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Assessing the Validity of On-Premise Alcohol License Data in Six Communities in California: Operating Characteristics and Outlet Densities

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Abstract

This study evaluated State of California alcohol license records as a measure of businesses selling alcohol for consumption on premise. In 2008, researchers attempted to visit all 799 licensed restaurants, bars, and pubs in six medium-sized cities near San Francisco. Surveys collected detailed business characteristics for a subsample of 151 bars or restaurants that included a separate bar area. Results suggest inaccuracies of official records regarding license locations and types (bar/pub vs. restaurant). Analyses also indicate that establishment characteristics are related to local alcohol outlet densities. Study implications and limitations are discussed.

Keywords

alcohol licenses; outlet density; availability

INTRODUCTION

A growing research literature investigates the relationship of alcohol outlet density with alcohol use and related problems, with one recent review citing over 100 studies (Campbell et al., 2009). Prior studies indicate that greater concentrations of alcohol outlets are associated with greater alcohol sales (Gruenewald, Ponicki, & Holder, 1993), survey measures of alcohol use (Gruenewald, Treno, & Johnson, 2002) and problems such as drinking and driving (Treno, Ponicki, Remer & Gruenewald, 2008), violence (Toomey et al., 2012), and childhood abuse and neglect (Freisthler & Weiss, 2008). Past studies identify substantial differences in effect between various types of alcohol outlets, with bars being more positively related to violence (Friesthler, Needell, & Gruenewald, 2005; Gruenewald & Remer, 2006; Lipton & Gruenewald, 2002; Mair, Gruenewald, Ponicki, & Remer, 2013) while alcohol-serving restaurants are more positively associated with local counts of traffic crashes (Ponicki, Gruenewald, & Remer, 2013; Scribner, MacKinnon, & Dwyer, 1994).

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Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Despite the wide use of outlet density measures for assessing health impacts related to the physical availability of alcohol, we know of no research that has assessed the validity of the license data typically used to measure counts and types of outlets. Outlet densities in US studies are generally calculated using alcohol beverage licensing data, which is available from most state alcohol beverage control agencies. Although varying in content from one state to another, these records typically specify the premise location, the types of alcoholic beverages that may be served, and whether the alcohol is to be consumed on-premise (e.g., bars, restaurants, or clubs) or off-premise (liquor or grocery stores). Inaccurate outlet counts may substantially bias statistical estimates of effects related to outlet densities, leading to improper recommendations for alcohol control policy. Misclassifications of outlet types make it difficult to differentiate the specific impacts of bars relative to other on-premise alcohol establishments, further reducing the policy relevance of empirical studies.

Although prior research has focused primarily on outlet density effects in total or within broad categories, some recent work suggests that specific outlet characteristics matter in terms of public health outcomes. For example, recent bar studies have identified operating characteristics of these outlets specifically related to drinking problems (Graham & Homel, 2008) and theoretical models have suggested that some of these characteristics will be more prevalent (e.g., larger outlets) and differentiated (e.g., forms of entertainment) in high-density areas (Gruenewald, 2007). The economic and social processes by which these effects arise are fairly well understood: Retail and urban housing markets interact to concentrate alcohol outlets in specific retail areas of communities proximate to consumers and spatially clustered due to shared market factors (Brakman, Garretsen, & van Marrewijk, 2009; DiPasquale & Wheaton, 1996). Competition among these outlets will lead to greater average establishment size and market segmentation. Linked social processes lead consumers to segregate across outlets (i.e., assortative drinking) and otherwise similar outlets (e.g., bars) to appeal to different market segments (e.g., sports bars). As Gruenewald (2007) notes, one negative consequence of these processes is the concentration of problem drinkers into establishments which support and maintain problem behaviors like drunken driving and alcohol-related violence.

