A randomized trial to evaluate a management training program to prevent illegal alcohol sales

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ABSTRACT

Aims   To evaluate effects of a training program for owners/managers of alcohol establishments—Alcohol Risk Management (ARM)—on: (i) propensity to sell alcohol to obviously intoxicated patrons; and (ii) changing establishment-level policies/practices. **Design**   We assigned alcohol establishments randomly to intervention (full-ARM) and delayed-intervention/control (ARM Express) conditions. **Setting**   One large metropolitan area in Midwestern United States. **Participants**   Owners and managers at 231 on-premise alcohol establishments (i.e. bars, restaurants). **Intervention**   Training programs consisted of one-to-one sessions with the owner/manager at each establishment. The goal of training was to help owners/managers to select and implement alcohol control policies in their establishments. The full-ARM training consisted of four one-to-one sessions and the ARM Express was a single session. **Measurements**   We measured intervention effects through baseline and follow-up pseudo-intoxicated alcohol purchase attempts (i.e. feigning intoxication while attempting to purchase alcohol) and telephone surveys of owners/managers at alcohol establishments. **Findings**   Sales rates to pseudo-intoxicated patrons reduced 23% (relative to delayed-intervention/control condition) at the first follow-up purchase attempt ($P = 0.06$) but returned to baseline levels 3 months later. On average, establishments selected 13 of 18 recommended policies, but in multivariate models we observed no significant differences at follow-up in reported policies/practices across establishments. **Conclusions**   Reliance on manager training to promote responsible establishment alcohol policies is not sufficient to prevent illegal alcohol sales to obviously intoxicated patrons and to reduce alcohol-related problems.

Keywords   Alcohol, illegal sales, management training, obviously intoxicated patrons, policies/practices.

INTRODUCTION

The majority (58–79%) of licensed alcohol establishments in the United States are likely to sell alcohol to patrons who appear obviously intoxicated, despite laws prohibiting these sales [1–5]. Over-consumption of alcohol at licensed establishments has been linked directly to alcohol-related problems such as violence and impaired driving [6–10].

Previous studies conclude that support of establishment management is essential for sustaining and increasing responsible alcohol beverage service among servers [11,12] Focusing on training only servers ignores the context in which servers make decisions about alcohol service [13,14]. Because of the importance of manage-

ment support for increasing responsible service of alcohol, effective methods are needed to encourage owners/managers to adopt responsible serving policies in their establishments.

Several studies have evaluated the effects of training managers on development of responsible policies in addition to training alcohol servers, where training was generic for all establishments. These programs resulted in either no changes in measured server behaviors or increases in mild interventions, such as offering alcohol-free beverages [11,15–19].

Although programs offering standardized manager training for multiple establishments at once have the advantage of requiring fewer resources, they have the disadvantage of not being able to tailor training

specifically to the needs of individual establishments, and thus may not be potent enough to make significant effects. Two early studies evaluated training programs that involved working individually with alcohol establishment management to develop and implement policies and to train staff. Both found decreases in likelihood of patron intoxication [20,21]. However, all studies of management training to date are limited by non-random assignment of alcohol establishments to condition or small sample sizes. Further evaluation of the effectiveness of server/management training is needed, particularly given that, as of January 2006, 38 US states had laws mandating or providing incentives for responsible beverage service training in alcohol establishments (http://alcoholpolicy.niaaa.nih.gov).

We developed a training program—Alcohol Risk Management (ARM)—that focuses on training management to implement and promote responsible establishment policies. Results from a small demonstration of ARM suggested that it was promising for preventing illegal alcohol sales to obviously intoxicated patrons [22]. In the current study, we conducted a large randomized trial to test the hypotheses that the ARM training would: (i) decrease the propensity of alcohol establishments to sell alcohol to obviously intoxicated patrons; and (ii) increase responsible establishment-level policies/practices.

METHODS

Intervention

Alcohol establishments were assigned randomly to intervention (full-ARM) or delayed intervention/control (ARM Express) conditions. The ARM Express training was offered to establishments assigned to the delayed-intervention condition to increase participation rates—i.e. to offer all establishments an incentive for participation. All training was completed between September 2002 and August 2004.

