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The Premises is the Premise: Understanding Off- and On-Premises Alcohol Sales Outlets to Improve Environmental Alcohol Prevention Strategies

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Abstract

Environmental strategies to prevent the misuse of alcohol among youth—e.g., use of public policies to restrict minors' access to alcohol—have been shown to reduce underage drinking. However, implementation of policy changes often requires public and private partnerships. One way to support these partnerships is to better understand the target of many of the environmental strategies, which is the alcohol sales outlet. Knowing more about how off-premises outlets (e.g., liquor and convenience stores) and on-premises outlets (e.g., bars and restaurants) are alike and different could help community-based organizations better tailor, plan, and implement their environmental strategies and strengthen partnerships between the public and commercial sectors. We conducted a survey of managerial or supervisory staff and/or owners of 336 off- and on-premises alcohol outlets in six counties in South Carolina, comparing these two outlet types on their *preferences* regarding certain alcohol sales practices, *beliefs* toward underage drinking, alcohol sales *practices*, and *outcomes*. Multilevel logistic regression showed that while off- and on-premises outlets did have many similarities, off-premises outlets appear to engage in more

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practices designed to prevent sales of alcohol to minors than on-premises outlets. The relationship between certain Responsible Beverage Service (RBS) practices and outcomes varied by outlet type. This study furthers the understanding of the differences between off- and on-premises alcohol sales outlets and offers options for increasing and tailoring environmental prevention efforts to specific settings.

Keywords

Responsible Beverage Service; underage drinking; environmental strategies; off-premises; on-premises

Underage drinking exacts a high toll on communities, as it is linked to increased traffic crashes (Hingson, & Winter, 2003), injuries and fatalities, risky sexual behaviors (Grunbaum, Kann, Kinchen, et al., 2004) and increased proclivity for the development of alcohol use disorders (SAMHSA, 2007). A recent report from the U.S. Surgeon General stated that underage drinking "…is a widespread and persistent public health and safety problem that creates serious personal, social, and economic consequences for adolescents, their families, communities, and the Nation (Department of Health and Human Services, 2007)". Environmental strategies to prevent the misuse of alcohol among youth—e.g., use of public policies to restrict minors' access to alcohol—have been shown to reduce underage drinking and binge drinking, and recoup drinking-related costs (Dent et al., 2005; Institute of Medicine, 2004; Hingson, & Howland, 2002; National Institute on Alcohol Abuse and Alcoholism, 2002; Miller & Hendrie, 2009). However, implementation of policy changes often requires public and private partnerships. For example, law enforcement strategies alone cannot achieve the effects that alcohol sales establishments can achieve when they regularly check IDs and train their staff to utilize responsible beverage serving (or RBS) practices.

Non-profit community organizations funded by Enforcement of Underage Drinking Laws Block Grant and Drug Free Communities and Supports programs are another key partner who often seek to implement support programs in partnership with alcohol sales establishments (e.g., running RBS training programs). These community based organizations vary in how they partner with local law enforcement, alcohol sales establishments and local alcohol distributors, but often the partnerships include direct collaboration. For example, while law enforcement agencies are responsible for conducting the actual compliance check, the community organizations often pair with law enforcement to plan the checks' location and frequency, maintain records of the checks' outcomes, disseminate the results to merchants and the broader community, and provide court mandated responsible beverage service training.

One way to support these partnerships is to better understand the target of many of the environmental strategies, which is the alcohol sales outlet. These strategies, such as compliance checks, RBS training, happy hour restrictions, and keg registration involve, to various degrees, the cooperation of staff, managers, and/or owners of alcohol outlets. These policies have been shown to impact alcohol outlets by decreasing sales to minors but may impact "off-premises" (places where alcohol is sold but cannot be consumed such as liquor

and convenience stores) and "on-premises" (places where alcohol can be purchased and consumed such as bars and restaurants) outlets in different ways (Wolfson et al., 1996).

Knowing more about off- and on-premises outlets could help community-based organizations better tailor, plan, and implement their environmental strategies and strengthen partnerships between the public and commercial sectors. Doing so would be consistent with implementation theories which suggest that the impact of diffusion efforts—and all the above environmental strategies are efforts to diffuse certain practices into existing alcohol sales outlets—will be maximized when they are based on assessed needs, barriers, and incentives of targeted end users, in this case, alcohol sales outlets (Rosenheck, 2001; Bartholomew et al., 2001; Rubenstein et al., 2000).

