Project ARM: Alcohol Risk Management to Prevent Sales to Underage and Intoxicated Patrons

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Clear policies and expectations are key to increasing responsible service of alcohol in licensed establishments. Few training programs focus exclusively on owners and managers of alcohol establishments to reduce the risk of alcohol service. Project ARM: Alcohol Risk Management is a one-on-one consultation program for owners and managers. Participants received information on risk level, policies to prevent illegal sales, legal issues, and staff communication. This nonrandomized demonstration project was implemented in five diverse bars. Two waves of underage and pseudo-intoxicated purchase attempts were conducted pre- and postintervention in the five intervention bars and nine matched control bars. Underage sales decreased by 11.5%, and sales to pseudo-intoxicated buyers decreased by 46%. Results were in the hypothesized direction but not statistically significant. A one-on-one, outlet-specific training program for owners and managers is a promising way to reduce illegal alcohol sales, particularly to obviously intoxicated individuals.

Alcohol is associated with many public health problems, including traffic crashes, homicides, suicides, drownings, and sexual assaults.[1-6] Extant research suggests that changing environments that promote risky patterns and rates of alcohol use can create long-term reductions in alcohol-related problems.[7] One component of the social environment that influences alcohol use is the serving practices of licensed alcohol establishments.

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Many alcohol establishments have serving practices that promote risky drinking. For example, sales to underage or intoxicated individuals are known to occur in one-half to three-fourths of all retail alcohol outlets.[8-10] One-third to two-thirds of intoxicated drivers report purchasing their alcohol at a licensed alcohol outlet immediately prior to their intoxicated driving.[11-12]

To reduce the number of illegal alcohol sales to youth and intoxicated patrons, training programs for alcohol outlet staff, such as servers, are frequently used throughout the United States. The best server training programs provide outlet staff with the skills necessary to refuse illegal alcohol sales, slow down service of alcohol, and promote the sale of food and nonalcoholic beverages.[13-14]

Although server training programs may reduce the risk of patron intoxication and decrease alcohol-related traffic crashes,[13,15-21] server training programs by themselves do not appear to be effective in stopping alcohol sales to underage or intoxicated customers.[16,18] To make server training programs more effective, outlet staff may need to be encouraged and supported by their management to serve alcohol responsibly.[16,17,22,23]

One way management can support responsible server and seller behavior may be to establish and enforce clearly written policies that create an environment promoting responsible service of alcohol. Effects of server training programs may be improved if an alcohol establishment's policies and the behaviors of owners and managers are consistent with messages provided in server training to employees. Written policies may be a useful tool for management to clearly communicate expectations about alcohol sales, given that high staff turnover in these alcohol establishments tends to make server training programs difficult to implement. Wolfson and associates[24,25] found that establishment policies and practices were significantly associated with fewer alcohol sales to purchasers who appeared to be under age 21.

Outlet-specific and management-specific training programs may be necessary to help owners and managers reduce risky practices by identifying, implementing, and enforcing effective alcohol policies for their establishments. However, few training programs exist for outlet managers. Among 22 recently reviewed local and national server training programs, only 9 had at least one component that appeared to target owners or managers of alcohol establishments.[14] Only 1 of these programs (consisting solely of a videotape) exclusively targeted owners and managers.

Although increasing responsible alcohol sales may require changes in the behavior of both outlet staff and management, few server and manager training programs include theoretically based behavior change techniques.[14] Two theoretical models that may be applied to these training programs are the health belief model and social learning theory.[14,26,27] According to the health belief model, behavior change is predictable based on certain belief patterns, including (1) believing there is risk if behavior is not changed, (2) perceiving this risk or consequence as serious, and (3) believing that the benefits of the behavior change outweigh the costs. In addition, there must be a "cue to action" or a motivating force to encourage the individual to alter his or her behavior.[28] Similarly, social learning theory posits that behavior results from an expectation about outcomes and a response to environmental cues.[27] However, social learning theory also suggests that self-efficacy, or the belief that one has the skills to change behavior, is necessary for behavior change. Self-efficacy may be increased through practice of the behavior, vicarious experience, and verbal persuasion.[29]

If these behavior change theories are applied to management training programs for alcohol establishments, the resulting training program would need to persuade owners and managers that (1) there could be serious consequences for making an illegal alcohol

sale, (2) the benefits of adopting and implementing written alcohol policies far outweigh the potential costs of implementing such policies, and (3) such a program will provide skills to develop effective policies. Many managers and owners currently do not believe they will face any consequences, serious or otherwise, for selling alcohol to underage or intoxicated individuals.[9,24] Also, owners and managers may not have the skills necessary to identify problem areas and policy solutions and to implement establishment policies.

As a result of the lack of theoretically based training programs targeting owners and managers of alcohol outlets, we developed Project ARM: Alcohol Risk Management. This article reports on the Project ARM intervention and an initial evaluation of its effects on service to underage and intoxicated patrons.