Not surprisingly, efforts to maintain market advantage in areas with high concentrations of alcohol outlets can also lead to competition for advantageous license conditions such as later alcohol sales and lenient restrictions on location and density. Bars, for example, have been more stringently regulated than other on-premise establishments in many states since the end of prohibition (Edwards et al., 1994), and there are several such regulatory differences in California. For example, it is a misdemeanor for bars in the state to allow entry to persons under age 21 (Business and Professions Code § 25665) but restaurants are not restricted in this regard. California's local authorities also have greater authority to restrict the opening of new bars, as opposed to restaurants, in areas of the state with "undue concentrations" of existing outlets (§ 23790; Colman & Sparks, 2006). In addition, California cities have reportedly been far more likely to use zoning powers to control bars than restaurants (conditional use permits; Wittman, Sparks, Ernst, Linden, & McGaffigan, 2010). Consequently, the state's on-premise alcohol licensees have an incentive to bypass these restrictive regulations by obtaining a restaurant license but operating their establishment as a bar, especially in late night hours (Wittman et al., 2010). Anecdotally, it appears that such

processes can lead to substantial problems in areas with high concentrations of these restaurants in high-income areas (CBS San Francisco, 2012).

Clearly, given these concerns, the validation of license types and the identification of effective operating characteristics of licensed outlets are crucial steps to formulating effective regulations to reduce alcohol-related problems. In this paper, we investigate these issues using data from scouting and premise surveys of all licensed on-premise alcohol outlets in six California cities. We address two research questions: First, do government license records accurately identify the locations, types, and general operating characteristics of on-premise outlets actively selling alcohol in California? Second, do the operating characteristics of these outlets (e.g., size, number of staff and patrons, etc.) vary as a function of hours of operation (early vs. late evening hours) and local densities of similar outlets?

MATERIALS AND METHODS

We attempted to locate and then identify operating characteristics of all licensed on-premise alcohol outlets in six cities in California. The six cities were a subset of those from a sample of 50 with between 50,000 and 500,000 residents conducted as part of a larger study of the social ecology of alcohol problems in the state. For ease of data collection, the communities were restricted to those within the greater San Francisco Bay Area. The cities were selected to provide a broad range of bar and restaurant densities with two having higher than average densities of bars and restaurants (per person), two having lower than average densities of both license types, and two having complementary levels, low-high and high-low, of both outlet types. A list of 799 active on-premise alcohol licenses with unique premise addresses was obtained from the California Department of Alcohol Beverage Control (ABC) records as of August 26, 2008. By ABC license category, there were 658 restaurants (license-type 41 or 47), 97 bars (types 40, 42, 48, or 61) or pubs (types 23 or 75), 19 clubs (types 50, 51, or 52), and 27 listed as “pending.” Pending licenses are considered active by ABC, although they may not correspond to open businesses.

Preliminary Scouting Survey

A scouting survey of all 799 ABC licensed outlets was completed within one month of acquisition of the ABC license list. Scouts traveled to each location and noted whether any alcohol establishment existed at the specified address or whether an outlet was visible on or within the nearby block face. This procedure accommodated the 3.6% of ABC records which did not specify a “doing business as” name or were located within multiunit buildings (e.g., a mall). Scouting attempts that failed to locate an alcohol outlet were repeated up to six times by other scouts. The goal was to verify the accuracy of specific premise addresses from ABC records, so no attempt was made to find outlets on alternate block faces or in different locations. Once an outlet was located, scouts recorded whether the premise appeared to be in business, hours of operation, and whether the establishment was a “bar,” or “restaurant with bar service.” For purposes of the scouting visit, “bars” were defined as those outlets which exclusively served alcohol with no food service. “Restaurants with bar service” were defined as those with physically separated (by walls, rails, or a step up or

down from the table service) alcohol-serving areas (as opposed to a sushi bar or checkout counter) with a dedicated bartender who served patrons directly.

Detailed Premise Survey

Surveyors returned to 151 outlets identified by scouts as bars, pubs, or restaurants with bar service (see results). Each of these premises was scheduled to be surveyed twice, once between 8 PM and 11 PM, and another time after 11 PM if the outlet remained open, with one visit conducted on a Friday and the other on a Saturday night. Surveyors entered each establishment and stayed for approximately 20 min in order to observe specified physical characteristics and the numbers and types of clients and staff. The surveyors were trained to identify patrons exhibiting specific indicators of intoxication including slurred speech, staggering, lack of coordination, being overly friendly or belligerent for no reason, slumping over table or bar, or consuming multiple drinks in a short time. The surveyors also subjectively judged whether each outlet appeared more like a bar or a restaurant based on whether alcohol or food appeared to account for the preponderance of the establishment's sales.