Toward that end, we conducted a survey of managerial or supervisory staff and/or owners of 336 off- and on-premises alcohol outlets in South Carolina as part of a larger evaluation of a community capacity-building intervention called Getting To Outcomes-Underage Drinking (GTO-UD; Imm et al., 2007). In addition to some outlet characteristics, the survey focused on areas that are important to understand when engaging alcohol sales outlets in prevention activities: Merchants' *preferences* regarding certain alcohol sales practices, merchants' *beliefs* toward underage drinking, merchants' alcohol sales *practices*, and *outcomes* of those practices. Many studies have shown that preferences and beliefs toward new practices impact the degree to which those new practices will be adopted and implemented (Rohrbach, D'Onofrio, Backer, & Montgomery, 1996). For example, there is some evidence to show that the support of outlet managers is critical to the successful implementation of environmental strategies such as RBS training (Toomey et al., 1998). Also, new practices are more likely to be adopted when they are compatible with current practices (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004).

In this survey, we examine the differences in preferences, beliefs, current practices, and outcomes between off- and on-premises alcohol outlets. A majority of research studies involving the practices of alcohol outlets has tended to report findings separately for off- and on-premises outlets. While that approach is sensible, current research lacks direct comparisons of the preferences, beliefs, and practices of these two types of outlets which coexist in most communities and together are the targets of preventive interventions. Such comparisons based on reports from outlet owners and managers would provide further information about how to best tailor environmental strategies by outlet type.

Our comparisons are adjusted for the density of off- and on-premises alcohol outlets surrounding each of the 336 outlets in our sample. Density—or how many outlets are present in a given area—is thought to influence the sales practices of alcohol outlets through both the competitive market forces that come with the increased competition of being near several other outlets and permissive norms that may occur with clusters of several alcohol outlets (Freisthler et al., 2003; Dang, Truong, & Sturm, 2009). While a review of previous research by Livingston, Chikritzhs, & Room (2007) shows that the relationship between density, consumption, alcohol sales and sales practices (e.g., selling to minors) is not definitive (some studies show its presence, some do not) or clearly uni-directional (many studies show more sales/consumption with higher density, a few do not), the evidence seems

to indicate that density has some type of effect. Therefore, we adjust for density to obtain a comparison in which variability can be more clearly attributed to outlet type.

METHODS

Study Sites

The outlets studied here were chosen from six South Carolina counties whose alcohol and drug abuse authorities received an Enforcing Underage Drinking Laws (EUDL) grant from the South Carolina Department of Alcohol and Other Drug Abuse and were part of a larger evaluation study. The Prevention Department of each county authority convened a coalition comprised of prevention professionals, law enforcement, local business leaders and city government officials, representatives from local school districts, students and parents to reduce youth access to alcohol using various environmental strategies. Law enforcement collaborated with prevention specialists and other coalition partners to implement compliance checks, party patrols, RBS education, and publicity about these activities. The six counties represent a mixture of socioeconomic profiles, with the more urban counties representing slightly higher socioeconomic status, based on median household income (www.quickfacts.census.gov, retrieved Aug 6, 2009). The population density of the counties varied, from 41.7 persons per square mile to 481 persons per square mile (www.sciway.net, retrieved April 12, 2010). The racial composition of the counties also varied. Statewide in 2000, about two thirds were White and 30% were African American. In the counties in this study, the most heterogeneous county is about half White and 45% African American, while the most homogeneous county is 84% White and 13% African American (www.sccommunityprofiles.org, retrieved April 12, 2010).

Sample Description

To sell alcohol, outlets are required to apply, pay for, and receive a license with the South Carolina Department of Revenue, the alcohol licensing agency in the state. A list of these off- and on-premises alcohol outlets and their mailing addresses was obtained for each of the six counties. These are the same lists community coalitions use to conduct compliance checks and to recruit participation in RBS education programs. The six coalitions culled the lists prior to sharing them by removing outlets that were not licensed as off-premises or on-premises beer/wine or liquor (e.g., 30-day vendors).

A total of 2,147 off- and on-premises outlets had a license to sell alcohol in the six counties and comprised our sample frame. Stratifying by county and off/on-premises sales status, we drew a random sample of 675 outlets based on power calculations for the larger evaluation of GTO-UD. Of those, 336 (49.78%) resulted in completed interviews, 49 (7.26%) refused, 124 (18.37%) were ineligible because they were out of business or were not alcohol sales outlets, 4 (0.59%) were duplicates, and 162 (24%) were incomplete at the end of the field period. Deleting ineligible cases from the original sample resulted in a completion rate of 61%.

After sending an introductory letter with a small pre-paid cash incentive, four experienced telephone interviewers contacted outlets and completed phone surveys following a

standardized Computer Assisted Telephone Interviewing (CATI) protocol. For each outlet completing the survey, interviewers verified whether the outlet sold alcohol for off- or on-premises consumption. Five of the 336 survey respondents replied that they sold alcohol both off and on the premises, so we excluded them from the comparative off/on-premises analyses, leaving 331 outlets in the analytic dataset (188 off- and 143 on-premises).