METHOD

Intervention Design

The ARM intervention was composed of five one-on-one consultation sessions for owners and managers of bars. The goal of this project was to work with owners or managers to (1) develop and implement written establishment policies that encourage responsible alcohol sales and (2) inform and discuss new alcohol policies with staff. Consultation sessions and written materials were tailored specifically to each establishment, allowing each establishment to obtain information most relevant to its structure, location, operations, and clientele. Each consultation session lasted 1 to 2 hours. Sessions were implemented once a week during a 5-week period.

The public health goal of Project ARM was to change those actions of alcohol establishments—sales to minors and sales to patrons already significantly impaired by alcohol—that can lead to death, injury, and damage. However, we recognized that the program might not be attractive to the managers on that basis alone. The program needed to be promoted to alcohol establishments in a different manner to gain the buy-in of bar owners and managers. Focus group discussions with owners and managers of alcohol establishments suggest that owners and managers believe that individual drinkers, not alcohol establishments, should be held responsible for alcohol-related problems.[30] So we designed a program that could answer questions that owners and managers may ask, such as the following: Why should the establishments participate in the program? Why should new establishment policies be developed and enforced? Will these new policies decrease their profits?

Following the behavior change principles outlined above, we identified and emphasized the management's self-interest of decreasing risk and economic loss and minimizing potential liability that results from illegal alcohol sales to underage and intoxicated customers. Our focus group discussions indicated that owners and managers fear lawsuits and decreased alcohol sales.[30] We also provided supportive materials and verbal persuasion to increase their confidence and skills in implementing new alcohol policies in their establishments.

Risk assessment. To facilitate discussions on the need for new establishment policies, ARM consultants showed owners and managers how their establishment compared with similar establishments in terms of (1) potential risk of illegally selling alcohol, (2) methods to slow service of alcohol to prevent patron intoxication, and (3) methods of communication with staff. ARM consultants asked the participating owner or manager at each es-

tablishment to complete a 68-item self-administered risk assessment survey. ARM consultants calculated risk scores based on responses to these items and presented the scores to owners and managers. The risk assessment survey included items that assessed both policies and practices.

Policy items on the risk assessment survey measured types of existing establishment policies that affect alcohol sales to underage and obviously intoxicated patrons, customer intoxication, and management communication with staff. For example, we asked whether establishments had policies regarding carding customers, denying service to obviously intoxicated customers, not announcing last call, and attending regular staff meetings. In addition, the survey asked how these policies were communicated to employees. Some establishments develop written policies that are distributed to employees. Other establishments post policies on an employee bulletin board. Still others place policies in files but do not communicate their existence to staff. Some establishments communicate policies orally but do not put the policies in written form. Other establishments may not have any policies at all.

Based on independent ratings by a panel of 10 server training and alcohol policy experts, a priori weights were assigned to each type of policy distribution. Weights were assigned because different forms of distribution of policies may have a differential effect on serving practices in an establishment. Weights for policy distribution were 1 for no policies, 3 for unwritten policies or written policies on file, 4 for written policies that were posted in the establishment, and 5 for written policies that were individually distributed to each employee. These weights assume that having a written policy that has been distributed to all staff may be more effective than an unwritten "policy" that is only shared orally.

The practice items measured frequency of occurrence of an establishment practice, such as how often staff card customers who appear to be younger than age 30, serve an obviously intoxicated customer, or notify incoming staff about the intoxication level of a customer. Establishments may have policies, but the policies may not be well understood or enforced. This could result in establishment practices or behaviors that are very different from those specified by establishment policies. Frequency of each type of practice was measured on a scale from 1 (*never*) to 5 (*always*).

Both the policy items and practice items addressed a wide range of issues that could affect responsible service of alcohol in a given establishment—from posting warning signs to not making last call for alcohol to checking age identification. The current research literature indicates that not all policies and practices are equally effective in reducing illegal alcohol sales or alcohol-related problems.[24,25] Therefore, both policy items and practice items were weighted based on a panel of judges' ratings of the likely effectiveness of the policy or practice in reducing the risk of making an illegal alcohol sale or experiencing alcohol-related problems. For example, a policy to post warning signs was judged less effective in reducing sales to underage people than a policy to check all age identification of customers who appear younger than age 30. A priori weightings for judged effectiveness ranged from 0.5 to 2, as determined by the panel of 10 experts.

Weighted responses to the risk assessment survey were summed to create a total risk score (possible range: 126.0 to 551.5), with lower scores indicating higher risk. In addition, risk scores were calculated for each of four subareas: (1) preventing sales to underage people (possible range: 29.5 to 99.0), (2) preventing sales to intoxicated patrons (possible range: 37.5 to 157.5), (3) dealing with intoxicated customers (possible range: 30.5 to 152.5), and (4) communicating with outlet staff (possible range: 28.5 to 142.5). Each of these four indices was developed a priori based on the existing research literature and recommendations of the expert panel. Using baseline data from the five intervention sites

and four pilot establishments, we calculated Cronbach's alpha coefficients for each of the indices, and results were encouraging—all coefficients were above 0.90. Caution should be used when interpreting these coefficients, however, since the sample size was small.

