

# Alcohol Outlet Characteristics and Alcohol Sales to Youth: Results of Alcohol Purchase Surveys in 45 Oregon Communities

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**Abstract** Reducing youth access to commercial sources of alcohol is recognized as a necessary component of a comprehensive strategy to reduce underage drinking and alcohol-related problems. However, research on policy-relevant factors that may influence the commercial availability of alcohol to youth is limited. The present study examines characteristics of off-premise alcohol outlets that may affect alcohol sales to youth. Random alcohol purchase surveys ( $N = 385$ ) were conducted in 45 Oregon communities in 2005. Underage-looking decoys who were 21 years old but did not carry IDs were able to purchase alcohol at 34% of the outlets approached. Purchase rates were highest at convenience (38%) and grocery (36%) stores but were relatively low (14%) at other types of outlets (e.g., liquor and drug stores). Alcohol purchases were less likely at stores that were participating in the Oregon Liquor Control Commission's Responsible Vendor Program (RVP), when salesclerks asked the decoys for their IDs, and at stores with a posted underage alcohol sale warning sign. Alcohol purchases were also inversely related to the number of salesclerks present in a store, but were not related to salesclerks' age and gender. Findings of this study suggest that more frequent compliance checks by law enforcement agents should target convenience and grocery stores, and owners of off-premise outlets should

require training of all salesclerks to ensure reliable checks of young-looking patron IDs, and should post underage alcohol sales warning signs in clear view of patrons.

**Keywords** Commercial alcohol availability · Alcohol sales · Alcohol use · Underage youth

Understanding and preventing underage drinking remains a public health priority as rates of underage alcohol use and heavy drinking have changed little in the past decade (National Research Council and Institute of Medicine [NRC/IOM], 2004). According to the 2004 Monitoring the Future survey of secondary school students, 19% of 8th graders, 35% of 10th graders, and 48% of 12th graders consumed alcohol at least once in the past 30 days, while 11%, 22%, and 29% of students in these respective grades reported consuming five or more consecutive drinks ("binge" drinking) at least once in the past two weeks (Johnston et al., 2005). Results of the 2004 National Survey on Drug Use and Health indicated that 50% of 18–20 year olds consumed any alcohol in the past month, while 37% reported binge or heavy drinking at least once in the past month (Substance Abuse and Mental Health Services Administration [SAMHSA], 2005). A conservative estimate of the annual social cost of underage drinking in the U.S. was \$61.9 billion in 2001 (Miller et al., 2006). Reducing underage alcohol use in general, and binge drinking in particular, are both stated as Healthy People 2010 Objectives (U.S. Department of Health and Human Services, 2000).

Reducing the availability of alcohol to youth from commercial sources is recognized as one necessary component of a comprehensive strategy for preventing underage drinking (NRC/IOM, 2004; Office of Juvenile Justice and Delinquency Prevention [OJJDP], 1999). Despite a national minimum drinking age of 21 years, research indicates that 30

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to 70 percent of alcohol outlets may sell to underage buyers, depending in part on their geographic location (Britt et al., 2006; Forster et al., 1994, 1995; Freisthler et al., 2003; Grube, 1997; Preusser & Williams, 1992; Schwartz et al., 1998; Wolfson et al., 1996). Surveys of adolescents also indicate that alcohol is available from commercial sources. For example, a survey of youth in Minnesota and Wisconsin by Wagenaar et al. (1996) indicated that 3% of 9th graders, 9% of 12th graders, and 14% of 18–20 year olds obtained alcohol from a commercial source prior to their last drinking occasion. A recent survey of 11th graders in Oregon also revealed that 30% of past-30-day drinkers obtained alcohol from a commercial source (e.g., grocery, convenience, or drug store) within the past 30 days (Dent et al., 2005).