Analyses

Scouting-phase observations were used to assess the accuracy of local outlet counts by license type based on the premise addresses from the ABC's active-license list. The remaining analyses were based on the subsample of bars, pubs, and restaurants with separate bar areas that were selected for detailed premise surveys in the second phase. The first analyses compared license types listed in the ABC database to the surveyors' perceptions of whether the premise operated more as a bar or a restaurant based on the primacy of alcohol vs. food service. A second set of analyses used regression models to assess differences in premise operating characteristics by outlet type, investigating whether establishments licensed as restaurants, but identified by scouts as having bar service, tended to operate more like bars in late evening hours. Linear specifications were used for measures of length of bar in feet, numbers of patrons upon arrival, patron intoxication rate, and patron throughput (patrons upon arrival plus estimated entry over 2 hr). Logit specifications were used for two binary outcomes indicating the presence of smoking and dancing. Ordered logit models were used for ordinal measures including an activity index (count of activity types: games, sports bar, stage, television, dancing, or "other"), lighting and noise levels, and available seating, servers, security, and bartenders (LIMDEP 9.0 software, Greene, 2007). City-specific dummy variables were included in preliminary analyses and retained if jointly significant. A third set of analyses assessed the association between these same outlet characteristics and the city-level and local densities of bars, pubs, and restaurants offering bar service. These multilevel models included fixed effects for city-specific outlet density (level 2) and concentration of outlets within 500 m of each establishment (level 1) while employing city-specific random intercepts to allow for unexplained community-wide differences in any particular characteristic (Greene, 2007). Multilevel linear, logit, and ordered logit specifications were used, depending on the distributional properties of the outcome measure. Since the sampling design limits generalizability to outlets in the six cities themselves, not to all other cities in the state or in the US, we provide p -values assuming both infinite (e.g., generalizing to all cities with populations between 50,000 and 500,000 in the state) and

finite population sizes (e.g., somewhat more appropriately referring to outlets only within the six cities, Thompson, 1992).

RESULTS

As shown by the descriptive statistics in Table 1, the scouting survey established that 8.9% of ABC licensed on-premise outlets either could not be located (39, 4.9%) or were out of business (32, 4.0%). These percentages varied somewhat by license type, with Club licenses less likely to be located or in business when located. Moreover, 6.4% of active licenses were either out of business or could not be located, but 63.0% of pending licenses were found to be active; this is not surprising given that several weeks may have passed between the time the list was obtained and the premise located, providing time for pending outlets to become active. Almost half (5 of 12, 41.7%) of licenses that had been listed by ABC with status “surrendered, not in use” were found and were in business at the time of the scouting survey, while all of the licenses listed as inactive due to nonpayment or indefinite suspension were located but found to be out of business.

Of the 728 establishments that could be scouted, 11 were excluded from the detailed data collection because they closed before 8 pm, the start time of the first period for detailed observations, or were closed due to ABC license suspension. An additional 541 were excluded because they operated as restaurants without separate bar areas. Seventeen clubs were excluded because they presented significant problems in access such as cover charges or queues to enter. Eight premises were excluded from analyses as they could not be surveyed prior to 11 PM. This left a subsample of 151 bars, pubs, or restaurants with bar areas for use in subsequent analyses. Of these, 63 (41.7%) were surveyed both before and after 11 pm, while 88 were only open for the early-evening survey.

Observed Versus Licensed Establishment Types

A key question to ask about the operations of the 151 bars, pubs, and restaurants with separate bar areas is whether their licensing and operating characteristics cohere. Of the 38 establishments licensed as bars or pubs, 13.6% were judged by surveyors as primarily providing food service, effectively operating as restaurants. Of the 107 establishments licensed as restaurants but having a separate bar area, 14.0% were recorded as operating as bars with limited or no food service. Combining all license types, 13.9% appeared misclassified by these criteria.

