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TESTING A SOCIAL ECOLOGICAL MODEL OF ALCOHOL USE: THE CALIFORNIA 50 CITY STUDY

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Abstract

Background and aims—Social ecological theories suggest that greater community alcohol availability and individual drinker characteristics should jointly affect drinking patterns and the use of drinking contexts. We assessed relationships of demographic and personality characteristics of individual drinkers and environmental characteristics at the city-level to measures of drinking patterns and use of drinking contexts.

Design—Multilevel statistical analyses of archival and survey data from 50 cities in California, USA.

Settings—An ecological sample of 50 geographically distinct cities with populations from 50,000 to 500,000 persons.

Participants—General population telephone survey of 8,553 adults 18 years of age and older stratified by cities.

Measurements—Archival data on city-level alcohol outlet densities were combined with individual survey data identifying community conditions, individual demographic and psychosocial characteristics, frequencies of use of drinking contexts and drinking patterns.

Findings—Greater on-premise outlet densities were related to greater drinking frequencies (b=2.967, z=4.688, p<0.001) and volumes (b=0.627, z=3.394, p<0.001), and use of on-premises drinking places (bars, b=0.334, z=2.645, p<0.006, and restaurants, b=0.171, z=2.770, p=0.005). Individual demographic and personality characteristics were related to drinking and use of drinking contexts. For example, greater impulsivity was related to greater drinking frequencies (b=0.200, z=2.088, p=0.023) and logged quantities (b=0.015, z=2.009, p=0.026), and proportionately more drinking at bars (b=0.033, z=2.016, p=0.026) and parties (b=0.171, z=2.770, p=0.004).

Conclusion—Community availability of alcohol and individual drinker characteristics appear to act jointly to affect drinking levels and use of drinking contexts in California, USA. These effects may increase risks related to drinking in some contexts (e.g., bars) much more than others (e.g., at friends' or relatives' homes).

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Social ecological theories of alcohol use focus upon the specific roles that drinking contexts play in the etiology of alcohol use and related problems. Drinking within the family, at social gatherings, and in commercial establishments is affected by drinkers' opportunities to drink in these environments and their use of these environments for drinking. The inter-relationships of commercial alcohol markets, drinkers' selection of places to drink, and the social influences drinkers experience in drinking places are difficult to disentangle, but a consideration of their dynamics suggests that the social and commercial availability of alcohol will affect drinking and problems related to drinking in different ways in different contexts. Commercial establishments compete to sell alcohol and provide sources of entertainment that attract drinkers. Drinkers choose to use alcohol in contexts they find most rewarding and influence one another's drinking and problem behaviors in those places. These processes are inter-related and form positive self-reinforcing feedback loops that lead problem behaviors to become focused in certain drinking contexts [1]. Importantly, aggregate social forces determine the locations and densities of commercial alcohol establishments and individual drinker characteristics affect their choice of places to drink.

The central arguments of the current paper are (1) that individual drinker characteristics are uniquely related to heavier drinking and the use of specific drinking contexts and (2) that greater commercial availability of alcohol promotes use of those contexts. To test these arguments we examine ecological correlates relating alcohol availability to individual drinking patterns and frequencies of use of drinking contexts. At the macro-level economic forces lead commercial alcohol markets to concentrate in specific community areas [2], diversify their operating characteristics [3], and provide the central link between community systems for the distribution of alcohol and alcohol related risks [4]. Geographic distributions of outlets are shaped by economic forces that induce outlets to locate near one another [5] and patterns of residential and commercial land use [6]. Not surprisingly, the geographic distributions of alcohol related violence and drunken driving reflect these aspects of drinking environments [7].

Relatively little is known about the social mechanisms by which macro-ecological features of drinking environments affect the micro-ecology of human social behaviors with respect to alcohol. The connecting theory needed to specify relationships between drinking agents and alcohol markets has begun to be developed in agent-based computational models [1][8]. Yet there has been little empirical consideration of the plausible impacts of macro-ecological features of drinking environments on individual drinking behaviors. Demographic characteristics related to drinking include household economic characteristics (e.g., income, employment, household size, marital status) and subcultural characteristics of drinkers (e.g., gender, ethnic group membership) [9]. Psychosocial characteristics related to heavy drinking and problems, such as drunken driving, include impulsivity, tolerance of deviance, risk taking, and membership in peer networks which include other high risk users [10] [11] [12] [13]. Certainly, drinker characteristics are related to drinking choices [14] [15] [16] [17], but the question remains whether they are related to choice of drinking contexts. Available literature suggests that greater costs of use suppress drinking at bars among low income drinkers [18] [19] and drinkers collectively affect one anothers' drinking risks [20] [21] [22], but this evidence does not link macro- to micro-ecological constructs related to availability and use.