To address the continuing problem of alcohol sales and service to underage patrons, states have implemented a number of environmental strategies, including responsible beverage sales and service training (RBS), increased enforcement (compliance checks), and requirements for warning signs. Many states now mandate training for store owners, managers, clerks and servers. In some cases training is voluntary, but is linked to incentives such as reduced liability. Trainings are typically information-based and may be delivered through an internet website, in written form (e.g., manuals, fact sheets), and/or by a professional trainer. Training materials convey information on alcohol sales and service policies, penalties for selling or serving alcohol to underage patrons, and tips and exercises to help salespeople and servers identify underage buyers, such as asking for proof of age. Additionally, states may require conspicuous posting of warning signs in one or more store locations (e.g., near the checkout counter or storefront window) to deter potential underage buyers. Some research suggests that RBS training may be effective in reducing alcohol sales and service to underage patrons (Pruesser et al., 1994; Saltz, 1997; Toomey et al., 2001). Other research, however, suggests that such training has little effect above and beyond that of compliance checks (Grube, 1997; Grube & Nygaard, 2005).

The present study examines whether participation in the Oregon Liquor Control Commission's RVP may affect underage alcohol sales by off-premise outlets such as grocery stores, gas stations, and liquor stores. The RVP requirements are: (1) new store staff must read and sign the OLCC brochure, *What Every Store Clerk Needs to Know About Selling Alcohol*, (2) store owners or managers must provide at least four employee trainings on responsible alcohol sales each year, (3) stores must have a written alcohol sales policy that all staff read and sign, and (4) stores must post a warning sign regarding the minimum legal drinking age and the store's alcohol sales policy. Additionally, the RVP offers incentives for on- and off-premise outlets, such as reduced sanctions for selling to underage buyers (e.g., lower fine for

selling alcohol to an underage buyer and no suspension of the store's alcohol sales license).

The present study also further investigates a number of other factors, such as type of off-premise outlet and characteristics of the salesperson and underage buyer that may contribute to sales to minors. Studies by Britt et al. (2006) and Freisthler et al. (2003) found evidence of differences in the likelihood of alcohol sales to apparent minors at different types of off-premise outlets (e.g., grocery or convenience stores relative to liquor stores) in descriptive analyses, but these differences were not statistically significant when adjusting for other explanatory variables. Some research suggests that older salespeople may be less likely to sell to underage patrons (Forster et al., 1994, 1995; Wolfson et al., 1996), but at least two studies have found no relationship between salesperson's age and alcohol sales to underage-looking patrons (Britt et al., 2006; Freisthler et al., 2003). Research findings regarding the gender of the salesperson are also mixed, as several studies indicated no relationship between salesperson's gender and sales to underage patrons (Britt et al., 2006; Forster et al., 1994; Freisthler et al., 2003), whereas another study indicated that underage sales were more likely at off-premise outlets when the salesperson was male (Forster et al., 1995). Two studies (Forster et al., 1995; Wolfson et al., 1996) reported the counterintuitive finding that underage sales were *more* likely at on-premise establishments (e.g., restaurants, bars) if warning signs were posted at the checkouts, but a more recent study by Britt et al. (2006) found a significantly lower sales rate at off-premise outlets with a warning sign posted. The available research also suggests that the characteristics of communities in which outlets are located (e.g., population size, geographic location) may influence alcohol sales to underage patrons, given the variability in alcohol sales rates observed across communities of different sizes and geographic locations (Britt et al., 2006; Forster et al., 1994, 1995; Freisthler et al., 2003; Grube, 1997; Preusser & Williams, 1992; Schwartz et al., 1998; Wolfson et al., 1996). These differences may also be partly attributable to changes in levels of enforcement of underage sales laws since the early 1990s (Britt et al., 2006). In general, however, relatively few studies have attempted to identify off-premise outlet characteristics and other factors (e.g., age and gender of buyer and salesperson) that may be predictive of underage alcohol sales, and that thus may help to inform prevention strategies.