Early and Late Operating Characteristics

Table 2 presents analyses relating observed establishment characteristics to license type and time of observation among the 63 selected premises that were open and surveyed both before and after 11 PM. Separate regression models were estimated for the 13 premise characteristics listed in the left column of the table. Each measure was regressed over an indicator of license type (restaurant vs. bar or pub), an indicator of whether the observation was from the early or late night period, and their interaction. The right column of the table indicates that city-level dummy variables were included in the final analyses explaining the activity index and number of servers, the only two models in which they were jointly

significant. Licensed restaurants had more seats, servers, patrons, throughput, intoxication, and lighting, but shorter bars and less noise, activities, smoking, bartenders, and dancing. During the late night period, premises of any license type exhibited more patron intoxication and dancing, but less seating and smoking. As the night progressed, outlets licensed as restaurants appeared more like bars, exhibiting increases in smoking and bartenders relative to nonrestaurant licensees, but with some declines in evidence of patron intoxication.

Characteristics Related to Outlet Density

Table 3 summarizes the results of 13 separate multilevel regression analyses, with each row relating a specific establishment characteristic such as noise level to outlet densities at the city and local levels. These analyses excluded 12 of the 151 establishments in the final sample that were located outside city boundaries despite being within city zip codes. The left portion of the table shows level-2 effects relating city-specific outlets per square kilometer to each outlet characteristic. The right portion displays the level-1 effects of local density, defined as the number of outlets within 500 m of a given establishment. Only one ostensibly significant effect related city level outlet density to a lower probability of observing dancing in these outlets. However, the local measure of outlet density was positively related to establishment noise, rates of patron throughput and intoxication, and counts of total patrons, servers, security, and bartenders. Local outlet density was negatively associated with the establishments' activity index, lighting, and smoking.

DISCUSSION

The validity of alcohol beverage license data depends on whether each outlet is at the location identified and, if so, open and operating as the type of establishment identified in the record. We were unable to locate operating alcohol outlets at nearly 9% of the premise addresses identified as active ABC licenses. Since scouts and surveyors sent to these address locations were also asked to assess whether any other neighboring location could be the outlet of interest (and found none), it appears that on-premise license counts from these ABC records may overstate the number of outlets in these cities. It remains possible that the scouts and surveyors missed some in-business establishments due to inaccurate ABC premise addresses. However, if the observed overstatement of license counts is a problem general to all ABC license data, current estimates of outlet effects will be understated relative to their true impacts on alcohol use and problems.

In addition to overstating the numbers of outlets, the results suggest that ABC license data also provide a somewhat misleading breakdown between bar and restaurant licenses. Project surveyors characterized outlets as restaurants or bars depending on whether food service or alcohol sales appeared dominant at an establishment, and these premise-type categorizations disagreed with the ABC license type for 14.0% of the outlets included in the detailed premise survey. It is impossible to draw strong conclusions about the validity of ABC license types based on the surveyors' subjective bar-versus-restaurant characterizations. However, misclassifications of this type would degrade the ability of statistical models to make effective distinctions between outlet types using license data. Table 2 provides further limited evidence that restaurant characteristics become more similar to those of bars in later

evening hours, with premises having restaurant licenses adding more bartenders in the later hours than do outlets licensed as bars or pubs. These observations lend tentative support to a recent argument that some businesses are operating like bars despite enjoying the less-rigorous regulation imposed on restaurant licensees (Wittman et al., 2010). If this is indeed common, it would represent a weakness in current alcohol control policy. Although California law requires that a licensed restaurant be a “bona-fide eating place,” it does not specify how central food service must be to the business (Business and Professions Code § 23038). The state ABC has historically stipulated that food should represent at least 50% of each restaurant’s sales, but administrative law judges have typically accepted licensees’ claims to meet the “bona-fide” requirement with considerably lower but still significant fractions of sales (Wittman et al., 2010). There are two potential benefits from empowering state alcohol authorities to insist that alcohol outlets obtain a bar license if they will be operating like a bar during any part of the day. First, it would help local authorities in areas with “undue concentrations” of existing outlets to reject new bar licenses, effectively reducing bar density. Second, it would prohibit underage clientele from attending these bar-like establishments, likely reducing harms at these outlets. Even in the absence of state action to strengthen the controls on restaurants, some cities have utilized land-use restrictions (conditional use permits) to accomplish this goal, such as regulating any outlet as a bar if its alcohol sales exceed a specified percentage of total sales receipts (City of Vista, 2011). Cities may also seek to control restaurant licensees’ behavior via their role in approving new outlets in high-density areas (Public Convenience and Necessity, § 23958.4).