With the exception of race/ethnicity, the demographics of survey respondents did not differ significantly by off/on-premises outlet type when controlling for county. About 56% of off-premises (59% on-premises) merchants surveyed were male (p=0.681). The average age of off-premises merchants was 41.62 (40.96 for on-premises) years with a standard error of 1.30 (1.90) (p=0.805). About 2% of off-premises (5% of on-premises) merchants had less than a high school education, 37% (28%) were high school graduates, 25% (29%) had vocational training or some college, 36% (37%) had at least a college degree (p=0.160). In addition, off-premises merchants had worked for an average of 7.96 years (SE=0.95) and on-premises worked an average of 7.10 years (SE=0.91), p=0.555. Approximately 23% of off-premises and 35% of on-premises respondents were the owner of the outlet, 58% (49%) were the head manager, and 18% (16%) were the assistant manager (p=0.185). Off-premises merchants were 56% White, 16% Black, and 28% other races/ethnicities, while on-premises merchants were 71% White, 9% Black, and 20% other races/ethnicities. Thus off-premises merchants were less likely to be White (p=0.004).

Measures

The merchant survey was comprised of 45 items. A total of 28 items were adapted from the Communities Mobilizing for Change on Alcohol survey (CMCA; Wagenaar et al., 1994, 2000; Wolfson et al., 1996) to assess off- and on-premises owners and managers about outcomes of their outlet's practices (e.g., if merchant would sell to a 21-year old if accompanied by a 19-year old) and beliefs (e.g., perceived likelihood that a business would be cited if selling alcohol to minors). The CMCA survey has been used in community intervention trials of on-premises and off-premises merchants suggesting validity in this population because it has been associated with changes in serving and selling practices over time (Wagenaar et al., 1999; Wolfson et al., 1996). An additional 17 items were developed for this study based on recommended practices alcohol outlets should follow to minimize the sale of alcohol to minors (Colthurst, 2004; Imm et al., 2007) including information about RBS trainings (e.g., whether managers and clerks are required to attend, when new employees attend, how often existing staff attend; beliefs about how helpful the training was, etc.), preferences toward RBS training, presence of a written policy to prevent the sale of alcohol to minors, presence of logs to document incidents, and beliefs related to recommended practices and enforcement (items are shown in Table 1). These questions were developed by the study's authors by reviewing best practices and following the same format of the CMCA survey. The draft questionnaire was reviewed by local practitioners in South Carolina and their comments were incorporated into the final survey.

Calculation of Alcohol Outlet Density

To adjust for density's possible impact in different ways, we calculated three density scores for each outlet based on the methods described by Freisthler et al (2003): 1) number of

outlets within 500 meters of the outlet being surveyed; 2) distance in kilometers to the closest outlet; 3) a dichotomous variable measuring whether another outlet was located within the same block or 1/16th of a mile. To calculate these scores, we used our original list of outlet addresses in our six counties (N=2147) and a list of outlet addresses in cities neighboring our six-county sample from the South Carolina Department of Revenue (N=345). After removing invalid addresses (duplicates, P.O. boxes), 2303 outlets were used in assigning density scores. To geocode the geographical coordinates (longitude and latitude) of each merchant, we first converted addresses into coordinates using Google Maps API Geocoding service (http://code.google.com/apis/maps/documentation/geocoding/index.html), an online open source of geo mapping. For addresses that could not be identified (N=271), we used Microsoft's online Terra Server database (data source from U.S. Geological Survey (USGS) aerial photographs) to obtain estimated geographic coordinates (http://terraserver-usa.com/ advfind.aspx). After determining the geographic coordinates, a matrix of great circle distances showing estimated ground distance between pairs of merchants was calculated using the Vincenty's formula (1975) for each outlet in our sample. The three density scores were obtained through the great circle distance matrix that satisfied the above three density methods. One outlet was deleted because it has an un-identifiable address, leaving a final analytic dataset of 330 outlets (187 off-premises outlets and 143 on-premises outlets). However, because results were similar across the three density scores, we only present results using the number of outlets within 500 meters, which is believed to be the most accurate (Freisthler et al 2003).

Statistical Analyses

We conducted two set of analyses: 1) bivariate comparisons between off- and on-premises outlets and 2) a subsequent multivariable analysis for the significant bivariate associations to assess whether relationships between RBS practices and outcomes differ between off- and on premises outlets.

Bivariate analyses—First, we used multilevel logistic regression as implemented by PROC GLIMMIX in SAS 9.2 (Littell et al. 1996) to test whether preferences and beliefs toward underage drinking and current prevention practices and outcomes significantly differed for off- versus on-premises outlets. Each model included a random county-specific intercept term to account for the sample design, correlations among respondents from the same county, and to stabilize estimates for counties with small numbers of observations (Morris 1983). We fit separate models for 23 binary survey outcomes and 22 ordinal survey outcomes. Off/on-premises status was included as the key predictor in each model, controlling for alcohol outlet density.