The present study examines, in a large number of Oregon communities, the characteristics of off-premise outlets and salespeople that may be associated with selling alcohol to underage decoys. Based on prior research and current beliefs regarding measures that state agencies, store owners and managers should take to prevent underage sales (e.g., training of salespeople, posting warning signs), we explore such factors as the age and gender of salespeople, the number

of salespeople or managers present in a store, the presence of warning signs, whether salespeople ask underage-looking decoys for proof of age, the type of outlet (e.g., grocery store), the population size of the community served by the store, and the store's participation in the RVP. We hypothesized that participation in the RVP would be inversely related to the likelihood of selling alcohol to underage-looking decoys, and that this relationship would be at least partially mediated by salespeople asking for proof of age and the posting warning signs, which are key components of the RVP.

## Method

### Sample of off-premise outlets

This study measured baseline retail compliance with underage sales laws in 45 Oregon communities participating in a randomized community trial to investigate the effectiveness of interventions to reduce youth access to alcohol. City population size ranged from 150 to 52,950, with 58% of the cities having less than 10,000 residents. Based on the Oregon Liquor Control Commission's list of current off-premise retail alcohol outlets in the targeted communities, purchase surveys were conducted in a census of all off-site outlets in communities with 20 or fewer outlets, and in a random sample of 20 outlets in communities with more than 20 outlets. Each outlet was visited once. Stores no longer in business or no longer selling alcohol were replaced with other randomly selected stores in communities with more than 20 outlets. A total of 513 off-premise outlets were included in the initial target sample.

### Data collection

Young-appearing adults were employed by the study to attempt to purchase alcohol. The decoy buyers were recruited through newspaper classified advertisements which sought young-appearing 21-year-olds. Photographs of potential buyers were reviewed by three people who work with youth, and the age appearance of the three females and two males hired was estimated to be between 18 and 19 years. Their appearance in the photographs was consistent with their appearance in person, thus allaying concerns about hiring decoys who would appear to be of legal drinking age. Training for underage-looking buyers included instruction in the survey protocol, role play of purchase attempts, and practice attempts to buy in non-study communities. Buyers were instructed not to attempt to look older.

Purchase attempts were conducted from July through September, 2005, on all weekend and weekday evenings. Because the target communities covered a wide geographic

area, they were grouped into geographic regions, in each of which one buyer conducted all of the purchase attempts. They dressed casually and carried money to purchase alcohol, but did not carry any identification. They attempted to purchase a six-pack of light beer, and when asked for identification said they did not have it with them. They answered truthfully when clerks asked their age. On completion of the purchase attempt, the buyer returned to the car and completed the survey form. Information recorded included the date and results of the purchase attempt, the gender and estimated age of the salesclerk, type of outlet, number of clerks in the store, and presence and location of any signs warning against alcohol sales to minors.

Purchase attempts were conducted at 468 (91%) of the 513 off-premise outlets in the initial target sample. Purchase attempts were not conducted at 45 outlets for a variety of reasons. We were unable to locate some of the outlets and others were no longer in business, were closed at the time of the survey, were located in areas we considered unsafe for our buyers, or our buyers knew someone who worked there. Of the 468 outlets where purchase attempts were conducted, 40 were not selling alcohol to go, though according to OLCC records they had an off-premise sales license, thus leaving 428 outlets at which decoys could attempt to purchase and leave with alcohol. Complete data were available for 385 (90%) of the 428 outlets where purchase attempts were conducted. Outlets for which we obtained complete data were more likely to be grocery and convenience stores and were less likely to be other types of off-premise outlets (e.g., drug-stores, liquor stores, taverns). Thus, grocery and convenience stores were over-represented in the study sample while other types of off-premise outlets were under-represented.

### Study variables

Whether or not an underage-looking decoy was able to purchase alcohol at an off-premise outlet was the outcome variable of interest. The RVP status of each outlet was based on OLCC records for licensed off-premise establishments included in the study sample. Two dummy-coded variables were created to represent convenience stores and "other" types of off-premise outlets (e.g., liquor and drug stores) with grocery stores serving as the referent group as they represented about half (51%) of all outlets in the sample. Five decoy/region dummy variables were created as there was only one decoy (male or female) for each of six Oregon geographic regions in which outlets were located. Six dummy variables were created to represent day of the week on which purchase attempts were made; Saturday served as the referent day as more purchase attempts occurred on Saturdays (124 or 32%) relative to other weekdays. Other candidate predictor variables included a dichotomous measure of city population size ( $\geq 10,000$  vs.  $< 10,000$ ), salesclerk's