Finally, it also appears that the operating characteristics of outlets are systematically different in areas with greater local outlet densities, but are generally not related to citywide concentrations of these premises. On the whole, the effects shown in Table 3 suggest that outlets in high-density areas are larger and more active with more patrons, space, and staff. The data also suggest some greater levels of intoxication and specialization in forms of entertainment, consonant with expectations with regard to market segmentation related to spatial competition among outlets.

In summary, the results of this study suggest caution in using alcoholic beverage license data as an indicator of on-premise outlet locations. A substantial proportion of outlets with active licenses could not be located or were out of business, and the data suggest that some licenses may be misclassified in terms of premise type. Higher accuracy of licensing data in terms of location and license type would be desirable for both estimating accurate outlet effects and for assuring that bar-like outlets are regulated like bars. The regression analyses indicate that outlet characteristics differ substantially by license type as well as by local outlet densities. These findings suggest the importance of policies that assess the issuance of new licenses based on existing outlet densities as well as measures to assure that premises licensed as restaurants actually operate in the manner of that license type.

Limitations

The premise survey conducted for this project involved several important limitations. It was a convenience sample of cities in the San Francisco Bay Area and thus the current results may not generalize well to other areas of California, and even less to alcohol licenses outside

the state. The inclusion of only six cities limits statistical power to identify community-level outlet density effects in the multilevel analyses (Table 3), while the sample of 151 outlets included in the detailed premise survey provides limited power for inferences beyond these cities. Not all premises could be visited due to access restrictions at clubs or restricted operating hours at other establishments, which may make the current results less generalizable to other situations. The 20 min observation period in the detailed surveys may not be sufficient to accurately characterize each outlet's environment. Although each surveyor received several hours of training including visits to multiple example establishments, subjectivity was unavoidable in assessments about patron intoxication or whether a premise was a bar or restaurant based on the proportion of business from food sales. Although premises were visited both early and late to investigate changes in operating conditions over the course of the evening and night, the survey methods did not provide any means for assessing inter-rater reliability for a visit at any given time. As such, the results of this study are more suggestive than conclusive. Future research utilizing more objective criteria for judging outlet types would provide results that are both more definitive and replicable.

Biographies

William R. Ponicki, M.A., is an Associate Research Scientist at the Prevention Research Center. His main area of research is econometric analysis of the impacts of alcohol and drug-control policies upon the consumption of these substances as well as associated problems. His previous empirical work has investigated the impacts of alcohol taxes, minimum legal drinking ages, and hours of alcohol sales in the determination of alcohol sales, traffic fatalities, cirrhosis rates, and violent crimes. His other work has included adapting Bayesian space-time disease models to analyze geographic and temporal patterns of traffic crashes, violence, and methamphetamine abuse.

Paul J. Gruenewald, Ph.D., is currently Scientific Director of the Prevention Research Center. His research interests focus upon studies of the social, economic, and physical availability of alcohol, alcohol use, and alcohol-related problems. Additional foci of his work include mathematical and statistical models of alcohol use and related problems, the development of evaluation methodologies appropriate to community-based evaluations of preventive interventions, and the environmental prevention of violence. He also directs the Spatial Systems Group, a coordinating center for work using Geographic Information

Systems, Spatial Statistical Systems, and Spatial Dynamic Models. He has been a Principal or Co-Investigator on 20 funded research projects. Dr. Gruenewald is currently Principal Investigator on three research projects funded by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). In honor of his research achievements, Dr. Gruenewald received a Merit Award from NIAAA to support continued studies of alcohol outlets and violence.

Lillian G. Remer, M.A., GISP, is an Associate Research Scientist at the Prevention Research Center. Her specialty is the development of Geographic Information Systems for the study of substance abuse and problem prevention.