Given that the number of times an outlet refuses to sell to minors each week could be influenced by how many times an attempt is made, when modeling the refusal outcome, we fit the regression for this outcome both unadjusted and adjusted for the number of weekly purchase attempts by minors as a sensitivity analysis. Twenty-four percent of respondents reported a greater number of weekly refusals than weekly purchase attempts. (The weekly purchase attempts and refusals items were deliberately placed far apart on the survey to avoid the socially desirable response of exactly as many refusals as purchase attempts). For

outlets reporting more refusals than attempts, we set attempts equal to refusals when modeling refusals rates out of total purchase attempts. We also fit the model two additional ways-setting refusals equal to attempts and dropping outlets who reported more refusals than attempts-to verify that results were similar.

For the unadjusted refusals model, we fit a cumulative logistic regression to the self-reported weekly refusals to sell alcohol to minors, discretized to 0, 1, 2, 3, or 4 or more refusals. To account for the data structure in the model adjusting for number of attempts, we fit a binomial model to the refusal rate (refusals/attempts) among those reporting at least one weekly purchase attempt. To obtain corrected p-values for the estimated off/on-premises odds ratios, significance levels were adjusted using the Hochberg method (Hochberg, 1988).

Multivariable analyses: Association between RBS practices and outcomes by outlet type—RBS outcomes and practices that significantly differed between off/on-premise outlet types in the bivariate analyses were selected for further regression modeling (one practice, new employees attending RBS training before starting work, was applicable only to outlets that required RBS training and was eliminated due to small sample size). This was done to go beyond identifying simple differences between off- and on premises outlets, and test whether there was a connection between certain RBS practices and outcomes and whether that connection differed between off- and on-premises outlets. For each RBS practice, we fit regressions (logistic or binomial, where appropriate) predicting each RBS outcome from (1) main effects of the RBS practice and off/on-premises outlet type and (2) the interaction of the RBS practice and outlet type, adjusting for outlet density and random county-to-county variation. Models for weekly refusal rate were conditional on outlets reporting at least one weekly purchase attempt. As with the bivariate analyses, we set attempts equal to refusals for respondents who reported more refusals than attempts. We fit two parallel sets of models setting refusals equal to attempts and dropping outlets who reported more refusals than attempts as a sensitivity analysis.

Main effects models test the association between the RBS practice and the outcome, averaging over off/on-premise outlet type, while interaction models allow the association of the RBS practice and the outcome to differ within off- and on-premise outlet types. The significance test for the interaction term tests the null hypothesis that the association of the RBS practice and the outcome does not differ between the two outlet types against the alternative hypothesis that the association differs between the two outlet types. The goal of this second set of analyses was to assess whether conducting a certain RBS practice was associated with a better or worse outcome in a particular outlet type.

RESULTS

Bivariate analyses

Table 1 reports off/on-premises odds ratios and their significance levels in two ways: (1) unadjusted and (2) adjusted for multiple comparisons, county and outlet density (number of outlets within 500 meters), in order to attribute the variability more to the influence of outlet type and not location. Unadjusted, 16 of the 45 off/on-premises comparisons examined reached statistical significance ($p<0.05$). Adjusted, nine of the 16 remained significant. Two

were outlet characteristics: Off-premises outlets had 2.82 times the adjusted odds of being part of a chain as compared to on-premises outlets ($p<0.01$). On-premises outlets reported fewer attempts by minors (discretized to 0, 1, 2, or 3 or more times) to purchase alcohol in a typical week (adjusted off/on-premises odds ratio OR=0.31, $p<0.001$).

Although off- and on-premises outlets did not differ significantly in their RBS beliefs and preferences after adjusting, they differed significantly in four RBS practices and three RBS outcomes. Regarding RBS *practices*, off-premises outlets were more likely to require employees to attend RBS training as a condition of employment (OR=2.17, $p<0.05$). However, among outlets that did require employees to attend RBS training, we found no significant off/on-premises differences in the timing or frequency of training required for new or existing employees. Further, we did not find significant off/on-premises differences in the type of RBS course required for new or existing employees (State approved vs. unapproved, in-house vs. otherwise). Also, compared to on-premises outlets, off-premises outlets were more likely to have posted signs about selling to minors (OR=8.47, $p<0.001$) and were far more likely to have an "age verification device" (OR=14.65, $p<0.001$), which is an electronic card-swipe machine that reads data off of a valid ID and displays age, date of birth and whether the card is expired. The device does not read data from fake IDs, alerting the clerk to reject the ID. Finally, off-premises outlets were less likely to engage in the RBS practice of having a manager present the majority of the time (OR=0.32, $p<0.01$).