An outline of the community- and individual-level characteristics considered in this paper is presented in Figure 1. Individual drinker characteristics nest within measures of community drinking environments and social conditions. At the drinker level we are interested in the demographic, personality and social characteristics related to drinking patterns and use of drinking contexts. At the community level we are interested in measures of drinking environments and social disorganization and their relationships to drinking patterns and use of drinking contexts. Figure 1 shows that drinking patterns and use of drinking contexts are both affected by individual characteristics and reciprocally related to one another; however, this non-recursive relationship cannot be assessed in the cross-sectional data available for the current study.

Finally, while a rich literature relates availability to use and problems at the population level [7], empirical assessments have not consistently related availability to survey-based measures of use and problems. Greater numbers of outlets should be related to lower convenience costs and greater use, but the relevant geographic scales for such effects may be entire cities rather than local neighborhood areas [6]. Consequently, studies which have focused on small areas within cities have found mixed results [23] [24] while those using larger units (e.g., ZIP codes [19] [25]) suggest that outlet densities are related to self-reported use. Whether these effects obtain at the city level and can be distinguished from other related social conditions remain open questions.

Given these observations, the current study tests four hypotheses:

1. Greater number and densities of alcohol outlets will be related to greater alcohol use.
2. Greater number and densities of on-premise alcohol outlets will be related to greater use of those outlets.
3. Psychosocial characteristics of drinkers will be heterogeneously related to drinking patterns and use of drinking contexts.
4. Specific individual characteristics related to drinking risks will be associated with drinking at bars.

Methods

A general population telephone survey of 8,790 adults 18 years of age and older was conducted across 50 cities in California, randomly selected from 138 cities between 50,000 and 500,000 population, with each city separated by at least two unselected city or county areas (reducing spatial autocorrelation between sample units). A list assisted stratified random sample of adults 18 years of age and older from households in the 50 cities was surveyed using a computer-assisted telephone interview. List assisted sampling combines random digit dialing of local phone numbers, based on city locations and exchange lists, with numbers available from commercially available telephone (cell and landline) name and address information compiled by vendors with access to these data sources (e.g., credit bureaus). Although random digit dialing techniques were preferred in the past, these are no longer feasible for geographically targeted samples in California. Current research indicates

that list assisted samples differ little from samples developed using random digit dialing [26] [27] [28]. All prospective respondents were sent a pre-announcement letter describing the study and offered the option to opt out of the survey by contacting the survey research firm. Surveys were conducted from January 1, 2009 to March 14, 2010, averaged 24 minutes in length, and were conducted in English or Spanish. Respondents gave verbal consent to participate in the survey and received no remuneration. The refusal rate for the survey was 45% of those contacted. The response rate was calculated to be 48.0% using standard definitions of the American Association of Public Opinion Research [29]. Residential locations of respondents were geocoded to Census block groups using spatial adaptive mask procedures to preclude identification by residential address [30] [31].

Low telephone survey response rates and potential non-response bias are now common problems in social science surveys [27]. These are particular problems in general population surveys sampling from large populations of unscreened adults. Subpopulation surveys (e.g., cohabiting adults of child bearing age) often appear to have much better response rates since the refusing pool includes many non-eligible respondents (who therefore may be classified as non-eligible rather than refused). Partially correcting for potential non-response bias, post-stratification survey weights were constructed in reference to the population of 138 cities based upon population size of persons 18 years of age and older classified by racial (American Indian, Asian, African American, Pacific Islander and White) and ethnic (Hispanic) group membership, gender, and age-groups. Demographic characteristics reflected those of the 50 cities, with 90% of survey weights falling between 0.90 and 1.10. These weights were applied in all of the analyses reported below.

Measures

Primary dependent measures included a dichotomous measure of alcohol use over the past 12 months (53.1 ± 49.9%), frequencies of use over the past 28 days (5.17 ± 7.94 days), frequencies of heavy use (defined as days consuming more than four drinks, 0.11 ± 0.31 days), average drinking quantities on each day of use (1.97 ± 1.55 drinks), and volume (11.14 ± 23.06 drinks). Self-reported frequencies of drinking 1, 2, 3, 6 or 9 or more drinks over the past four weeks (or one year for those drinkers who had not used in the past month) and maximum drinks consumed on any occasion were collected for every drinker. These were used to estimate measures of adult drinking patterns that have been demonstrated to have good reliability and validity in previous work (test-retest reliabilities, $0.65 < r < 0.85$ [32] [33] [32]). Proportionate use of drinking venues was assessed relative to reported frequencies of drinking (see also [9] [19]). These were the proportion of drinking days on which alcohol was consumed at home (0.53 ± 0.38), a bar (0.06 ± 0.18), a restaurant (0.10 ± 0.21), a party (0.08 ± 0.18), or at relatives' or friends' homes (0.23 ± 0.29).