ARM consultation sessions. During the first session, the risk assessment survey was administered to the participating owner or manager. In addition, the ARM consultant showed the owner or manager a videotape that included peer testimonials about the benefits of having written establishment policies. The consultant then gave an overview of state alcohol laws and the potential liability that establishments face for an illegal alcohol sale.

The risk assessment scores generated from data gathered in session 1 were used to guide discussions during sessions 2 and 3. The consultant presented the risk scores for the manager's outlet compared with the average risk of other, similar establishments. Using outlet risk scores as a guide, Project ARM consultants recommended up to 19 model alcohol policies. If an establishment's score was elevated in one of the four risk areas, emphasis was placed on adoption of policies that target that area. For example, if an establishment had a higher risk score for sales to underage people than other establishments, the consultant stressed the importance of policies such as checking age identification of everyone younger than age 30. As each policy was discussed, the consultant provided the owner or manager with resource materials that would help with implementation. For instance, a calendar that indicated the date of birth that is the cutoff for a legal alcohol sale was provided to help a server determine if someone is underage.

During session 4, the consultant cofacilitated an establishment staff meeting with the owner or manager. During the staff meeting, the consultant showed the ARM videotape that addressed the importance of policies and reviewed state alcohol laws and liability issues. The owner or manager presented the new establishment policies and asked for input from staff on implementation of these policies. By discussing new policies with the staff before they were finalized, the consultant, along with the owner or manager, attempted to increase the staff's support for and compliance with the new policies.

During session 5, the consultant and the owner or manager discussed changes in any of the selected policies. The consultant provided information on how to make the new policies effective, particularly through active monitoring and enforcement. Owners and managers were encouraged to arrange server training for their employees and were given a list of local server training programs. The consultant also recommended that regular staff meetings be held to discuss the effectiveness of policies and impediments that servers face when trying to responsibly serve alcohol. At the end of session 5, the owner or manager completed the risk assessment survey again. Change in the risk score was an intermediate outcome for the assessment of the ARM program.

Evaluation Design

As part of this demonstration project, Project ARM was implemented and evaluated in five bars located in a major metropolitan area. Pre- and postintervention underage and pseudo-intoxicated purchase attempt rates from the five intervention bars were compared with rates in nine matched control bars. All research protocols were approved by the University of Minnesota's Internal Review Board.

Establishments. We recruited a diverse group of five bars, based on location, customer type, outlet size, and their perceived risk of illegal sales of alcoholic beverages (member-

ship vs. nonmembership in a high-risk insurance pool). Project ARM consultants initiated recruitment through telephone contact followed by face-to-face meetings. Recruitment was targeted to one individual in each outlet whom we identified as having the most influence regarding decision making and policy implementation in that outlet. Participating owners and managers received $300 as an incentive to complete the program. In the five intervention bars, one owner and four managers who had decision-making authority agreed to participate.

Fifty percent of all establishments contacted agreed to participate. Most owners and managers who declined to participate did so because of perceived lack of need, lack of time, or because of their belief that the risks involved with alcohol sales are unavoidable. The intervention sample included a college bar, a suburban bar, an urban bar, a high-risk bar, and a nightclub located in a suburban entertainment complex. Of the five bars that refused to participate, two were neighborhood bars, two were urban bars, and one was a high-risk bar. All participating bars completed all components of the training program. ARM consultants all had experience in the hospitality industry and were able to build a relationship with each owner or manager. Trainers held all sessions with owners and managers at their establishments and accommodated their schedules to ensure full participation.

We matched control sites to increase baseline comparability in the absence of randomization. Each of the five intervention bars was matched with two control establishments based on similar type and location. One control site was visited only once for data collection because of potential danger to researchers attempting to purchase alcohol, resulting in nine control sites in the analyses. The resulting study sample consisted of (1) three college bars, serving a primarily young clientele, located adjacent to a university; (2) three suburban bars serving a mixed clientele, including older patrons and families; (3) three urban bars serving a working-class clientele; (4) two high-risk bars; and (5) three nightclubs located in suburban entertainment complexes. All control bars were within 5 miles of the intervention bars; we chose bars in close proximity to decrease the likelihood of differential community-based enforcement across intervention and matched control bars.

To evaluate the effects of Project ARM on the propensity of participating establishments to illegally sell alcohol, two waves of both pseudo-intoxicated and underage purchase attempts were made in both the pre- and postintervention periods. All purchase attempts were made within 4 to 6 weeks before and after the intervention in each of the five intervention bars and their matched control establishments. All purchase attempts were completed on a Friday or Saturday between 3:00 p.m. and 10:00 p.m. The purchase attempts were balanced in terms of time and day of purchase. Neither intervention nor control bars were aware that these unobtrusive observations were being made; notifying the bars about these observations might have artificially reduced the sales rates in all establishments, biasing the results of the study.