Regarding RBS *outcomes*, off-premises outlets were more likely to refuse the sale of alcohol to a 21-year-old accompanied by a 19-year-old (OR=2.63, $p<0.01$). While off-premises outlets reported refusing minors' attempted alcohol purchases at a higher weekly rate than on-premises outlets (discretized to 0, 1, 2, 3, or 4 or more times; OR=3.45, $p<0.001$), they also reported a greater weekly average number of attempted alcohol purchases by minors. Even after accounting for their higher weekly average purchase attempts in a binomial model contingent on reporting at least one weekly purchase attempt, off-premises outlets were still more likely to report a higher weekly number of refusals to sell to minors (OR=5.10, [adjusted] p-value < 0.001, setting attempts equal to refusals for outlets reporting more refusals than attempts). Results were similar when cases who reported more refusals than attempts were dropped, and when refusals were set equal to attempts for these cases. Off-premises outlets were also less likely to report having not been cited for selling alcohol to minors in the past 12 months (OR=0.13, $p<0.05$).

Association between RBS practices and outcomes by outlet type

Table 2 presents significant odds ratios from logistic regressions predicting three key RBS outcomes shown to differ between off/on-premises outlets from (1) main effects of RBS practices and off/on-premise outlet type and (2) their interaction. First, no RBS practice main effects were significant in the models where not being cited for selling alcohol to a minor in the past year was the outcome. Results for the other two outcomes by RBS practice are below.[1]

[1]For models predicting weekly refusal rates to minors, purchase attempts were set equal to refusals for outlets reporting more refusals than attempts. Results were similar when dropping these outlets or setting refusals equal to attempts (not shown).

RBS training—Averaging over off- and on-premises outlets, those that required employees to complete RBS training reported greater rates of weekly refusals to attempted alcohol purchases by minors (OR=1.81, $p<0.10$). The interaction of outlet type and requiring RBS training was significant ($p<0.05$) for weekly refusal rate, suggesting heterogeneity of the RBS training effect between outlet types. Within off-premises outlets only, the association between requiring RBS training and weekly refusal rates was not significant; but it was significant within on-premises outlets (OR=12.67, $p<0.05$).

Posting signs—There were no significant associations of posting signs about the sale of alcohol to minors with any of the RBS outcomes.

Age verification device—The main effect of having an age verification device was not significant with respect to refusing to sell alcohol to a 21-year-old accompanied by a 19-year-old, nor was its interaction with outlet type. Among off-premises outlets, those with an age verification device were more likely to refuse the sale of alcohol to a 21-year-old accompanied by a 19-year-old (OR=1.85, $p<0.05$), but not among on-premises outlets. Averaging over outlet type (among outlets with at least one weekly purchase attempt), having an age verification device was significantly associated with greater refusal rates to minors (OR=2.18, $p<0.001$). This outcome was borderline significant just among off-premises outlets (OR=1.99, $p<0.10$). Neither the interaction term nor the within on-premises only effect were significant for the weekly refusals outcome.

Written policy—Outlets with a written policy about selling alcohol to minors were more likely to refuse to sell to a 21-year-old with a 19-year-old, both averaging over outlet type and within off-premises outlets (OR=2.01, $p<0.05$ and OR=3.42, $p<0.01$, respectively). The interaction with outlet type was significant for this outcome ($p<0.05$). For weekly refusal rate, the main effect of having a written policy was not significant but the interaction with outlet type was borderline significant ($p<0.10$).

Manager on site—Averaging over outlet type, those with a manager on site 75% of the time or more were less likely to refuse to sell to a 21-year-old accompanied by a 19-year-old (OR=0.55, $p<0.05$). The interaction was not significant. Off-premises outlets with a manager on site a greater amount of the time were less likely to turn away a 21-year-old with a 19-year-old (OR=0.48, $p<0.05$), but greater manager presence was not significant within on-premises outlets. Regarding weekly refusals to purchase attempts by minors, the main effect of greater manager presence was not significant; nor was the interaction of manager presence and outlet type.

Age of seller—To model the effect of seller age on RBS outcomes, we discretized the percentage of employees selling/serving alcohol who were under age 25 into five categories: 0%, 1–10%, 11–20%, 21–40%, and 41–100%. The reference category was 41–100% of sellers/servers under age 25. The joint test for whether seller age categories predicted refusal to a 21-year old accompanied by a 19-year old was not significant in the main effects model. In the interaction model for this outcome, the joint test for the four interaction terms was significant ($p<0.05$), indicating a significant seller age by outlet type interaction within at least one seller age category. The interaction of outlet type and no sellers/servers under 25

was significant ($p<0.01$); within on-premises outlets those with no sellers/servers under 25 were more likely to refuse to sell to a 21-year-old and a 19-year-old. (OR=4.78, $p<0.05$). Additionally, within on-premises outlets those with 21–40% of sellers/servers under 25 were more likely to refuse a 21-year-old with a 19-year-old (OR=5.22, $p<0.05$). Regarding weekly refusals to minors attempting to purchase alcohol, the joint test for the main effect of seller age category was significant ($p<0.001$). Compared to the reference category of 41–100% of sellers/servers under 25, outlets with 1–10% of sellers under 25 reported more weekly refusals to minors (OR=16.50, $p<0.05$).