Full-ARM

The full-ARM training program consisted of four one-to-one training sessions with the decision-maker at each establishment. Sessions lasted 1–2 hours and were held at the establishments. All ARM trainers had experience in the hospitality industry. The goal of the program was to help owners/managers to select and implement alcohol control policies in their establishments. Each establishment was provided with an establishment-specific policy manual that was introduced to and discussed by alcohol servers at an all-staff meeting. The ARM training program has been described fully in a previous publication [22]. The only change in the program evaluated here

is that the original second and third sessions were combined into one 2-hour session.

ARM Express

ARM Express was a less intensive, single 2-hour session that was offered to increase establishment participation in the study. The trainer presented the owner/manager with an overview of relevant state laws, and spoke with management/staff about the importance of having written establishment policies. Participants received handouts on how to conduct staff meetings, introduce new policies and implement and enforce selected policies.

Alcohol establishments

Recruitment

We obtained lists of the bars and restaurants in one US Midwestern city from state and city licensing agencies ($n = 431$). Eighty-one of these establishments were ineligible for the study because they were duplicates, out of business, a private club or no longer sold alcohol. We contacted the remaining 350 eligible establishments to identify the owner or manager who was the primary decision-maker. We sent recruitment packets describing our two training programs to decision-makers of 258 establishments selected at random (of the 350 eligible establishments, we attempted but did not reach 10 and did not attempt to reach 82 because we had reached our participation goal before they were selected for recruitment). We then followed-up with a telephone call to all selected establishments, again describing the two programs and incentives for participation ($100 for either program).

Random assignment

Of the 258 establishments contacted, 231 agreed initially to participate (89.6%). Once decision-makers agreed to participate, we assigned establishments randomly to either the intervention or delayed-intervention/control condition using a random numbers table. If an owner was the decision-maker for a chosen establishment and he/she agreed to participate in the study, all alcohol establishments owned by that individual were assigned to the same condition, in order to prevent diffusion of training materials and information between conditions. As establishments were assigned to condition, we formed unmatched pairs to control for timing of the collection of outcome measures, with each pair consisting of one establishment assigned to full-ARM and one to ARM Express. We assigned 122 to the full-ARM condition and 109 to the ARM-Express condition (uneven pairs are due to individuals owning multiple businesses and new pairs

being formed when establishments declined participation after randomization). We estimated originally that with 100 establishments per condition we could detect, with 85% power, a net change of 25%.

Participation rates

Of those establishments assigned randomly to the full-ARM condition, 85.2% ($n = 104$) completed all four training sessions, 7.4% ($n = 9$) completed only two sessions and 7.4% ($n = 9$) did not complete any sessions. We re-contacted establishments assigned to the ARM Express condition after completion of the three waves of purchase attempts, which was usually several months after they agreed initially to the random assignment. As a result of participation in other training programs or changes in management in that intervening period, only 28.2% of the 109 establishments completed ARM Express.

Establishments that agreed to participate in the study did not differ from establishments that declined ($P \leq 0.05$) in terms of license status (full liquor versus beer/wine-only) or any other measured establishment characteristics, and alcohol control policies/practices except establishments that declined were less likely than those that participated to have written alcohol policies (83% versus 96%) and more likely to be a member of a professional association (100% versus 76%).

Data collection

Pseudo-intoxicated alcohol purchase attempts

To measure propensity for illegal alcohol sales to obviously intoxicated patrons, 14 actors (seven males/seven females; aged 21–61, mean age = 48) conducted pseudo-intoxicated alcohol purchase attempts (i.e. feigning intoxication while attempting to purchase alcohol). We selected actors based on their ability to appear obviously intoxicated as judged by a panel that included people with experience in the hospitality industry. Buyers followed a standardized protocol used in previous studies (see Lenk *et al.* [3] for description of protocol). Purchase attempts were conducted at all intervention and delayed-intervention/control establishment pairs—one purchase attempt was made at baseline, one at the first follow-up (approximately 1 month after the conclusion of the full-ARM training in intervention establishments) and one at the second follow-up (approximately 3 months after the fourth session of the full-ARM training in intervention establishments); all purchase attempts were completed before ARM Express was conducted. Establishments were not informed of these observations.