Psycho-social measures included measures of impulse control, tolerance of deviance, risky driving, and engagement in friendship networks with other drinking drivers. The Dickman Dysfunctional Impulsivity Scale [34] measured impulsivity with 7 dichotomous items summed to indicate higher levels of impulsivity (Cronbach's $\alpha = 0.73$). Tolerance of deviance ($\alpha = 0.78$) and high risk driving (related to sensation seeking, $\alpha = 0.75$) were assessed using scales developed by Donovan [35] and Bingham et al [11]. Among drinkers

only, engagement in friendship networks with other drinking drivers was assessed using items asking respondents whether they had friends who had driven after drinking in the past month, been stopped by police for drunken driving, or been arrested or convicted for drunken driving ($\alpha = 0.75$). Demographic measures included effects-coded variables for gender (male vs. female, the excluded category), age groups (30–45, 46–59, and 60-plus vs. 18–29), ethnic group membership (Black, White and Asian vs. other ethnic groups, Hispanic ethnicity separately indicated), education (high school graduate, college graduate, graduate or professional education vs. less than high school), employment (full time and unemployed vs. part-time and other), income ($20,000–$60,000, $61,000–$100,000, greater than $100,000 vs. under $20,000), marital status (married and separated/divorced/widowed vs. single), immigrant status (born outside vs. inside the US) and household size (number of adults 18 years of age and older living in same residence).

Locations of retail alcohol outlets were obtained from the California Department of Alcohol Beverage Control. 99% were successfully geocoded to their street address and categorized as bars or pubs, restaurants, or off-premise places. Across the 50 cities there were 0.458 ± 0.227 on-premise outlets per roadway mile (0.403 ± 0.200 restaurants, 0.056 ± 0.035 bars and pubs) and 0.270 ± 0.128 off-premise outlets per roadway mile. Statistical models included city-level densities of on-premise outlets and the proportion of these outlets which were bars or pubs (0.119 ± 0.044). This minimized collinarity among the outlet measures. Supplementary outlet density measures were calculated for areas within 500 meters of the masked location of each respondent's residence (some measurable spatial error accrued from masking; controls for this source of error were not significant in specification tests). Effects related to local measures of availability were not significant in all supplementary analyses.

Finally, standardized instruments were used to assess neighborhood conditions at the individual-level [36] [37]. These included measures of collective efficacy ($\alpha = 0.76$), residential stability (number of years resident in the neighborhood) and disorganization ($\alpha = 0.75$). These measures were aggregated across individuals to obtain city-level indices of social disorganization.

Statistical Approach

Multilevel random effects models (REMs) were used to assess relationships between city- and individual-level measures and drinking patterns [38], using logistic REMs for dichotomous measures of drinker status and heavy drinking, and censored regression (TOBIT) REMs for drinking frequencies, logged quantities and logged volumes (zero censored). Censored regression models corrected for downward bias in coefficient estimates due to the impacts of censoring at lower bounds of estimation.

Doubly censored TOBIT models were used to assess relationships of covariates to proportionate frequencies of use of drinking contexts. The dependent measure in each case was the proportion of drinking days on which each context was used, ranging from 0.00 to 1.00. This aspect of the model realistically reflected the available data; many respondents drank infrequently (from 1 to 6 times a month), often in only one location creating a surfeit of zeros and ones. Whereas logistic models must interpolate these values in some way, they can be directly incorporated into a censored regression framework [38].

Since the use of drinking contexts is likely a function of drinking patterns (e.g., use of more contexts with greater drinking frequencies), we assessed the impacts of drinking on the use of contexts using a dose-response framework from previous studies [33]. The model distinguishes effects related to drinking (frequencies) from effects related to continued drinking volumes (the volume consumed beyond the first drink). This provided an assessment of the linear increase in risks related to each additional drink consumed [39].

Finally, of the 8,790 sampled cases, 2.7% had missing values on the measure of drinker status or one or more covariates; an additional 1.6% had missing data on one or more other drinking measures. These missing values reduced the full set of respondents available for analysis to 8,553 for the analysis of drinker status and 4,770 for analyses of drinking patterns and the use of drinking contexts among drinkers. Missing data arose most among young, male, white respondents but overall demographic differences between missing and non-missing cases were not significant. For this reason analyses of the complete set of 8,553 and 4,770 drinkers are presented here.

Results

Table 1 presents descriptive statistics on all independent measures for all respondents (left side of table) and drinkers only (right side of table). Table 2 presents coefficient estimates from logit and censored regression analyses of drinking measures. Effects estimates are grouped by individual-level socio-demographic and personality measures, then measures of city-level drinking environments and social disorganization. Standard deviations of random effects for level two outcomes are presented for all analyses. Standard deviations of errors are also presented for censored regressions. The statistical contribution of each block of variables to each analysis was calculated using likelihood ratio chi-square statistics. Two-tailed $p = 0.050$ significance tests are reported only for those variables which appear in blocks which were found significant at a Bonferroni adjusted p-value of 0.001 (45 block tests conducted across all analyses presented). This procedure provides reasonable protection against Type I errors likely to arise when interpreting the 320 coefficient estimates.