DISCUSSION

Working with alcohol sales outlets to improve their selling practices is an important component of an overall underage drinking environmental prevention strategy as recommended by the CDC and Institute of Medicine (2004). While many minors obtain alcohol through social sources (e.g., older siblings), between 23% and 30% of youth still access alcohol through commercial sources (Dent et al., 2005; Paschall et al., 2007). In addition, environmental strategies targeting alcohol access (i.e. RBS training, compliance checks) can significantly reduce underage drinking and are cost-effective (Dent et al., 2005; Miller & Hendrie, 2009). This study compared a sample of off- and on-premises alcohol sales outlets on their *preferences* regarding certain alcohol sales practices (e.g., wanting improved RBS training content), *beliefs* toward underage drinking (e.g., how likely is it they would be cited for selling to minors), alcohol sales *practices* (e.g., requiring RBS trainings), and *outcomes* (e.g., refusing the sale of alcohol to a minor).

While off-and on-premises outlets have many similarities in their beliefs (similarly perceive the problem, difficulty in purchasing alcohol for minors), preferences (e.g., similar interest in more frequent, convenient, and better RBS training), practices (e.g., few of both *always* check age), off-premises outlets appear to engage in more practices designed to prevent sales of alcohol to minors than on-premises outlets after adjusting for outlets' county and surrounding density and multiple comparisons. Off-premises outlets are more likely to require RBS training, use age verification devices, post signs about selling to minors, and have a written policy against selling to minors (although the latter was not significant after adjusting, the raw data had a non-trivial difference of 78% vs. 63%). All of these practices have been shown to have some positive impact on underage drinking (Toomey et al., 2008; Paschall et al., 2007). In terms of outcomes, off-premises outlets state they are more likely to refuse alcohol to a 21-year-old accompanied by a minor and refuse more minors alcohol, even after adjusting for the fact they are approached more often by minors than are on-premises outlets. Consistent with these outcomes, off-premises outlets appear more concerned about getting caught selling to minors and have greater expectation that their prevention efforts will be rewarded. Despite these differences, more off-premises sites report getting cited for selling to minors.

However, the degree to which these practices were associated with better outcomes varied by outlet type. One practice—RBS training—was only associated with improved outcomes among on-premises outlets. Age verification devices and written policies were only found to improve outcomes among off-premises outlets. Two practices—posting signs and having a

manager present 75% or more of the time—were not associated with improvement on any outcome for both outlet types. Having older sellers, which studies are mixed on its association with selling to minors (Freisthler et al., 2003; Forster et al., 1995), had contradictory associations with outcomes. Among on-premises outlets, having more older sellers improved one outcome (selling to a 21/19 year old), while the association of older sellers and refusals to minors was inconsistent when averaging over both types of outlets.

These findings have several implications. Although there is a need for greater prevention efforts targeting both types of outlets, this study shows that it may be beneficial for community-based organizations to tailor certain environmental prevention practices. First, given the positive impact of training among on-premises outlets shown here, community-based organizations may want to increase the marketing of a more “on premises-tailored” RBS training as only one-third of on-premises outlets report requiring training compared to half of off-premises outlets. The data from this study’s survey suggest that fewer on-premises outlets find the current training helpful (again, not significant after adjusting but a 30% difference favoring off-premises) and would like to see it improved (n.s., but a 12% difference favoring on-premises). A review of South Carolina’s RBS training courses shows that most of the curriculum is tailored to the off-premises setting. The South Carolina Department of Revenue lists over 4,000 off-premises outlets and over 6,600 on-premises outlets suggesting that efforts to tailor on-premises training would have far reaching potential.

Results from this study show that more on-premises outlets believe they would not get caught selling to minors than off-premises outlets. Reports from South Carolina officials in the six counties that were surveyed show that compliance checks (using an “undercover” minor to assess whether an outlet would sell to a minor) are conducted overwhelmingly within off-premises outlets compared to on-premises (about 91% vs 9% in 2007 and 2008). This discrepancy could explain why on-premises outlets report getting cited less despite having less stringent alcohol practices. Also, given that the literature on RBS suggests greater impact when combined with enforcement strategies like compliance checks (Toomey, Lenk, Wagenaar, 2007), conducting more on-premises checks could enhance the impact of the previous recommendation of engaging these on-premises establishments into more RBS training.

These results also suggest that it may be helpful to advocate for the use of written policies and age-verification devices particularly in off-premises outlets, although there is not much evidence from previous studies for both (Toomey et al., 2008 and Krevor et al., 2003, respectively). However, studies on both practices highlighted the need for employees to engage in these practices properly for them to be effective, which again raises the need for training and use of techniques consistent with implementation theories mentioned above. Finally, although off-premises outlets use signs more than on-premises outlets, these data suggest that signs are not helpful for either outlet type. Similarly, although on-premises outlets have managers present more than off-premises outlets, these data suggest that manager presence is not helpful for either outlet type. Signs and manager presence have not been practices with demonstrated utility in reducing sales to minors.