Establishment policies

Management survey

Trained staff conducted baseline and follow-up telephone surveys of decision-makers at establishments to assess establishment characteristics and alcohol policies/practices. The survey consisted of 80 items and took 15–20 minutes to complete. The baseline survey was implemented in 2002–2003 prior to recruitment to training conditions. We attempted to survey all bars and restaurants in business during the baseline period ($n = 350$). The follow-up survey was implemented in 2004–2005 after all training sessions and purchase attempts were completed; all establishments that were in business at baseline and follow-up were invited to participate in the follow-up survey. Overall baseline and follow-up participation rates were 88% and 83%, respectively. Survey participation rates for establishments that agreed to participate in the full-ARM or ARM Express conditions ($n = 229$) were 92% at baseline and 88% at follow-up. Survey response rates for the 27 establishments that declined to be part of the randomization process were 85% at baseline and 67% at follow-up. Response rates for the 82 establishments that were never contacted for participation in the intervention were 82% at baseline and 76% at follow-up.

Policy selection

In addition to the telephone survey, we also collected policy information from the ARM trainers. ARM trainers recorded alcohol control policies selected by each of the owners and managers who participated, and whether each selected policy was revised by the establishment or implemented as recommended by the trainer.

Measures

Variables fall into three categories: purchase attempt characteristics, establishment characteristics and policies/practices. In creating some variables, we collapsed responses into categories based on frequency distributions.

Purchase attempt characteristics

Purchase attempt characteristics include: (i) attempt outcome (sale, no sale); (ii) server-perceived age (< 30 years; ≥ 30 years); (iii) server gender; (iv) buyer age (≤ 25 years, 26–55 years, > 55 years); (v) buyer gender; (vi) observer gender; (vii) time of purchase attempt (before 8 p.m.; after 8 p.m.); (viii) server was drinking (yes, no); (ix) security was present (yes, no); (x) server checked buyer's age identification (yes, no); and (xi) security checked buyer's age identification (yes, no).

Establishment characteristics

The following eight variables pertaining to establishment characteristics were obtained from the management survey: (i) how long respondent worked for/owned the business (≤ 2 years; > 2 years); (ii) how long business was in operation in current location (≤ 2 years; > 2 years); (iii) establishment is member of a professional association (yes, no); (iv) establishment is member of a chain (yes, no); (v) average length of employment among staff (≤ 1 year; > 1 year); (vi) average length of employment among management (≤ 1 year; > 1 year); (vii) percentage of revenues from alcohol ($\leq 50\%$; $>50\%$); and (viii) maximum occupancy of the establishment (≤ 150; > 150). We obtained eight more establishment characteristic variables from purchase attempt forms: (i) location of establishment (residential; downtown); (ii) number of customers (crowded/many people versus not); (iii) signs posted warning against sales to intoxicated patrons (yes, no); (iv) signs posted warning against sales to underage patrons (yes, no); (v) number of intoxicated customers (none versus few/many); (vi) quality of establishment (upscale versus moderate/downscale); (vii) types of alcohol promotions present (0–3); and (viii) pitchers were sold (yes, no). We obtained another variable, license type (full liquor versus beer/wine-only), from our database of establishments. We dichotomized some of these variables based on the distribution of the original items.

Policies/practices

We measured eight individual policy/practice items from the management survey (all response options: yes/no): (i) establishment has written alcohol policies; (ii) establishment holds staff meetings at least monthly; (iii) over-service of alcohol is discussed at staff meetings; (iv) cutting-off service to intoxicated patrons is discussed at staff meetings; (v) server training is required; (vi) management training is required; (vii) obviously intoxicated patrons prohibited in bar/establishment; and (viii) manager on duty $> 75\%$ of time.

In addition, we created two policy/practice indices from items on the management survey: (i) an index of seven items on general alcohol policies/practices; and (ii) an index of nine items on intoxicated patrons (i.e. preventing sales to, reducing the number of, or handling, intoxicated patrons). We chose items for each index based on the likelihood of affecting responsible alcohol service (Cronbach's alpha coefficients: general index = 0.62; intoxicated patrons index = 0.64). For policies/practices that promote responsible alcohol service (e.g. server training required), one point was received if the establishment reported having the policy/practice, and for policies/practices that detract from responsible alcohol service (e.g. discounts on drinks offered), one point was received if the establishment did not have the policy/practice.