The estimates in Table 2 show that prevalence of alcohol use was greater among young white males with higher educations and incomes, employed full time, single, and born inside the US. Drinkers were more likely to be found in cities with greater collective efficacy and lower levels of neighborhood disorganization. Among those who drank, frequency of use was greater among older white males with greater incomes who were not employed full time. Importantly, frequencies of drinking were related to greater impulsivity and less risky driving. Drinking frequencies were greater in cities with greater densities of on-premise outlets, and higher proportions of bars.

Among those who drank, average quantity consumed was greater among young Hispanic males, persons with less education and greater incomes, who were single, born inside the US or unemployed. Greater impulsivity, risky driving and membership in a DUI network were also related to greater drinking quantities. Heavier drinking was associated with much the same measures with the exceptions that white (rather than Hispanic) males were more likely

to engage in this pattern of use. Heavier drinking was also associated with greater tolerance of deviance. Finally, volume consumed was greater among white males with greater education and incomes, born inside the US, and living in smaller households who exhibited greater impulsivity and tolerance of deviance and lived in cities with greater densities of on-premise establishments, greater proportions of bars, greater collective efficacy and less neighborhood disorganization.

Table 3 presents coefficient estimates from censored regression models of the proportionate use of drinking contexts. The results are formatted like those in Table 2, but also include effects related to drinking frequencies and continued volumes. As shown, greater drinking frequencies were associated with proportionately greater drinking at home and proportionately less drinking outside the home. Greater volumes were related to proportionately greater drinking at bars and at friends' or relatives' homes. Males were more likely to drink at home and females to drink outside the home. Drinking was most frequent at home among blacks, at parties or friends' and relatives' homes among Hispanics, and at restaurants among whites. Greater education was associated with drinking at restaurants, parties and at friends' or relatives' homes. Married drinkers drank more often at home, younger drinkers at bars, unemployed persons at parties and friends' or relatives' homes, and those with higher incomes in restaurants and bars. Controlling for these effects, greater drinking at bars was related to greater impulsivity, less tolerance of deviance, greater risky driving and memberships in DUI networks. Greater drinking at restaurants was related to greater risky driving. Greater drinking at parties was related to greater impulsivity and risky driving, and risky driving was also related to drinking at restaurants and friends' or relatives' homes. City-level on-premise outlet densities were related to greater use of bars and restaurants.

Discussion

The results provide support for all four research hypotheses. Supporting hypothesis one, greater on-premise outlet densities were related to drinking frequencies and volumes; greater proportions of bars among on-premise establishments were related to greater drinking frequencies, quantities, heavy drinking and volumes used. Supporting hypothesis two, greater on-premise outlet densities were related to proportionately greater use of bars and restaurant. These two observations show that greater on-premise densities were related to heavier drinking outside the home, particularly in bars. These observations are also consistent with the economic objectives of commercial alcohol establishments and are important to the social ecology of alcohol problems. Permitted forms of commercial availability are related to patterns of use in drinking contexts and potentially affect risks related to drinking in those contexts.

In support of hypothesis three, the results provide evidence that specific psychosocial characteristics are associated with drinking in different contexts. While greater drinking frequencies were associated with proportionately greater use at home and less use outside the home, greater drinking volumes were associated with proportionately greater use outside the home at bars and friends' or relatives' homes. In addition, greater frequencies and volumes of use were related to impulsivity, risky driving, and membership in social

networks with other drinking drivers. Finally, greater use at bars and parties was associated with greater impulsivity and risky driving, while membership in social networks with other drinking drivers was related to less drinking at home and more drinking at bars. This general pattern of results shows that the uses of drinking contexts are highly differentiated with respect to drinker characteristics and drinking patterns, and we presume drinking risks. Thus, in support of hypothesis four, bars emerge as high risk environments with a confluence of risk characteristics associated with problems [7][40].

Selection and Influence

The current study provides insights into the broad effects greater outlet densities may have on drinking and problems in community settings. One of the primary arguments for understanding alcohol use and related problems in terms of community systems [4] is that changes in small system inputs, such as outlet densities, may have large multiplicative effects on system outputs, alcohol problems. These effects can arise when a system input has identifiable effects on more than one system component. The current study suggests that bar densities are specifically associated with greater levels of alcohol use and greater use of these drinking settings. These multiplier effects may underlie observed impacts of alcohol outlets on problems. As such, greater numbers of bars within communities may act as a social pump, multiplicatively affecting problems through several impacts on the ecological system underlying use and problems.