This study has limitations that should be noted. First, this study used a sample of off- and on-premises alcohol sales outlets in one state, which may limit the study's generalizability. Outlets in other states operating under a different set of regulations may have different beliefs, preferences, and practices. Second, the response rate of 61% was modest and it is possible that non-respondents differed from respondents in important but unobservable ways, though we found no significant differences on observed characteristics. Third, the items asking about various RBS practices were created specifically for this study. While they are face valid, their psychometric properties are not known. Finally, the results were based on self-report, which may have been biased given the sensitive nature of some of the questions. In particular, self-report of being cited for selling alcohol to minors is subject to social desirability. Unfortunately the low rate of on-premises compliance checks and insufficient recordkeeping of compliance checks in general at the state level render direct estimation of noncompliance rates difficult if not impossible using currently available data. In fact, part of the GTO-UD intervention is to work with community organizations to better record, track, and evaluate compliance check results in order to improve the frequency, targeting, and quality of the checks.

Despite these limitations, we believe that this study furthers the understanding of the differences between off- and on-premises alcohol sales outlets and offers options for increasing and tailoring environmental prevention efforts to specific settings.

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Table 1

Unadjusted and adjusted odds ratios indicating the likelihood that off versus on-premises outlets differed by RBS beliefs, preferences, practices and outcomes.[a]

% or Mean (SD)		*DOMAINS/ITEMS*	*Odds Ratio*	
OFF	**ON**	***Outlet Characteristics***	***Unadjusted***	***Adjusted***
53%	32%	Part of regional/national chain	2.32***	2.82**
24%	16%	Has been approached by local organization encouraging RBS	–	–
19.95 (28.07)	20.48 (25.82)	Smaller percentage of employees who sell alcohol that have been employed less than 6 months	–	–
2.58 (5.64)	1.42 (8.54)	Fewer times minors attempted to purchase alcohol at your business in a typical week	0.34***	0.31***
		RBS Beliefs		
5.00 (2.02)	4.51 (1.97)	Believe they are more likely to be cited if selling alcohol to minors [b]	1.64*	–
3.26 (1.71)	2.70 (1.59)	More likely to strongly agree that businesses that avoid sales to minors get more credit for their efforts [c]	1.79*	–
4.82 (0.60)	4.69 (0.81)	More likely to strongly agree that employees know how to refuse service to minors [c]	–	–
3.98 (1.28)	3.82 (1.35)	More likely to strongly agree that alcohol-related accidents among youth are a serious problem in our community [c]	–	–
3.89 (1.32)	3.67 (1.33)	More likely to strongly agree that underage drinking is a serious problem in our community [c]	–	–
2.13 (1.60)	2.07 (1.50)	Favors fining businesses caught selling alcohol to minors [c]	–	–
2.50 (1.60)	2.59 (1.56)	Favors revoking the licenses of businesses caught selling alcohol to minors [c]	–	–
5.01 (1.94)	4.96 (1.94)	More difficult for minors to buy alcohol at grocery or convenience store [b]	–	–
6.08 (1.55)	5.92 (1.65)	More difficult for minors to buy alcohol at liquor store [b]	–	–
5.16 (1.75)	4.95 (1.68)	More difficult for minors to order drink in bar or restaurant [b]	–	–
2.91 (2.10)	2.82 (1.97)	More difficult for minors to get older brother or sister over 21 to buy alcohol for them [b]	–	–
3.47 (2.08)	3.32 (1.77)	More difficult for minors to get another person over 21 to buy alcohol for them [b]	–	–
5.42 (2.07)	5.58 (1.92)	More difficult for minors to get another person under 21 to buy alcohol for them [b]	–	–
4.64 (0.74)	4.50 (0.89)	More likely to strongly agree that employees know what RBS practices and laws are [c]		–
		RBS Preferences		
59%	71%	Would like improved RBS content	0.59*	–
71%	69%	Would like more frequent RBS training dates	–	–
72%	73%	Would like RBS training at their facility	–	–
65%	63%	Would like RBS incentives for employees not required to be trained	–	–
74%	44%	RBS training was very helpful	3.63***	–
74%	59%	Very satisfied with content & quality of RBS training	–	–
49%	32%	Employees are required to take RBS training	2.12*	2.17*