Analyses

We designed our analyses to test effects of the ARM intervention on two categories of outcomes: (i) propensity to sell alcohol to obviously intoxicated patrons; and (ii) reported policies/practices, with common analytical strategies for both. First, we compared establishments in each condition at baseline on numerous characteristics. We then conducted bivariate analyses between the outcome variables and each independent/control variable using logistic regression. Those variables associated significantly with outcome variables at $P < 0.20$ were included in multivariate analyses (although arbitrary, we chose a liberal P-value so that no important independent/control variables were screened out, while at the same time eliminating those variables with clearly no association with the outcome). We also controlled for any significant baseline differences ($P < 0.20$) between conditions. We used general linear mixed model regression to assess all initial multivariate models and, for models with dichotomous outcomes, we estimated the final model using generalized linear mixed model regression with a logit link function.

Effects of training on sales rates

We analyzed changes in alcohol sales rates for two conditions, intervention establishments ($n = 122$) versus delayed-intervention/control establishments ($n = 109$), across the three purchase attempt time-points. Our outcome variable was purchase attempt outcome and our potential control variables included license type, the 10 other variables pertaining to purchase attempt characteristics and the eight establishment characteristics from purchase attempt forms. We included buyer identification as a random effect to control for variation in buyers' ability to purchase alcohol. We tested our primary hypothesis using the time × condition interaction, a 2 degrees of freedom (df) test. We explored this overall test further with 1 df planned contrasts, looking at effects from baseline to the first follow-up purchase attempt and from baseline to the second follow-up purchase attempt. We conducted intention-to-treat analyses. We also assessed the effects of the training interval—the time between completion of the third training session (the session hypothesized as most likely to directly influence server behavior) and time of the follow-up purchase attempt—but found that it had no significant effect on our outcome.

Effects of training on reported policies/practices

We analyzed first the number and type of written alcohol control policies selected by establishments that completed the full-ARM training. Two members of staff reviewed independently each revised policy selected by an establishment and coded whether the policy: (i) was essentially the same as what was initially recommended or stronger ('implemented'); (ii) was weaker than the recommended policy ('revised'); or (iii) differed enough that it negated the policy selection ('rejected'). Initial agreement between coders was 58% (362 of 626), with all discrepancies resolved via discussion. We calculated average number and range of policies selected across intervention establishments.

We also analyzed changes in self-reported establishment policies/practices from baseline to follow-up management surveys across four groups of establishments (i.e. four conditions): (i) assigned to and participated in full-ARM ($n = 104$); (ii) assigned to delayed-intervention/control condition and participated in ARM Express ($n = 31$); (iii) assigned to delayed-intervention/control condition but did not participate in ARM Express ($n = 78$); and (iv) were not contacted ($n = 82$). Separate multivariate analytical models were developed for each of eight outcome variables: the two policy/practice indices and six variables based on policies/practices that were recommended in the ARM training program (first six policy/practice variables listed in variables section). Control variables included all eight variables pertaining to establishment characteristics as reported on the management survey, whether manager was on duty over 75% of time and license type. We assessed overall time × condition interactions for each model, followed by planned contrasts comparing specific conditions. We also assessed variation in time between the training (third session for full-ARM, day of implementation for ARM Express) and implementation of the follow-up survey but found it did not affect our outcomes.

RESULTS

Effects of training on sales rates

At baseline, intervention and delayed-intervention/control groups had similar alcohol sales rates (intervention = 74% and delayed-intervention/control = 70%) and were similar across establishment, buyer and server characteristics, and policies/practices except for: (i) servers in intervention establishments were less likely to check age identification and more likely to look younger; and (ii) intervention establishments were less likely to sell pitchers of beer and to have written policies.

In the overall multivariate model, time × condition was not statistically significant ($P = 0.17$; Table 1), indi-

cating that the intervention did not have an effect over time on likelihood of sales to obviously intoxicated patrons. We also assessed specific effects on the sales rate at the first follow-up compared to baseline. The sales rates were 61% at intervention establishments and 74% at delayed-intervention/control establishments, and the time × condition term for baseline to first follow-up was marginally significant ($P = 0.06$; Fig. 1). We also assessed the specific effects on the purchase rate at the second follow-up (approximately 2 months later) compared to baseline. The sales rates at that time were 75% at intervention establishments and 82% at delayed-intervention/control establishments, and the time × condition interaction term for baseline to second follow-up was not statistically significant ($P = 0.21$).