These model-based causal arguments must, however, be viewed with caution. This study confirms the existence of expected correlations that arise among a suite of ecological, demographic and psychosocial measures in a large sample of drinkers. Estimates of these relationships do not distinguish whether drinkers' selection of places or social influences in those places affect drinking patterns and problem outcomes [41]. While there is growing evidence of the social processes that lead to problems in certain drinking environments like bars [40], critical tests of the selection of drinkers into these contexts have not been made. The current research provides one ecological framework for such work and presents empirical findings that begin the process of identifying ecological correlates of high risk drinking.

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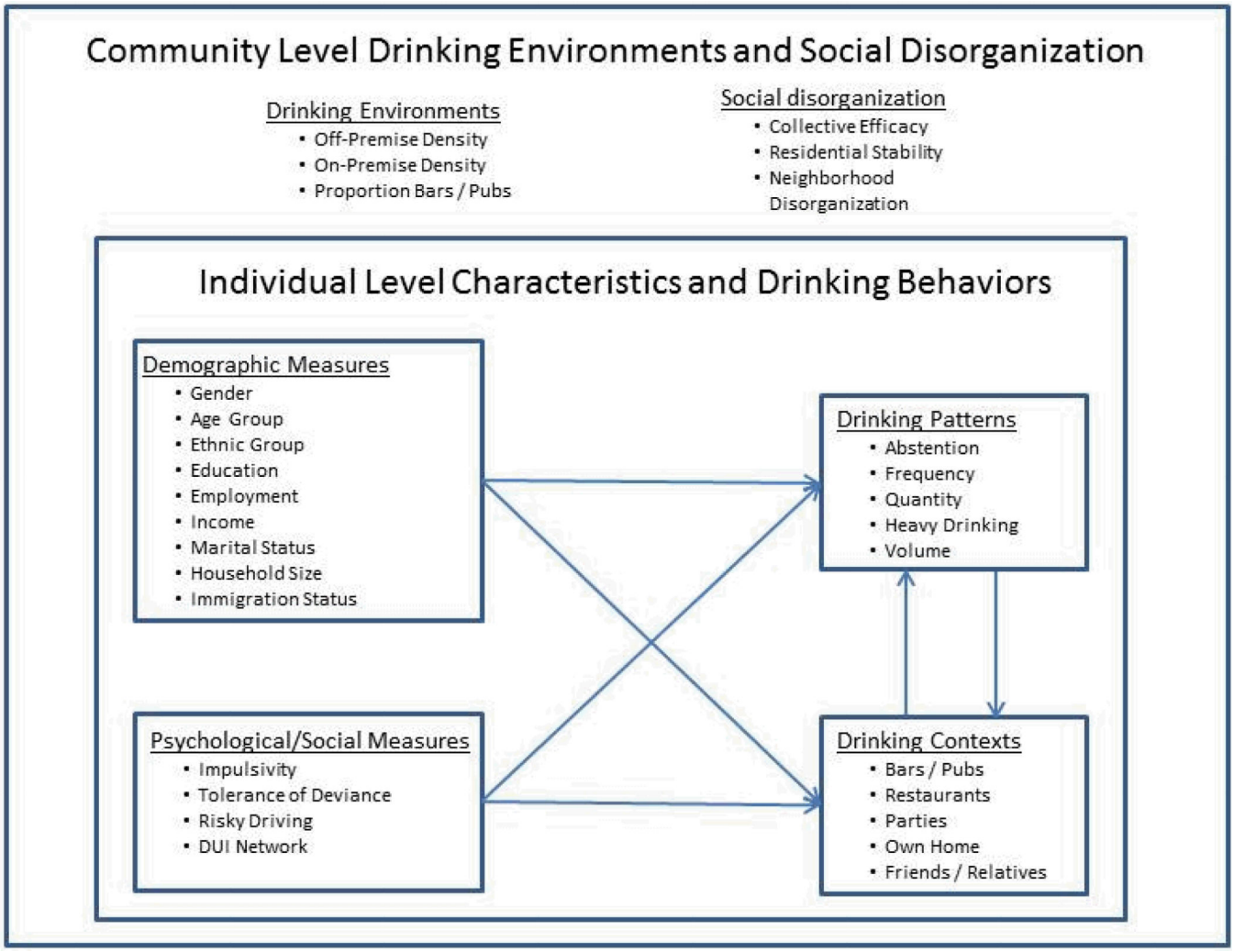

Figure 1.

Conceptual relationships between community-level and individual-level correlates of drinking patterns and use of drinking contexts

Table 1

Descriptive statistics for study variables grouped by socio-demographic, personality, drinking environment and social disorganization measures.