**Table 1** Alcohol outlet sample characteristics, by responsible vendor program (RVP) status

Variable	Total sample ( <i>N</i> = 385)	RVP ( <i>n</i> = 130)	Non-RVP ( <i>n</i> = 255)
Sale made to underage-looking decoy (%)	34.0	24.6 <sup>†</sup>	38.8
Convenience stores (%)	38.2	40.0	37.3
Grocery stores (%)	50.9	52.3	50.2
Other off-premise outlets (%) <sup>a</sup>	10.9	7.7	12.5
Alcohol sale warning sign posted (%)	70.9	76.9	67.8
Age identification requested (%)	75.8	83.1*	72.2
Number of salesclerks in store, mean (SD)	2.5 (2.3)	3.1 (2.9) <sup>†</sup>	2.2 (1.8)
Male salesclerk (%)	32.7	30.8	33.7
Salesclerk's age, mean (SD) <sup>b</sup>	36.8 (11.5)	36.2 (10.6)	37.1 (11.9)
City population ≥ 10,000 (%) <sup>c</sup>	43.9	43.8	43.9
Decoy/region 1 (%)	42.1	41.5	42.4
Decoy/region 2 (%)	26.5	27.7	25.9
Decoy/region 3 (%)	14.5	14.6	14.5
Decoy/region 4 (%)	11.7	13.1	11.0
Decoy/region 5 (%)	5.2	3.1	6.3
Day of purchase attempt			
Sunday (%)	6.8	9.2	5.5
Monday (%)	5.7	6.2	5.5
Tuesday (%)	20.3	16.2	22.4
Wednesday (%)	9.6	10.8	9.0
Thursday (%)	18.4	11.5*	22.0
Friday (%)	7.0	10.0	5.5
Saturday (%)	32.2	36.2	30.2

<sup>a</sup>Other types of stores included drugstores, liquor stores, and taverns.

<sup>b</sup>Estimated salesclerk's age ranged from 17 to 70.

<sup>c</sup>City population size ranged from 150 to 52,950 (mean = 13,128, SD = 13,022).

\**p* < .05. <sup>†</sup>*p* < .01.

gender and estimated age, whether age identification was requested by the salesclerk (yes/no), and whether an underage sales warning sign was posted in the establishment (yes/no). Descriptive statistics for study variables are provided in Table 1.

### Data analysis

Descriptive analyses (chi-square and *t*-tests) were first conducted to compare characteristics of off-premise outlets that were participating in the RVP to those that were not. Logistic regression analyses were then conducted to determine whether participation in the RVP and other factors (e.g., type of outlet, age of salesperson) were associated with selling alcohol to an underage-looking decoy. An initial regression model included RVP status along with dummy variables for outlet type, age and gender of salesclerk, number of salesclerks in the store, city population size, decoy/region, and day of purchase attempt. Any variables not associated with selling alcohol to a decoy in the initial regression model were dropped from the analysis. The hypothesized mediating variables—asking the decoys for proof of age and posting a warning sign—were then added to the model to determine whether any observed relationship (odds ratio) between RVP and sales would be attenuated in size and/or statistical significance, which would indicate a mediating effect (Baron & Kenny, 1986; MacKinnon & Dwyer, 1993). Analyses were conducted with SUDAAN software to adjust for sampling

design or clustering effects attributable to off-premise outlets being nested within each community (Research Triangle Institute, 2002).