Effects of training on policies/practices

At baseline, the four groups were similar across most establishment characteristics and policies/practices, with the following exceptions: (i) establishments that completed ARM Express were more likely than other establishments to have been owned/managed by the same person for more than 2 years; (ii) establishments not contacted were more likely than other establishments to be a member of a chain; and (iii) establishments that participated in full-ARM were more likely than other establishments to report having a manager on duty > 75% of the time.

Establishments participating in full-ARM adopted many of the recommended policies. On average, establishments selected 13 of 18 recommended policies for implementation in their establishments (Table 2). Many of the 18 policies were adopted by most establishments (e.g. prohibit sales to intoxicated customers, provide copies of policies to staff, monitor for suspicious behavior); however, several policies were adopted by a small number of establishments (e.g. prohibit last call, measure all drinks).

In multivariate models, we observed no significant differences in the overall (3 df) time × condition variable across the four conditions for any of the eight models, indicating that the intervention did not have an effect over time on reported policies and practices between baseline and follow-up management surveys (Table 3). We also observed no significant differences in the three planned contrasts (1 df) of specific conditions (Table 3).

DISCUSSION

One month following the ARM training, we observed a 23% relative reduction in likelihood of illegal sales to obviously intoxicated patrons at bars and restaurants that participated in the four-session full-ARM program

Table 1 Overall multivariate model for intervention effects on alcohol sales rates.*

Intervention measures	df	Estimate (SE)	P-value
Visit			
Baseline versus follow-up 1 versus follow-up 2	2	–	**0.04**
Baseline versus follow-up 1	1	−0.22 (0.21)	0.28
Baseline versus follow-up 2	1	0.33 (0.24)	0.16
Condition (intervention versus delayed-intervention/control)	1	0.29 (0.20)	0.15
Visit × condition			
Baseline versus follow-up 1 versus follow-up 2	2	–	0.17
Intervention versus delayed-intervention/control			
Baseline versus follow-up 1	1	0.78 (0.42)	0.06
Intervention versus delayed-intervention/control			
Baseline versus follow-up 2	1	0.58 (0.46)	0.21
Intervention versus delayed-intervention/control			
Covariates			
Full liquor (versus beer/wine-only)	1	**−0.49 (0.23)**	**0.03**
Visit time after 8 p.m.	1	0.31 (0.23)	0.18
Security at door	1	−0.47 (0.32)	0.14
Warning signs against sales to underage	1	−0.34 (0.46)	0.33
Warning signs against sales to intoxicated patrons	1	0.55 (0.46)	0.24
Crowded/many people	1	−0.08 (0.20)	0.70
Server age < 30 years	1	**−0.42 (0.19)**	**0.03**
Pitchers sold	1	−0.28 (0.30)	0.35
Bartender checked ID	1	0.63 (0.38)	0.10

*Values significant at $\alpha = 0.05$ in bold type; df: degrees of freedom; SE: standard error.
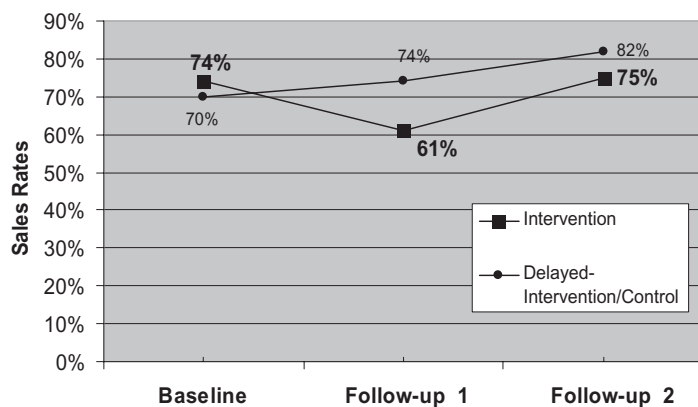

Figure I Multivariate results for intervention effects on sales rates: intervention versus delayed-intervention/control (planned contrasts). Baseline to follow-up 1: $P = 0.06$; baseline to follow-up 2: $P = 0.21$

(compared to delayed intervention/control condition). However, effects of the training program dissipated within 3 months, indicating that this intensive program is not sufficient to create sustained changes in likelihood of illegal alcohol sales. This finding is important, given that the program tested here is more intensive than what is required by most states which have server/management training laws [23]. Less intensive programs are likely to have smaller effects that are likely to dissipate even more quickly. States or local communities that rely primarily on manager training programs to prevent illegal alcohol sales to obviously intoxicated patrons are unlikely to reduce related public health problems.