	All Respondents:		Drinkers Only:	
Variable:	**Mean:**	**sd:**	**Mean:**	**sd:**
Gender				
Proportion Male	0.495	0.500	0.563	0.496
Ethnic Group				
Proportion Black	0.043	0.203	0.044	0.206
Proportion Hispanic	0.426	0.494	0.327	0.469
Proportion White	0.410	0.492	0.516	0.500
Proportion Asian	0.091	0.288	0.085	0.279
Education				
Proportion High School Graduate	0.442	0.497	0.434	0.496
Proportion College Graduate	0.218	0.413	0.265	0.441
Proportion Professional School	0.165	0.371	0.212	0.409
Marital Status				
Proportion Married	0.584	0.493	0.586	0.493
Proportion Separated/Divorced/Widowed	0.162	0.368	0.155	0.362
Immigration Status				
Proportion Born Outside US	0.394	0.489	0.281	0.450
Household Size				
Number of Adults	1.893	0.979	1.857	0.909
Age Group				
Proportion 30–45	0.311	0.463	0.298	0.457
Proportion 46–59	0.203	0.402	0.228	0.420
Proportion 60+	0.219	0.414	0.220	0.414
Employment				
Proportion Full time	0.386	0.487	0.456	0.498
Proportion Unemployed	0.103	0.303	0.092	0.289
Income				
Proportion $20–$60K	0.324	0.468	0.325	0.468
Proportion $60–$100K	0.172	0.378	0.222	0.415
Proportion >$100K	0.158	0.365	0.228	0.420
Personality Characteristics				
Impulsivity (0–7)	1.221	1.602	1.106	1.578
Tolerance of Deviance (0–12)	0.854	1.416	1.798	1.417
Risky Driving (0–14)	-----	-----	4.501	2.613
DUI Network (0–3 or more in Network)	-----	-----	0.582	0.955
Drinking Environments				

	All Respondents:		Drinkers Only:	
Variable:	**Mean:**	**sd:**	**Mean:**	**sd:**
On-Premise Density per Roadway Mile	0.403	0.182	0.403	0.182
Off-Premise Density per Roadway Mile	0.265	0.114	0.265	0.114
Proportion Bars per Roadway Mile	0.121	0.039	0.121	0.039
Social Disorganization				
Collective Efficacy (City-Level Scale)	7.511	0.367	7.511	0.367
Residential Stability (City-Level; Years in City)	15.105	2.804	15.105	2.804
Neighborhood Disorganization (City-Level Scale)	6.260	0.459	6.260	0.459

Table 2

Drinking outcomes associated with socio-demographic, personality, drinking environment, and social disorganization measures.

	DRINKER STATUS:			FREQUENCY:			LN(QUANTITY):			HEAVY DRINKING:			LN (VOLUME):		
Variable	**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**	
Constant	0.3259	0.561		2.5227	0.644		0.0516	0.161		−2.1295	−1.671		−0.4118	−0.384	
GENDER															
MALE	0.1186	6.634	*	1.0805	8.152	*	0.1398	12.960	*	0.4181	8.990	*	0.4279	11.765	*
ETHNIC GROUP															
BLACK	−0.0629	−0.854		−0.9101	−1.214		−0.0231	−0.513		−0.1018	−0.494		−0.3270	−2.065	*
HISPANIC	0.0501	1.071		−0.1904	−0.416		0.1030	3.536	*	0.0242	0.193		−0.0862	−0.869	
WHITE	0.2777	7.071	*	2.1200	6.137	*	0.0263	1.082		0.2545	2.424	*	0.5807	7.067	*
ASIAN	−0.2441	−3.498	*	−1.8854	−2.383	*	−0.2001	−4.290	*	−0.1982	−0.918		−0.6771	−4.102	*
EDUCATION															
HIGH SCHOOL GRADUATE	0.2256	7.034	*	0.1835	0.466		0.0207	0.953		0.0167	0.163		0.1898	2.255	*
COLLEGE GRADUATE	0.3043	8.468	*	0.2464	0.607		−0.0401	−1.709		−0.1290	−1.189		0.2589	2.908	*
PROFESSIONAL	0.3024	7.916	*	0.5977	1.455		−0.0790	−3.188	*	−0.2269	−1.975	*	0.2885	3.133	*
MARITAL STATUS															
MARRIED	−0.0543	−2.086	*	0.2867	1.370		−0.0747	−5.003	*	−0.1707	−2.957	*	−0.0225	−0.442	
SEPARATED/DIVORCED/WIDOWED	−0.0102	−0.347		0.1481	0.657		−0.0251	−1.442		−0.0548	−0.805		−0.0360	−0.627	
IMMIGRATION STATUS															
BORN OUTSIDE US	−0.1612	−6.178	*	−0.3874	−1.875		−0.0539	−3.468	*	−0.2811	−4.151	*	−0.2341	−4.391	*
HOUSEHOLD SIZE															
NUMBER OF ADULTS	−0.0035	−0.180		−0.2946	−1.682		0.0027	0.233		−0.0022	−0.047		−0.0014	−2.450	*
AGE GROUP															
30–45	−0.0296	−0.830		0.1394	0.354		−0.0027	−0.128		0.0064	0.081		−0.0018	−0.024	
46–59	−0.0498	−1.397		0.5318	1.379		−0.0679	−3.194	*	−0.1427	−1.763		0.0794	1.048	
60+	−0.1195	−3.221	*	1.3594	3.427	*	−0.1761	−7.700	*	−0.3584	−3.826	*	0.1212	1.507	
EMPLOYMENT															
FULL TIME	0.1341	6.299	*	−0.3586	−2.260	*	0.0118	0.953		0.0284	0.548		−0.0027	−0.066	
UNEMPLOYED	0.0265	0.758		−0.5264	−1.676		0.0622	2.974	*	0.1407	1.748		−0.0918	−1.285	