Scott E. Martin, B.S., was a Research Associate at the Prevention Research Center from 2000 through 2012, where his specialties included managing field surveys at alcohol outlets. He earned his B.S. in Applied Behavioral Sciences at the University of California at Davis in 1999. He is currently a graduate student in the School of Information at the University of California at Berkeley.

Andrew J. Treno, Ph.D., is a Senior Research Scientist at the Prevention Research Center. Dr. Treno's work on the social ecology of alcohol-related problems encompasses the areas of unintentional injury, violence, drinking and driving, consumption patterns, and premise utilization among youth, young adults, and the broader population. He has been in the field of Prevention Science research for over 20 years and his current CV lists over 80 publications. He also holds a faculty position in the University of California, Berkeley Extension Program in Alcohol and Drug Abuse Studies.

GLOSSARY

Alcohol beverage license

A government-issued permit to sell alcoholic beverages.

License type

The type of establishment listed on an alcohol license (e.g., bar, restaurant, and club).

Off-premise outlet

An establishment that sells alcohol for off-site consumption (e.g., liquor store).

On-premise outlet

An establishment that sells alcohol for on-site consumption (e.g., bar and restaurant).

Outlet density

The number of alcohol outlets per square mile within an area.

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TABLE 1

Locating on-premise alcohol outlets listed on alcohol licenses

License category	In-business alcohol outlet		Out-of-business alcohol outlet		Could not find alcohol outlet		Total
	#	%	#	%	#	%	
All licenses	728	91.1	32	4.0	39	4.9	799
<i>By ABC license type</i>							
Restaurant	618	91.2	29	4.3	31	4.6	678
Bar/pub	89	91.8	3	3.1	5	5.2	97
Both bar and restaurant licenses	5	100.0	0	0.0	0	0.0	5
Club	16	84.2	0	0.0	3	15.8	19
<i>By ABC license status</i>							
Active	706	93.5	20	2.6	29	3.8	755
Pending	17	63.0	6	22.2	4	14.8	27
Surrendered, not in use	5	41.7	1	8.3	6	50.0	12
Revocation pending for nonpayment	0	0.0	3	100.0	0	0.0	3
Indefinite suspension	0	0.0	2	100.0	0	0.0	2

Notes: Scouts visited addresses from a list of active on-premise license records for six California cities obtained from the California Alcohol Beverage Control (ABC) on August 26, 2008. All scouting visits were completed within one month of acquisition of the ABC list. Scouts looked for each alcohol outlet at the listed address and neighboring addresses, and unsuccessful attempts to locate the premise were repeated up to six times by other scouts.

TABLE 2

Models relating outlet type and time of day to premise characteristics

Outcome measure (Model Type) ¹	Explanatory variables				City-level fixed effects included? ²
	Constant	Has ABC restaurant license	Is late observation	Restaurant license AND late observation	
Activity index ³ (Ordered Logit)	2.864 ^{**} (6.60)	-1.233 ^{**} (-2.50)	0.036 (0.09)	-0.360 (-0.54)	Yes ($p < 0.013$)
Lighting level (Ordered Logit)	3.124 ^{**} (6.96)	0.428 [#] (0.83)	-0.041 (-0.09)	-0.365 (-0.51)	No
Noise level (Ordered Logit)	2.245 ^{**} (6.28)	-0.576 [#] (-1.15)	0.259 (0.59)	0.291 (0.41)	No
Bar length in feet (OLS)	35.197 ^{**} (18.32)	-5.097 [#] (-1.67)	-1.303 (-0.48)	2.303 (0.53)	No
# Available seats (Ordered Logit)	1.974 ^{**} (5.53)	1.501 ^{**} (2.89)	-0.435 [#] (-0.94)	-0.205 (-0.28)	No
# of Patrons (OLS)	27.368 ^{**} (7.12)	8.192 [#] (1.34)	1.053 (0.19)	-2.133 (-0.25)	No
Presence of smoking (Logit)	1.674 ^{**} (3.76)	-2.618 ^{**} (-4.16)	-0.644 [#] (-1.12)	1.509 [#] (1.81)	No
# of Servers (Ordered Logit)	-2.661 ^{**} (-3.81)	2.504 ^{**} (3.87)	-0.280 (-0.38)	-0.164 (-0.18)	Yes ($p < .048$)
# of Security (Ordered Logit)	-0.978 ^{**} (-2.79)	-0.404 (-0.67)	0.277 (0.58)	0.151 (0.18)	No
# of Bartenders (Ordered Logit)	4.876 ^{**} (13.45)	-0.364 [#] (-0.72)	-0.013 (-0.03)	0.596 [#] (0.84)	No
Presence of dancing (Logit)	-0.898 [*] (-2.51)	-0.760 [#] (-1.17)	0.359 [#] (0.73)	0.546 (0.64)	No
Proportion intoxicated (OLS)	0.040 [#] (1.63)	0.029 [#] (0.74)	0.079 [*] (2.25)	-0.049 [#] (-0.89)	No
Patron throughput ⁴ (OLS)	72.526 ^{**} (4.79)	27.354 [#] (1.14)	11.158 (0.52)	-17.038 (-0.50)	No