Underage purchase attempts. Six women, ages 18 to 20 years old, were hired to make alcohol purchase attempts (in the state where this project was implemented, it is legal for a bona-fide university-based research team to use underage buyers). To ensure that all buyers looked underage, potential buyers were screened by a panel of 10 individuals; those buyers who appeared 18 or 19 years old were selected for the study. Only female buyers were used to achieve more homogeneity across purchase attempts. All buyers were accompanied by another woman who also appeared to be younger than age 21. Both dressed casually (i.e., did not attempt to appear older) and did not carry age identification. Both team members were trained on research protocol and safety measures and were blinded as to treatment condition.

During each purchase attempt, the buyer and the companion entered the establishment together and sat at a table. The buyer attempted to purchase an alcoholic drink while the companion ordered a nonalcoholic beverage. If the server asked for age identification, the buyer explained that her identification was in the car. If asked her age, the buyer was instructed to state her real date of birth and, if pushed further, to state her real age. Buyers were instructed not to attempt to persuade the server to serve them alcohol. If service was refused, both team members left the establishment. If served alcohol, the buyer was instructed to leave the establishment without consuming any of the drink. The underage purchase attempt protocol used in this study is well developed, based on a protocol we have used on hundreds of occasions in other studies.[8,31] Previous studies[8,31] indicate that purchase rates vary by buyer; therefore, we controlled for this "buyer effect" in our analyses.

Pseudo-intoxicated purchase attempts. Pseudo-intoxicated buyers were three male actors ages 30, 34, and 44, specifically hired and trained for this role. Pseudo-intoxicated buyers performed the intoxicated protocol before a panel of judges, which rated the actors' skill at feigning intoxication. The panel consisted of 10 individuals, most of whom had experience in the hospitality industry. The remaining panel members represented the "reasonable person" recognized by law as the standard by which conduct is judged. In addition to the buyer, a staff person served as an observer during each purchase attempt. The observer entered the establishment separately prior to the purchaser, observed the interaction between the server and the pseudo-intoxicated buyer, and recorded a variety of data regarding the purchase attempt and the environment of the establishment.

Pseudo-intoxicated buyers exhibited clear intoxication behaviors (e.g., loss of coordination, fumbling with items in the pocket, acting disoriented) while entering the establishment and then staggered to the bar to find a seat. Before ordering, the buyer asked the server several confused questions while demonstrating slow, slurred speech, inappropriate laughter, and forgetfulness. After asking what kind of beer they serve, the buyer ordered a double vodka. If the buyer's request was refused, he asked for a beer instead. If still refused, the buyer asked for the time and made an excuse to leave. If the buyer was served, he asked twice how much he owed, paid for the drink, and then asked for directions to the restroom where he would leave his drink, untouched. After 5 minutes, the buyer returned to the bar and ordered a second double vodka from the same server while continuing to exhibit drunken behavior. This second purchase attempt provided greater assurance that the server had an opportunity to recognize the intoxication and also facilitated evaluation of whether there would be repeated service to someone who was clearly intoxicated. If the second request was refused, the buyer made an excuse and left. If served the second time, the buyer waited a few minutes, left the drink on the bar, and exited the establishment. If at any time the buyer was asked for identification, he presented his real identification. If asked if he was driving, he said he was meeting someone who would give him a ride. No car keys were displayed. Indications that bar staff or other customers were aware of the buyers' apparent intoxication level were noted by observers at nearly every visit.[32]

The observer left the establishment immediately after the buyer to ensure that the buyer was not at risk for assault. The observer never acknowledged knowing the buyer unless the service or security staff detained the buyer in any way. In such cases, the observer stepped in, pretending to be a friend or relative, and volunteered to take the buyer home. Pseudo-intoxicated buyers were trained to closely follow this protocol. Buyers were blinded to the treatment condition. The pseudo-intoxicated purchase attempt protocol was adapted from a protocol used by McKnight.[33] To decrease potential confounding

of an individual actor's ability to feign intoxication, each establishment had the same buyer at baseline and follow-up. Since follow-up purchase attempts occurred 4 to 6 weeks after the baseline purchase attempts, the risk that a buyer would be recognized at an establishment was small. In addition, we controlled for potential buyer effects in all analyses to ensure that any systematic differences by the buyer were not inadvertently attributed to the intervention.

Dependent variables. Two visits were made by an underage buyer to each establishment during each of two survey periods (pretest, posttest), with a single purchase attempt at each visit. One dependent variable was defined from each visit, reflecting whether the underage confederate was able to purchase an alcoholic beverage during that visit (1 = sold, 0 = not sold). In addition, two visits were made by a pseudo-intoxicated buyer to each establishment during each survey period, with up to two separate purchase attempts at each visit. Two dependent variables were defined from the combination of two purchase attempts at each visit. The first focused on whether the pseudo-intoxicated buyer was able to purchase alcohol at least once (1 = ever sold, 0 = never sold). The second focused on whether the pseudo-intoxicated buyer was refused on either attempt (1 = ever refused, 0 = never refused). With 14 establishments (5 intervention, 9 control), 56 observations were available for each dependent variable.