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	DRINKER STATUS:			FREQUENCY:			LN(QUANTITY):			HEAVY DRINKING:			LN (VOLUME):		
Variable	**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**	
INCOME															
$20–$60K	0.1980	8.983	*	0.2099	1.068		0.0168	1.132		0.0610	0.847		0.0810	1.599	
$60–$100K	0.3545	12.376	*	0.6474	0.003		0.0350	1.982	*	0.1216	1.487		0.2701	4.652	*
> $100K	0.4399	13.581	*	1.2529	5.402	*	0.0825	4.212	*	0.1804	2.045	*	0.4191	6.636	*
PERSONALITY															
IMPULSIVITY	0.0088	0.732		0.2001	2.088	*	0.0151	2.009	*	0.0417	1.430		0.0618	2.446	*
TOLERANCE OF DEVIANCE	−0.0184	−1.393		0.1867	1.903		0.0141	1.803		0.0872	3.076	*	0.0610	2.341	*
RISKY DRIVING	---	---		−0.1447	−2.630	*	0.0101	2.301	*	0.0261	1.497		−0.0183	−1.233	
DUI NETWORK	---	---		0.0133	0.080		0.0271	2.189	*	0.1347	2.968	*	0.0639	1.516	
DRINKING ENVIRONMENTS															
ON-PREMISE DENSITY	0.1185	1.204		2.9671	4.688	*	−0.0334	−0.578		−0.1403	−0.622		0.6274	3.394	*
OFF-PREMISE DENSITY	0.0463	0.277		0.5662	0.426		0.1917	1.762		0.1014	0.230		−0.0246	−0.068	
PROPORTION BARS	0.5820	1.311		8.3426	2.676	*	0.5292	2.093		2.3365	2.272		2.7241	3.285	*
SOCIAL DISORGANIZATION															
COLLECTIVE EFFICACY	0.1371	2.641	*	0.8269	2.394		0.0072	0.251		−0.0047	−0.041		0.2827	2.956	*
RESIDENTIAL STABILITY	0.0051	0.880		−0.0784	−1.778		0.0030	0.882		−0.0036	−0.253		−0.0211	−1.863	
NEIGHBORHOOD DISORGANIZATION	−0.1030	−2.192	*	−0.5266	−1.685		−0.0219	−0.854		−0.0568	−0.541		−0.1789	−2.097	*
S. D. of Random Effects	0.1559	9.084	*	1.4230	11.269	*	0.1603	15.551	*	0.1885	4.635	*	0.6437	17.110	*
Standard Deviation of Error (TOBIT)				8.482	69.078	*	0.651	71.133	*				2.124	47.725	*

Table 3

Proportional use of drinking contexts associated with socio-demographic, personality, drinking environment, social disorganization and drinking measures.

	PROPORTION HOME:			PROPORTION BAR:			PROPORTION RESTAURANT:			PROPORTION PARTY:			PROPORTION FRIENDS / RELATIVES:		
Variable	**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**	
Constant	0.6562	2.882	*	0.6549	0.922		0.0868		0.249	−0.4324	−0.858		−0.1699	−0.523	
GENDER															
MALE	0.0353	4.848	*	−0.0240	−1.011		−0.0904	−7.546	*	−0.0492	−2.899	*	−0.0524	−4.759	*
ETHNIC GROUP															
BLACK	0.0993	3.106	*	0.0550	0.589		0.0097	0.203		0.0002	0.003		−0.0881	−1.982	*
HISPANIC	0.0105	0.557		−0.0218	−0.362		−0.0070	−0.226		0.1156	2.517	*	0.0955	3.278	*
WHITE	−0.0164	−1.019		−0.0272	−0.539		0.0723	2.854	*	0.0161	0.424		0.0047	0.197	
ASIAN	−0.0295	−1.021		−0.0371	−0.400		−0.0129	−0.281		−0.0738	−1.072		0.0977	2.214	*
EDUCATION															
HIGH SCHOOL GRADUATE	0.0094	0.654		0.1202	2.117	*	0.0806	2.793	*	0.0598	1.639		0.0320	1.413	
COLLEGE GRADUATE	0.0081	0.515		0.1756	2.887	*	0.1325	4.371	*	0.0776	1.971	*	0.0537	2.188	*
PROFESSIONAL	0.0120	1.207		0.1042	1.701		0.1049	3.368	*	0.1430	3.428	*	0.0575	2.247	*
MARITAL STATUS															
MARRIED	0.0586	6.037	*	−0.1577	−4.710	*	−0.0159	−0.959		0.0030	0.125		−0.0393	−2.513	*
SEPARATED/DIVORCED/WIDOWED	0.0175	1.585		−0.0524	−1.408		0.0130	0.711		−0.0130	−0.464		−0.0019	−0.108	
IMMIGRATION STATUS															
BORN OUTSIDE US	0.0023	0.222		−0.0880	−2.553	*	−0.0431	−2.484	*	0.0322	1.294		0.0125	0.781	
HOUSEHOLD SIZE															
NUMBER OF ADULTS	−0.0015	−0.188		−0.0391	−1.416		−0.0271	−1.954		−0.0031	−0.155		−0.0007	−0.054	
AGE GROUP															
30–45	0.0414	3.110	*	−0.1145	−2.599	*	0.1041	3.997	*	−0.0773	−2.290	*	−0.0400	−1.835	
46–59	0.0457	3.402	*	−0.2133	−4.594	*	0.1631	6.264	*	−0.0801	−2.368	*	−0.0676	−3.084	*
60+	0.0394	2.744	*	−0.3640	−6.409	*	0.2059	7.451	*	−0.0661		−1.833	−0.0373	−1.617	