We do not know what transpired in these establishments after training was completed. For example, did management distribute the policy manuals to newly hired staff and enforce the policies? Similar to what was observed in other studies [24], when we re-contacted establishments in the delayed-intervention/control condition to schedule the ARM Express training, we found that many managers we contacted initially had left the establishments. Sustained effects of the policies resulting from ARM are dependent upon the policies being supported and enforced throughout transitions in managers. If a new manager is either not given the policy manual or is not supportive of the policies, it is unlikely that

Table 2 Recommended policies: Intervention establishments.

	Number of establishments (n = 104)		
Recommended policy	Implemented *	Revised †	Rejected
Check age identification	93%	7%	0%
Confiscate false age identification	27%	19%	54%
Prohibit sales to intoxicated customers	96%	3%	1%
Measure all drinks	13%	2%	85%
Prohibit drink promotions	55%	17%	28%
Promote food and non-alcoholic beverages	76%	10%	14%
Provide alternative transportation	94%	5%	1%
Notify arriving staff	87%	0%	13%
Give 15% gratuity if service declined/no tip	39%	0%	61%
Prohibit last call	15%	11%	74%
Monitor for suspicious activities	96%	0%	4%
Comply with fire code	54%	29%	17%
Prohibit drinking alcohol on the job	82%	7%	12%
Conduct alcohol awareness training	90%	8%	2%
Keep incident log	98%	0%	2%
Have manager on duty at all times	94%	5%	1%
Hold mandatory staff meetings	83%	9%	9%
Provide copies of policies to all staff	100%	0	0

*Implemented as is or made a stronger policy. †Implemented but made a slightly weaker policy.

reductions in likelihood of illegal alcohol sales will be sustained. Future studies should track changes in management systematically and assess whether this change influences effects of responsible beverage service training. In addition, it is essential that *all* management staff at an establishment support and enforce policies to ensure consistency.

Although participants selected policies for their establishments during the training sessions, we observed no differences in reported serving policies/practices at the follow-up survey in establishments that participated in full-ARM or ARM Express compared to establishments that did not participate in either of the training programs. This suggests that the policy manuals, even when customized for individual establishments, did not alter actual policies/practices.

Findings from this and other studies suggest that training management and/or servers is not sufficient to create sustained responsible alcohol service [16,25]. In contrast, several studies have found that regular enforcement campaigns are effective for preventing illegal alcohol sales to underage youth [26,27]. However, enforcement campaigns to prevent illegal sales to obviously intoxicated patrons are operationally more complex, and may take more time and resources. One study found that enforcement campaigns may be effective in preventing illegal alcohol sales [28]; however, more research is needed to assess effects of enforcement campaigns conducted alone or in combination with comprehensive training programs.

One limitation of the current study is that it was conducted in only one Midwestern city, decreasing the generalizability of the findings. However, by conducting the study in only one city we maximized the internal validity of the study, avoiding a nested design that would have decreased our statistical power [29]. Only after the effectiveness of training programs has been established should the focus shift to generalizability. Another limitation is that the follow-up management surveys were completed 4–22 months after completion of full-ARM. During this time-period, other types of interventions (e.g. training offered by the state's alcohol retail association) and other factors may have affected serving practices in establishments that did not participate in ARM. Because the follow-up survey was conducted after alcohol purchase attempts, we could not conduct analyses to assess the mediating effects of reported policies/practices on the likelihood of alcohol sales to obviously intoxicated patrons.

Limitations of this study are offset by a number of strengths. This is the first large-scale, randomized trial of a management training program that was designed specifically to influence establishment-level alcohol policies and practices. Participation rates were high and the training program was well received by management and staff. Despite these strengths, intervention effects were short-lived. Results from this study indicate that policies mandating training programs to prevent sales to obviously intoxicated patrons are unlikely, by themselves, to have long-term effects on public health problems. Further

Table 3 Multivariate models for intervention effects on policies/practices.