Analyses. The evaluation design of Project ARM was a traditional repeated-measures design with two within-subjects factors and one between-subjects factor.[34] The case or respondent was the alcohol establishment. Period and visit were within-subjects factors because each establishment was observed at each visit and each period. Condition was a between-subjects factor because each establishment was assigned to one condition (intervention treatment vs. control). Condition, period, visit, and their interactions were fixed effects, while establishment was a random effect. The traditional ANOVA model specifies two error terms for this design[34]—here, establishment within conditions and period by visit by establishment within condition. This model is readily extended to an ANCOVA model to allow regression adjustment for covariates.

We fit that model using SAS PROC MIXED, version 6.12,[35] a general mixed-model regression program that is well suited to design and data structures of this kind.[36,37] We included as additional fixed effects the buyer ID, approximate number of patrons in the establishment at the time of the purchase attempt, job category and perceived age of seller, and whether the purchase attempt was made from a table or at the bar. We included these variables because we knew from previous research[8,31] that the purchase attempt buy rates vary among buyers and across levels of the other covariates. To the extent that those variables were unevenly distributed across establishments, they would induce confounding if ignored; to the extent that they were balanced across the establishments, they would reduce power if ignored. Each analysis employed a two-tailed Type I error rate of 5%, and no correction was made for multiple testing because there were only three dependent variables and because we had a priori expectations for each.

Because the MIXED procedure assumed that the residual errors are distributed normally, we repeated the final model using the SAS GLIMMIX macro. This analysis provided a logistic regression equivalent to the ANCOVA model fit by MIXED and so avoided any question about the normality of errors assumption that is attached to the ANCOVA model. For each dependent variable, the results from the mixed-model logistic regression analysis were equivalent to those from the ANCOVA model; because most

readers will be more familiar with the ANCOVA model and its results, we present only the results from the ANCOVA.

We present the adjusted means for each dependent variable later in Table 3. Intervention effects were estimated as the adjusted net difference among the four condition means for each dependent variable: net change = $(I_{follow\text{-}up} - I_{baseline}) - (C_{follow\text{-}up} - C_{baseline})$. Results are also presented in terms of relative change: relative change = (net change/$I_{baseline}$) • 100.

RESULTS

Intermediate outcomes. Prior to Project ARM, only two of the five bars had established any written alcohol policies. One outlet had two and the other seven written policies at baseline. Following management training, all five bars had written policies, adopting 14 to 18 of the 19 model policies (or modified versions of a model policy; see Table 1). Before adopting a policy, some bars worked with the ARM consultants to modify a recommended policy to fit the individual establishment. For example, one bar adopted a policy to check age identification of people appearing younger than 25 rather than 30. While we preferred policies to be adopted as we had written them, we determined it was preferable that managers adopt a modified version of a policy, moving toward more control over alcohol service, than to not take any action at all. Some bars chose not to adopt certain policies, such as the policy to serve only measured drinks, because they believed they would lose business. Two bars adopted 18 of the 19 model policies, the exception being the policy related to the minimum age of server. Most bars did not want to consider age when hiring alcohol servers because they depend on 18- to 20-year-olds to staff their establishments and felt that this policy may be viewed as age discrimination.

Mean risk scores across intervention bars improved after the Project ARM training, suggesting a decrease in risk of illegal alcohol sales (see Table 2). Aggregate mean scores for each of the four subcategories—sales to the underage customers, preventing intoxication, handling intoxication, and staffing and communication—also changed in the expected direction after the intervention.

Purchase attempt results. Underage purchase rates within the two conditions were similar at baseline (intervention [I] = 46.0%, control [C] = 48.0%). Following the intervention, the purchase rate went up slightly in the control condition (to 49.4%) and down in the intervention condition (to 42.0%). The 11.5% relative decrease was in the hypothesized direction but not statistically significant (see Table 3).

A similar pattern was observed for sales to pseudo-intoxicated buyers. At baseline, the pseudo-intoxicated purchase rates for the first purchase attempt were comparable, although the controls were slightly higher (I = 68.4%, C = 70.1%). Following the intervention, the pseudo-intoxicated purchase rate was slightly higher in the control condition (72.9%) and substantially lower in the intervention condition (40.0%). The 45.8% relative decline was in the hypothesized direction; however, given the small sample size, the result was not statistically significant.

The baseline rate for refusals to pseudo-intoxicated buyers on either the first or second purchase attempt was much higher in the intervention than the control bars (I = 83.1%, C = 63.0%). The refusal rate in the intervention bars decreased slightly to 80.3% but decreased much more in the control establishments at follow-up (54.8%). As a result, the 6.5% relative change was in the expected direction.