	PROPORTION HOME:			PROPORTION BAR:			PROPORTION RESTAURANT:			PROPORTION PARTY:			PROPORTION FRIENDS / RELATIVES:		
Variable	**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**		**Coef.**	**b/S.E.**	
EMPLOYMENT															
FULL TIME	−0.0132	−1.617		0.0693	2.556	*	0.0346	2.600	*	−0.0334	−1.746		0.0008	0.064	
UNEMPLOYED	−0.0461	−3.483	*	0.0631	1.428		−0.0116	−0.487		0.0917	2.724	*	0.0424	1.974	*
INCOME															
$20–$60K	0.0046	0.488		0.0490	1.406		0.0336	2.043	*	0.0076	0.329		0.0034	0.231	
$60–$100K	0.0075	0.657		0.0637	1.603		0.0765	4.047	*	−0.0077	−0.283		−0.0029	−0.167	
> $100K	−0.0019	−0.148		0.1512	3.514	*	0.1045	4.990	*	0.0183	0.616		0.0011	0.057	
PERSONALITY															
IMPULSIVITY	−0.0079	−1.632		0.0332	2.016	*	−0.0091	−1.068		0.0336	2.824	*	0.0103	1.359	
TOLERANCE OF DEVIANCE	0.0029	0.561		−0.0428	−2.260	*	−0.0071	−0.809		0.0019	0.149		−0.0049	−0.608	
RISKY DRIVING	−0.0042	−1.431		0.0286	2.936	*	0.0277	5.523	*	0.0165	2.274	*	0.0137	2.984	
DUI NETWORK	−0.0216	−2.746		0.0933	3.592	*	0.0233	1.675		0.0249	1.281		0.0146	1.161	
DRINKING ENVIRONMENTS															
ON-PREMISE DENSITY	0.0149	0.396		0.3340	2.645	*	0.1712	2.770	*	0.0330	0.380		0.0215	0.383	
OFF-PREMISE DENSITY	−0.0882	−1.309		−0.1458	−0.583		−0.1412	−1.150		0.2333	1.394		0.0390	0.366	
PROPORTION BARS	0.1956	1.169		−0.0493	−0.090		−0.1043	−0.383		−0.0632	−0.161		−0.0112	−0.045	
SOCIAL DISORGANIZATION															
COLLECTIVE EFFICACY	0.0216	1.120		−0.1542	−2.450		0.0477	1.560		0.0241	0.534		0.0495	1.703	
RESIDENTIAL STABILITY	−0.0036	−1.640		−0.0085	−1.180		0.0023	0.609		−0.0015	−0.291		0.0051	1.511	
NEIGHBORHOOD DISORGANIZATION	−0.0139	−0.807		−0.0513	−0.891		−0.0355	−1.251		−0.0199	−0.498		−0.0058	−0.226	
DRINKING FREQUENCY	0.0083	5.651	*	−0.0089	−2.236	*	−0.0114	−5.930	*	−0.0118	−4.092	*	−0.0186	−10.483	*
CONTINUED DRINKING VOLUME	0.0002	0.276		0.0063	4.034	*	−0.0012	−1.338		0.0020	1.557		0.0017	1.997	*
S. D. of Random Effects	0.0049	0.731		0.1276	5.352	*	0.1794	14.362	*	0.0495	3.107	*	0.0435	4.227	*
Standard Deviation of Error (TOBIT)	0.4540	51.073	*	0.9791	16.153	*	0.6441	37.095	*	0.8647	21.481	*	0.6444	34.797	*

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