### Results

Descriptive results in Table 1 indicate that one-third (130) of the 385 off-premise outlets in the sample were participating in the RVP at the time of the study. Alcohol was sold to youthful-looking decoys during 34% of the purchase attempts. Consistent with expectations, purchases were significantly less likely at RVP outlets (25%) than non-RVP outlets (39%). Thirty-eight percent of the off-premise outlets in the sample were convenience stores, while 51% were grocery stores and 11% were other types of outlets (e.g., drugstores, liquor stores, taverns). The percentages of outlet types did not differ significantly by RVP status. Alcohol purchase rates were highest at convenience (38%) and grocery (36%) stores but were relatively low (14%) at other types of outlets. Alcohol sales warning signs were posted in 71% of the outlets, and were somewhat more likely to be posted in RVP (77%) than non-RVP outlets (69%) (*p* < .10). Salesclerks asked for the decoys' age identification at 76% of the outlets, and were significantly more likely to do so at RVP (83%) than non-RVP outlets (72%). The average number of salesclerks in the store was also higher at RVP (3.1) than non-RVP outlets (2.2). One-quarter (26%) of the salesclerks were male;



the mean estimated salesclerk age was 37 years (range: 17–70); 42% of the cities in which the outlets were located had a population of 10,000 or greater. None of these demographic characteristics differed significantly by RVP status, and RVP and non-RVP outlets were distributed similarly across the five regions. The majority of purchase attempts were conducted on Tuesdays (20%), Thursdays (18%), and Saturdays (32%). A significantly lower percentage of Thursday purchase attempts were conducted at RVP outlets (11%) relative to non-RVP outlets (22%).

An initial logistic regression model (Model 1, Table 2) showed a significant inverse association between RVP participation and the likelihood of selling alcohol to an underage-looking decoy (OR = 0.56,  $p < .05$ ). The likelihood of selling alcohol to a decoy was not significantly different at convenience stores relative to grocery stores, but was significantly less likely at “other” types of off-premise outlets, such as drugstores and liquor stores (OR = 0.33,  $p < .01$ ). The number of salesclerks present in the stores was inversely related to an alcohol purchase (OR = 0.81,  $p < .05$ ). One of

the decoy/regions and two of the purchase attempt days (Sunday and Thursday) were positively associated with an alcohol purchase, but other variables in the model (salesclerk’s age and gender, city population) were not associated with selling alcohol to an underage-looking decoy. Our initial regression model explained 16% of the variation in alcohol sales to an underage-looking decoy.

A second logistic regression model (Model 2, Table 2) excluded variables that were not associated with selling alcohol to a decoy in the first regression model, and added the two hypothesized mediating variables (asking for age identification, posting a warning sign) to the remaining variables from Model 1. Asking for age identification was strongly and inversely related to selling alcohol to an underage-looking decoy (OR = .001,  $p < .001$ ). Posting a warning sign also was inversely associated with an alcohol purchase (OR = 0.43,  $p < .05$ ). These variables improved the explanatory value of the initial model substantially (Cox and Snell  $R^2 = .51$ ). The association between RVP participation and selling alcohol to an underage-looking decoy was no longer statistically significant in the second regression model, and the magnitude of the association decreased somewhat (from OR = 0.53 to 0.59). The magnitude of the relationship between “other” types of outlets (relative to grocery stores) and selling alcohol to a decoy was enhanced in the Model 2 (from OR = 0.33 to 0.23), but was no longer statistically significant, while the relationship between number of salesclerks in a store and selling alcohol to a decoy decreased in magnitude (from OR = 0.81 to 0.93) and was no longer statistically significant. Relationships between decoy/region, day of purchase attempt and alcohol purchase outcome also were generally attenuated in Model 2 as compared to Model 1.

## Discussion

Reducing the commercial availability of alcohol to underage youth may help to reduce underage drinking and alcohol-related problems, especially if an initiative of this nature is conducted as part of a comprehensive prevention strategy (NRC/IOM, 2004; OJJDP, 1999). This study used data from alcohol purchase surveys conducted at 385 off-premise alcohol outlets in 45 Oregon communities to identify outlet characteristics and other factors that may be related to selling alcohol to underage youth. The alcohol purchase rate in our survey was 34%, a finding that is comparable to some prior studies (e.g., Freisthler et al., 2003; Grube, 1997; Preusser et al., 1994) and to the 29% statewide underage alcohol purchase rate observed by the Oregon Liquor Control Commission (OLCC) in its 2004 compliance checks (OLCC, 2005).