Intervention measures	df	Has written policies		Has staff meetings ≥ 1 month		Overservice discussed		Cutting off service discussed		Server training required		Manager training required		General index (1–7)		Intox index (1–9)	
		Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Time (pre versus post)	1	-0.72	0.51	<0.01	0.19	0.38	0.52	-0.18	0.50	0.51	0.52	**0.75**	**0.37**	**0.30**	**0.11**	0.18	0.12
Condition	3	P = 0.65		P = 0.92		P = 0.89		P = 0.75		P = 0.43		P = 0.79		P = 0.21		P = 0.91	
Full versus others	1	-0.26	1.40	0.07	0.72	0.09	0.84	0.11	1.00	-0.45	1.20	0.76	1.20	-0.45	0.46	-0.16	0.51
Full versus no contact	1	-0.41	0.52	0.05	0.29	0.05	0.34	-0.25	0.38	-0.38	0.43	-0.05	0.42	-0.07	0.18	<0.01	0.21
Full and Express versus others	1	0.31	0.99	0.31	0.50	-0.29	0.60	-0.83	0.78	-1.40	0.89	-0.59	0.87	-0.42	0.32	0.20	0.35
Time × condition	3	P = 0.40		P = 0.50		P = 0.70		P = 0.84		P = 0.75		P = 0.33		P = 0.38		P > 0.99	
Pre versus post; full versus others	1	4.80	2.90	-0.46	1.10	-0.07	1.70	1.20	1.80	0.72	2.10	1.20	1.90	0.96	0.63	0.06	0.71
Pre versus post; full versus no contact	1	1.10	1.10	-0.46	0.43	0.53	0.67	0.08	0.65	0.48	0.74	1.20	0.68	0.30	0.26	0.05	0.29
Pre versus post; full & Express versus others	1	1.50	2.10	-1.10	0.75	0.60	1.20	-0.97	1.40	1.60	1.60	1.80	1.50	-0.13	0.45	0.07	0.50
Covariates																	
Full liquor (versus beer/wine only)	1	0.70	0.44	**-0.65**	**0.28**	**0.91**	**0.28**	**1.10**	**0.32**	0.60	0.34	**0.74**	**0.35**	**0.46**	**0.18**	–	–
Owned/managed > 2 year	1	-0.10	0.53	-0.42	0.42	-0.28	0.31	-0.27	0.39	0.17	0.33	-0.18	0.34	**-0.33**	**0.14**	0.02	0.17
At location > 2 year	1	–	–	–	–	0.22	0.29	0.42	0.50	–	–	–	–	–	–	–	–
Member of association	1	–	–	0.38	0.26	–	–	–	–	–	–	–	–	0.18	0.14	–	–
Member of chain	1	0.85	0.65	-0.12	0.29	-0.20	0.31	0.32	0.37	0.08	0.36	0.18	0.37	0.32	0.16	**0.39**	**0.18**
Average staff employed > 1 year	1	–	–	-0.14	0.39	–	–	–	–	–	–	–	–	–	–	–	–
Average management employed > 1 year	1	–	–	-0.22	0.31	–	–	–	–	–	–	–	–	–	–	–	–
Manager on duty > 75% of time	1	0.64	0.52	**-0.62**	**0.24**	-0.35	0.49	-1.10	0.62	0.28	0.51	**1.00**	**0.45**	0.17	0.19	-0.19	0.24
Alcohol sales > 50% of gross	1	–	–	–	–	**1.00**	**0.39**	0.47	0.41	**2.40**	**0.68**	**2.20**	**0.61**	**0.98**	**0.16**	0.23	0.21
Max occupancy > 150 patrons	1	0.41	0.50	–	–	–	–	–	–	0.15	0.35	–	–	**0.39**	**0.15**	–	–

Values significant at α = 0.05 in bold type. For models with 3 degrees of freedom (df), P-values reported rather than estimates and standard errors.

work is needed to determine the optimal combined strategies (e.g. training boosters, enforcement) for creating long-term reductions in illegal alcohol sales and related harm. Given the high risks for problems due to alcohol intoxication, and the prominent role of alcohol establishments in intoxication, additional research on potentially effective means to reduce over-service of alcohol is warranted.

Acknowledgements

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