Table 1. Recommended Model Policies and Status of Policy by Establishment After the Project ARM Intervention

Recommended Model Policies	Establishment 1	2	3	4	5
1. Check identification of customers appearing to be under the age of 30.	Y	M	Y	Y	Y
2. Confiscate false age identification.	Y	Y	M	Y	Y
3. Consider age as a criterion when hiring alcohol servers.	R	R	R	Y	R
4. Monitor all areas of the establishment.	R	R	M	Y	R
5. Limit the number of people coming into your establishment.	Y	R	Y	R	Y
6. Do not offer drink promotions that encourage excessive drinking.	Y	Y	Y	Y	Y
7. Serve only measured drinks.	Y	R	R	Y	R
8. Notify other servers about the status of customers at the end of shift.	Y	Y	Y	Y	Y
9. Do not announce last call; stop service half hour before closing.	Y	M	Y	Y	Y
10. Promote food and nonalcoholic beverages.	Y	R	Y	Y	Y
11. Do not serve obviously intoxicated customers.	Y	Y	Y	Y	R
12. Guarantee 15% gratuity if service is refused and guest doesn't leave a tip.	R	Y	R	M	NA
13. Arrange alternative transportation.	Y	M	Y	Y	Y
14. Record all questionable incidents in an incident log.	Y	Y	M	Y	Y
15. Require annual server training.	Y	Y	Y	Y	M
16. Prohibit drinking on the job.	Y	Y	M	Y	Y
17. Have manager/lead worker on duty at all times.	Y	Y	Y	Y	M
18. Hold regular staff meetings.	Y	Y	Y	Y	Y
19. Distribute written copies of policies to all staff; post policies in visible area.	Y	Y	Y	Y	Y
Total policies adopted	16	14	16	18	14

NOTE: Y = adopted, R = refused, M = adopted but modified, NA = not applicable to that business.

DISCUSSION

Since this was a demonstration project, the goal was to develop the intervention program and conduct preliminary testing to see whether the program was feasible, was well received by participants, and held promise of being able to change serving practices. Process evaluation data indicate that owners and managers enjoyed and valued participation in Project ARM. Outlet employees also expressed appreciation for Project ARM, indicating they liked having clear rules about what is acceptable or not in terms of serving alcohol to underage or intoxicated customers.

Project ARM was effective in changing establishment policies. Fourteen to 18 of the model policies were adopted in each of the five intervention bars. Each of the participating owners and managers orally introduced and discussed the selected policies with their staff and provided each staff person with a written copy of these policies.

The main results of this demonstration project are encouraging. Although not statistically significant, we observed a net change in the hypothesized direction for all three outcome variables. Compared with control establishments, bars that participated in the ARM consultation program sold alcohol to project buyers less often. Significant differences were not expected because the sample size was small, limiting the statistical power of this demonstration effort.

Table 2. Average Prerisk/Postrisk Scores for Intervention Outlets

	Prerisk		Postrisk	
	Mean	Standard Deviation	Mean	Standard Deviation
Overall risk	332.6	74.9	431.1	30.2
Sales to underage customers	72.9	10.5	84.5	8.1
Preventing intoxication	79.0	13.3	109.6	15.0
Handling intoxication	99.2	25.7	125.3	4.0
Staffing and communication	81.5	32.2	111.7	19.4

NOTE: Higher score equals lower risk.

Table 3. Results of Repeated ANCOVA Analyses of Effect of Intervention on Alcohol Service Behavior

	Intervention		Control						
Outcome Measure	Pre (%)	Post (%)	Pre (%)	Post (%)	Net Difference	Relative Change	Standard Error	*t*-Ratio	*p* Value
Ever sold to underage	46.0	42.0	48.0	49.4	–5.3	–11.5	0.30	–0.18	0.86
Ever sold to pseudo-intoxicated	68.4	40.0	70.1	72.9	–31.3	–45.8	0.27	–1.17	0.27
Ever refused pseudo-intoxicated	83.1	80.3	63.0	54.8	5.4	6.5	0.22	0.24	0.81

To achieve statistical significance for the observed relative decrease of 45.8% for pseudo-intoxicated buys, we would need participation of 20 bars per condition (i.e., 20 intervention and 20 control). To reach statistical significance for a decrease in sales to underage buyers, we would have needed 830 bars per condition. The magnitude of observed effects suggests that Project ARM may be effective in preventing sales to obviously intoxicated patrons but is less likely to affect sales to underage people.

Project ARM may be more successful in reducing sales to obviously intoxicated patrons than underage individuals for several reasons. First, intoxicated customers may be more common in bars than underage purchasers, making discussions of sales to intoxicated individuals more salient. Second, intoxication may be more easily identifiable than age. Our pseudo-intoxicated buyers were instructed to act out clear and obvious signs of substantial intoxication, such as slurred speech and staggered walking. Skills needed to identify these signs may be much easier to develop than judging whether an individual is potentially underage. A standard recommendation is to check age identification of anyone who appears younger than age 30. Servers may need more skills to identify signs of age or more external pressure from their management or the community to ask for age identification.

While the ARM intervention may be promising for decreasing sales to intoxicated customers, the intervention did not substantially alter the rate of refusals to pseudo-intoxicated purchasers on the first or second purchase attempt. One explanation for this

may be that the baseline rate of ever being refused was quite high in the intervention bars (83%), so there may have been a ceiling effect. The fact that intervention bars were more likely to refuse alcohol sales to the pseudo-intoxicated buyers on the first or second purchase attempt than control bars, even at baseline, may reflect a selection bias artifact. However, control bars were very similar to intervention bars at baseline in terms of implemented alcohol policies and illegal sales rates.