N= 126 observations (1 early and 1 late for the 63 final-sample establishments observed both early and late.

Numbers in parentheses are z scores prior to finite population correction.

¹ Regression types vary by whether outcome is binary (logit), ordered categories (ordered logit), or continuous (OLS).² City-level fixed effects (vs. Petaluma, coefficients not shown) were tested for all models, but retained only where jointly significant ($p < 0.05$).³ Activity index is a count of activities observed among the following: games, sports bar, stage, TV, dancing, or "other."⁴ Patron throughput is defined as patron count on arrival plus estimated arrivals per 2-two hr period.^{**} indicates uncorrected $p < .01$, two-tailed test.^{*} indicates uncorrected $p < .05$, two-tailed test.

indicates $p < .05$ with finite population correction based on 87.5% of population sampled (Thompson, 1992).

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TABLE 3

Multilevel models relating outlet density to premise characteristics

Outcome variable	Level 2 covariate: City-level outlet density ¹			Level 1 covariate: Local outlet density ²			Model type
	<i>b</i>	<i>z</i>	<i>p</i> -value ³	<i>b</i>	<i>z</i>	<i>p</i> -value ³	
Activity index ⁴	−0.431	−0.42	–	−0.094	−7.79	<.001	OLS HLM
Lighting	−0.165	−0.76	–	−0.011	−3.72	<.001	OLS HLM
Noise	0.263	0.94	–	0.009	2.97	.004	OLS HLM
Bar length (feet)	−0.664	−0.14	–	0.024	0.47		OLS HLM
Seating	−17.709	−1.62	–	0.209	1.56		OLS HLM
Patrons	−8.528	−0.96	–	0.445	4.33	<.001	OLS HLM
Smoking ⁵	–	–	–	−0.027	−2.70	.008	Logit FEM
Servers	−1.765	−1.94	–	0.026	2.47	.014	OLS HLM
Security	−0.097	−0.31	–	0.010	3.03	.002	OLS HLM
Bartenders	−0.212	−0.77	–	0.024	7.87	<.001	OLS HLM
Dancing	−4.782	−2.82	.004	0.005	0.29	–	Logit HLM
Proportion intoxicated	0.855	1.11	–	0.021	2.38	.018	OLS HLM
Patron arrival rate	−20.112	−0.88	–	1.837	6.96	<.001	OLS HLM

N = 139 (dropped 12 premises from final sample that were outside city boundaries, yet in city-identified zip codes). All HLM models included random intercepts for each of the six cities, whereas the smoking model included city fixed-effects.

¹ Bars per square kilometer (including pubs and restaurants with bar areas).

² Density (bars/km²) within 500 m of each bar, with finite population correction, 87.5% sampled (Thompson, 1992).

³ Nondirectional two-tailed test, shown only where *p* < .05.

⁴ Activity index is a count of activities observed among the following: games, sports bar, stage, tv, dancing, or “other”.

⁵ Smoking in and around outlets was very infrequent. Logit HLM would not converge, so used city fixed-effects instead of HLM.