% or Mean (SD)		DOMAINS/ITEMS	Odds Ratio	
OFF	**ON**	***Outlet Characteristics***	***Unadjusted***	***Adjusted***
74%	49%	New employees attend RBS training before starting job[d]	2.96*	–
33%	36%	When attending RBS training, new employees attend RBS courses approved by the State [d]	–	–
44%	52%	When attending RBS training, new employees attend courses other than in-house training.[d]	–	–
61%	61%	Existing employees regularly attend server training (at least yearly)[d]	–	–
28%	39%	When attending RBS training, existing employees attend RBS courses approved by the State [d]	–	–
37%	50%	When attending RBS training, existing employees attend courses other than in-house training.[d]	–	–
60%	61%	Has a regular system to monitor how well employees comply with underage drinking law	–	–
63%	10%	Establishments have age verification device	14.73***	14.65***
78%	63%	Has written policy about preventing sales to minors	2.03*	–
24%	32%	Has incident log	–	–
30%	27%	Regularly requires age identification for purchase of alcohol (% always)[e]	–	–
97%	78%	Signs posted about sale of alcohol to minors	8.40***	8.47***
62%	52%	Merchant does additional things to prevent underage sales [f]	–	–
28%	25%	Provides incentives to employees who detect minors trying to purchase alcohol	–	–
60%	61%	Has a regular system to monitor how well employees comply with underage drinking law	–	–
68%	88%	Manager present greater percentage of the time [g]	0.29***	0.32**
19.68 (24.81)	27.20 (28.84)	Smaller percentage of employees who sell alcohol that are under 25 y.o.	1.63*	–
OFF	ON	*RBS Outcomes*	*Unadjusted*	*Adjusted*
1.34 (0.61)	1.34 (0.72)	Less frequently sells alcohol to a person under 21 [c]	–	–
83%	97%	Has not been cited for selling to minors in past 12 months	0.14***	0.13*
49%	25%	Would not sell to 21 y.o. if accompanied by 19 y.o.	2.86***	2.63**
2.99 (5.34)	0.81 (1.34)	Greater number of times/week minors were turned away when attempting to purchase alcohol	3.33***	3.45***

[a]Odds ratios significantly *greater* than one indicate that off-premises outlets are more likely than on-premises outlets to have the characteristic or engage in the RBS practice listed in the table. Odds ratios significantly *less* than one indicate that on-premises outlets are more likely than off-premises outlets to have the characteristic/engage in the RBS practice.

[b]1 to 7 scale (not at all likely to extremely likely; not at all difficult to very difficult)

[c]1 to 5 scale (strongly disagree to strongly agree; favor to oppose; never to frequently)

[d]Answered only by merchants who stated that employees are required to take RBS training for employment

[e]Response options were: “always (regardless of age)”, “if buyer appears under 35”, “if buyer appears under 25”, “if buyer appears under 21”, and “at discretion of seller”. Percentages shown are for respondents reporting “always (regardless of age)”.

[f]Additional things included RBS practices and non-RBS practices in addition to posting signs about age identification

[g]Response options were: “more than ¾ of the time”, “½ to ¾ of the time”, and “less than ½ the time”. Percentages reported shown are for respondents reporting “more than ¾ of the time”.

*$p < 0.05$,

**$p < 0.01$,

***$p < 0.001$

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Table 2

Significant Odds Ratios for RBS Practices from Logistic Regressions Modeling (1) Main Effects of RBS Practices and Off/On-Premises Outlet Type and (2) Their Interaction, Adjusting for Outlet Density and Random County Effects

Outcome	Type of Effect	Sellers required to be trained in RBS	Signs posted about selling to minors	Outlet has age verification device	Has written policy about selling to minors	Manager on site more than ¾ of time	Smaller % of employees who sell alcohol that are under 25 y.o. (ref. group 41–100%)
Has not been cited for selling to minors in past 12 months[1]	Averaging over off/on-premises						
Would not sell to 21 y.o. with a 19 y.o.	Averaging over off/on-premises				2.01 *	0.55 *	
	Interaction Term				*		Joint test for all interactions (4 df) * Off *0% ** Off *1–10% Off *11–20% Off *21–40%
	Within off-premises			1.85 *	3.42 **	0.48 *	
	Within on-premises						0% 4.78 * 1–10% 3.32 11–20% 0.70 21-40% 5.22 *
Greater refusal rate given at least 1 weekly attempt[2]	Averaging over off/on-premises	1.81 +	†	2.18 ***			Joint test for all categories (4 df) *** 0% 0.50 1–10% 16.50 * 11–20% 0.99 21–40% 1.22
	Interaction Term	*	†		+		†
	Within off-premises		†	1.99 +			†
	Within on-premises	12.67 *	†				†

+ $p < 0.10$,

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$.

[1] Only four on-premises outlets reported having been cited for selling alcohol in the past 12 months, so the sample size was only large enough to fit the main effects model.

[2] Setting attempts equal to refusals for outlets reporting more refusals than attempts. Results were similar when dropping these outlets or setting refusals equal to attempts (not shown).

[†] Sample size not sufficient to fit the model containing this term.