The interpretation and generalizability of these results are limited by threats of selection bias introduced from two design limitations. First, only half of the establishments we contacted agreed to participate in the program. Although the establishments that refused to participate were similar in terms of type to those that agreed to participate, we do not know if nonparticipants differed in other important ways that could influence the effectiveness of the program.

Second, establishments were not randomly assigned to condition. Intervention bars may have been more concerned about responsible serving practices than control establishments, even at baseline. However, the intervention outlets had few written alcohol service policies prior to the intervention and were similar to the controls in terms of two of the three outcomes—sales to underage and sales to pseudo-intoxicated patrons. In addition, control bars were matched to intervention bars on size and location of outlet to increase baseline similarity.

Implications for Practice

An important issue for both researchers and practitioners is how to increase participation rates. Assuming that a program such as Project ARM can reduce illegal alcohol sales, practitioners need to have as many establishments as possible participate in the program to substantially prevent illegal sales in a community. Establishments may resist participation in this type of program for several reasons, including lack of time and belief that they do not have a problem. Many establishments may also distrust organizations that are not part of the hospitality industry or feel that alcohol establishments are being unfairly targeted.

One way to increase participation may be to develop an effective program that takes less time to complete. Another is to increase credibility and trust by hiring consultants or trainers who have experience in the hospitality industry, such as former bartenders and servers. Offering incentives may also increase participation rates; however, despite being offered $300, only half of the outlets we contacted agreed to participate. When developing and marketing a program, it is also important to consider the self-interest of the manager and owner. They want a program that will help them run a better business—decreasing risk of problems while maintaining profits. On completion of the program, all of the participants indicated that given the value of information provided in the program, they would have completed the program even without incentive money.

It should be noted that in the "real world," the ARM intervention would most likely be implemented within a context of increased community concern about alcohol problems, stepped-up enforcement levels, and other conditions that would motivate outlets to participate in a training program. Some outlets may be motivated to participate in a training program and to comply with laws out of concern about preventing alcohol-related problems. Others, however, may only be motivated to participate because of active enforcement efforts and community pressure to comply.

Community enforcement efforts and interventions such as ARM may complement each other. Implementing the ARM intervention in the context of increased enforcement

levels and community pressures may increase the effectiveness of the program by increasing participation rates and motivating owners and managers to encourage responsible service of alcohol among their staff. Interventions such as ARM may help with enforcement efforts by increasing the political feasibility of making enforcement actions against alcohol retailers.

Despite limitations, results of this demonstration project are encouraging for practitioners and researchers. Studies of other training programs have shown limited effects on illegal alcohol sales. A program developed from key behavior change principles that specifically targets owners and managers of alcohol establishments (rather than service staff) may prevent illegal alcohol sales to obviously intoxicated patrons. However, a larger randomized trial is needed to fully determine the effectiveness of this type of program. In addition, further research is needed to assess the long-term effects of Project ARM. In the current study, follow-up purchase attempts were completed within 4 to 6 weeks of the completion of the intervention. Effects of the program may increase or diminish over time, depending on the level of commitment to and enforcement of the policies by outlet management.

References

1. Baker SP, O'Neill B, Ginsburg MJ, Li G: *The Injury Fact Book* (2nd ed.). New York, Oxford University Press, 1992.
2. Hayward L, Zubrick SR, Silburn S: Blood alcohol levels in suicide cases. *J Epidemiol Community Health* 46:256-260, 1992.
3. Roizen J: Estimating alcohol involvement in serious events, in: *Alcohol and Health Monograph 1: Alcohol Consumption and Related Problems*. Washington, DC, Government Printing Office, 1982, pp. 179-219.
4. Roizen J: Issues in the epidemiology of alcohol and violence, in: Martin SE (ed.): *Alcohol and Interpersonal Violence, Monograph 24: Fostering Multidisciplinary Perspectives*. Washington, DC, Government Printing Office, 1993, pp. 3-36.
5. Leigh BC: The relationship of substance use during sex to high-risk sexual behavior. *J Sex Res* 27(2):199-213, 1990.
6. Stall R, Wiley JA, McKusick L, Coates TJ, Ostrow D: Alcohol and drug use during sexual activity and compliance with safe sex guidelines for AIDS. *Hlth Educ Q* 13:359-371, 1986.
7. Edwards G, Anderson P, Babor TF, Cassell S, Ferrence R, Giesbrecht N, et al: *Alcohol Policy and the Public Good*. New York, Oxford University Press, 1994.
8. Forster JL, Murray DM, Wolfson M, Wagenaar AC: Commercial availability of alcohol to young people: Results of alcohol purchase attempts. *Prev Med* 24:342-347, 1995.
9. McKnight AJ, Streff FM: The effect of enforcement upon service of alcohol to intoxicated patrons of bars and restaurants. *Accid Anal Prev* 26(1):79-88, 1994.
10. Preusser DF, Williams AF: Sales of alcohol to underage purchasers in three New York counties and Washington, D.C. *J Pub Hlth Policy* 13(3):306-317, 1992.
11. Foss RD, Perrine MW, Myers AM, Musty RE, Voas RB: A roadside survey in the computer age, in Perrine MW (ed.): *International Committee on Alcohol, Drugs, and Traffic Safety—T-89*. Chicago, National Safety Council, 1990.
12. O'Donnel M: Research on drinking locations of alcohol impaired drivers: Implementations for prevention policies. *J Pub Hlth Policy* 6(4):510-525, 1985.
13. Saltz RF: The roles of bars and restaurants in preventing alcohol-impaired driving: An evaluation of server intervention. *Eval Hlth Professions* 10:5-28, 1987.
14. Toomey TL, Kilian GR, Gehan JP, Wagenaar AC, Perry CL, Jones-Webb R: Qualitative assessment of responsible alcohol service training programs. *Pub Hlth Rep* 113(2):62-169, 1998.

