalizations. Thirdly, self-reported data on alcohol use and style virtually always tend to understate actual drinking levels and frequency (Midanik, 1982). Such recall biases appear to be consistent over time, however, making it possible to assess temporal changes in alcohol use (Johnston *et al.*, 1992). Further, BRFSS binge drinking estimates have been shown to correlate consistently with alcohol sales and drunk driving fatalities, suggesting the validity of these measures (Paschall *et al.*, 2010). Finally, the estimates of the trends in drinking during the Great Recession are descriptive and cannot rule out other nationwide factors that may have influenced changes in alcohol consumption that were unrelated to changes in economic conditions.

This paper documents a rise in moderate, heavy and binge drinking as one of a series of human costs of the Great Recession (Reeves *et al.*, 2012). It adds new evidence to the literature on the relationship between economic recession and alcohol consumption by looking at the patterns of drinking during the most severe economic crisis in 80 years. It also guides clinicians and policy makers by identifying those subpopulations who were at highest risk for frequent binge drinking during the recession.

Previous economic downturns have produced conflicting evidence and theories regarding the impact of economic conditions on alcohol use and problem drinking (Dee, 2001; Ruhm and Black, 2002; Dávalos *et al.*, 2011). Such

uncertainty has led to divergent proposals from city, county and state health departments regarding the levels of funding for screening and clinical intervention for alcoholism during the economic downturn. Our findings of countervailing trends in drinking participation vis-à-vis frequency of drinking and bingeing thus have important implications for health policy and clinical practice. Specifically, these findings challenge those who would use evidence of reductions in overall consumption to justify cutbacks in alcohol prevention and treatment services, especially as those that are most vulnerable, due to budgetary shortfalls, are most likely to be in areas where job losses, and thus the need for services, are greatest.

Future research is needed to understand the pathways through which changing macroeconomic conditions differentially impact subgroups, in particular, the role of psychosocial stressors and factors endowing individuals with resilience, the use of alcohol in relation to other controlled substances as coping mechanisms and potential area effects arising from alcohol control policies. Such research will further guide policy makers and clinicians in anticipating prevention and treatment needs in this and future economic downturns.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *Alcohol and Alcoholism* online.

Conflict of interest statement. None declared.

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