15. Gliksman L, Single E: *A Field Evaluation of a Server Intervention Program: Accommodating Reality*. Paper presented at the Canadian Evaluation Society Meetings, Montreal, Canada, May 1988.
16. Howard-Pitney B, Johnson MD, Altman DG, Hopkins R, Hammond N: Responsible alcohol service: A study of server, manager, and environmental impact. *Am J Pub Health* 81(2):197-199, 1991.
17. McKnight AJ: *An Evaluation of a Host Responsibility Program*. Washington, DC, U.S. Department of Transportation, National Highway Traffic Safety Administration, 1987.
18. McKnight AJ: Factors influencing the effectiveness of server-intervention education. *J Stud Alcohol* 52(5):389-397, 1991.
19. Molof MJ, Kimball C: *A Study of the Implementation and Effects of Oregon's Mandatory Alcohol Server Training Program*. Eugene, OR, Integrated Research Services, 1994.
20. Russ NW, Geller ES: Training bar personnel to prevent drunken driving: A field evaluation. *Am J Public Health* 77:952-954, 1987.
21. Holder HD, Wagenaar AC: Mandated server training and reduced alcohol-involved traffic crashes: A time series analysis of the Oregon experience. *Accid Anal Prev* 26(1):89-97, 1994.
22. National Highway Traffic Safety Administration: *TEAM: Techniques of Effective Alcohol Management: Findings From the First Year.* Washington, DC, Department of Transportation, 1986.
23. Saltz RF: Where we are in the evaluation of responsible beverage service program evaluations. *Alcohol Drugs Driving* 10(3-4):277-285, 1994.
24. Wolfson M, Toomey TL, Forster JL, Murray DM, Wagenaar AC: Alcohol outlet policies and practices concerning sales to underage people. *Addiction* 91(4):589-602, 1996.
25. Wolfson M, Toomey TL, Forster JL, Wagenaar AC, McGovern PG, Perry CL: Characteristics, policies and practices of alcohol outlets and sales to underage persons. *J Stud Alcohol* 57:670-674, 1996.
26. Glanz K, Lewis FM, Rimer BK (eds.): *Health Behavior and Health Education*. San Francisco, Jossey-Bass, 1997.
27. Bandura A (ed.): *Social Learning Theory.* Englewood Cliffs, NJ, Prentice Hall, 1977.
28. Green LW, Kreuter MW: *Health Promotion Planning: An Educational and Environmental Approach*. Mountain View, CA, Mayfield, 1991.
29. Rosenstock IM, Strecher VJ, Becker MH: Social learning theory and the health belief model. *Hlth Edu Q* 15(2):175-183, 1988.
30. Gehan JP, Toomey TL, Jones-Webb R, Rothstein C, Wagenaar AC: Alcohol outlet workers and managers: Focus groups on responsible service practices. *J Alcohol & Drug Ed*, 44(2): 60-71, 1999.
31. Forster JL, McGovern P, Wagenaar AC, Wolfson M, Perry CL, Anstine P: The ability of young people to purchase alcohol without age identification. *Addiction* 89:699-705, 1994.
32. Toomey TL, Wagenaar AC, Kilian GR, Fitch OB, Rothstein C, Fletcher L: Alcohol sales to pseudo-intoxicated bar patrons. *Pub Hlth Rep* 114(4):337-342, 1999.
33. McKnight AJ: *Development and Field Test of a Responsible Alcohol Service Program: Vol. III. Final Results*. Washington, DC, U.S. Department of Transportation, National Highway Traffic Safety Administration, 1989.
34. Winer BJ, Brown DR, Michels K: *Statistical Principles in Experimental Design*. New York, McGraw-Hill, 1991.
35. SAS Institute: *SAS/STAT Software: Changes and Enhancements Through Release 6.1.2*. Cary, NC, SAS Institute, 1997.
36. Little RC, Milliken GA, Stroup WW, Wolfinger RD: *SAS System for MIXED Models*. Cary, NC, SAS Institute, 1996.
37. Murray DM: *Design and Analysis of Group-Randomized Trials*. New York, Oxford University Press, 1998.