In our study, alcohol sales to underage-looking decoys were more likely at grocery and convenience stores than other types of off-premise outlets (e.g., liquor stores, drugstores), in part because the salesclerks there were less likely

**Table 2** Logistic regression analyses to assess effects of alcohol outlet characteristics on sales to underage-looking decoys, odds ratio (95% confidence interval)

Variable	Model 1	Model 2
Convenience store <sup>a</sup>	0.83 (0.51, 1.36)	1.41 (0.80, 2.47)
Other type of store <sup>a</sup>	0.33 (0.15, 0.71)	0.23 (0.02, 2.47)
Male salesclerk	1.15 (0.70, 1.88)	—
Salesclerk’s age	0.98 (0.96, 1.00)	—
Number of salesclerks in store	0.81 (0.69, 0.95)	0.93 (0.76, 1.15)
City population $\geq$ 10,000	1.35 (0.72, 2.53)	—
Decoy/region 2 <sup>b</sup>	0.84 (0.43, 1.64)	1.14 (0.48, 2.74)
Decoy/region 3 <sup>b</sup>	2.31 (1.04, 5.13)	1.21 (0.40, 3.61)
Decoy/region 4 <sup>b</sup>	0.71 (0.15, 3.39)	0.65 (0.13, 3.18)
Decoy/region 5 <sup>b</sup>	0.08 (0.01, 1.69)	0.05 (0.01, 0.30)
Day of purchase attempt		
Sunday <sup>c</sup>	3.76 (1.60, 8.82)	2.89 (1.31, 6.35)
Monday <sup>c</sup>	2.59 (0.61, 10.97)	2.06 (0.22, 19.17)
Tuesday <sup>c</sup>	3.03 (1.23, 7.46)	1.81 (0.67, 4.89)
Wednesday <sup>c</sup>	1.82 (0.33, 10.10)	1.36 (0.24, 7.73)
Thursday <sup>c</sup>	2.39 (1.14, 5.00)	2.20 (0.75, 6.47)
Friday <sup>c</sup>	1.53 (0.64, 3.69)	1.39 (0.51, 3.73)
RVP participant	0.56 (0.34, 0.94)	0.59 (0.28, 1.24)
Salesclerk asked for age ID	—	0.001 (0.0002, 0.01)
Alcohol sale warning sign posted	—	0.43 (0.19, 0.97)
Cox and Snell $R^2$	.16	.51

<sup>a</sup>Grocery stores are the referent group. Other types of stores included drugstores, liquor stores, and taverns.

<sup>b</sup>Decoy/region 1 is the referent group.

<sup>c</sup>Saturday is the referent day of purchase attempt.

to ask for patron IDs and because signs warning against alcohol sales to minors were less likely to be posted. Salesclerks at stores participating in the OLCC's Responsible Vendor Program (RVP) were also less likely than those at non-RVP stores to sell alcohol to underage-looking decoys. This effect, again, is at least partly explained by the increased likelihood that clerks in RVP stores were more likely to ask underage-looking decoys for proof of age, which was strongly and inversely related to an alcohol purchase. RVP stores also were somewhat more likely than non-RVP stores to have an alcohol sales warning sign posted, which also decreased the likelihood of an alcohol purchase. Although RVP status *per se* was no longer statistically significant in the full regression model, the magnitude of the association between RVP participation and alcohol purchases by underage-looking decoys was only slightly attenuated by the hypothesized mediating variables (asking for proof of age and posting a warning sign). Thus, RVP participation may affect alcohol sales to underage youth through other mechanisms not examined in this study.

Alternatively, the observed relationship between RVP status and alcohol purchases could be at least partially spurious and attributable to pre-existing outlet characteristics not examined in this study (e.g., history of selling alcohol to underage youth). It is also possible that stores that were more committed to reducing sales to underage buyers, and perhaps already using the policies and procedures required by the RVP, were more likely to participate in the program. A recent study in Minnesota and Wisconsin communities by Fabian et al. (2005) indicated that certain types of off-premise establishments (gas stations, grocery and convenience stores) were more likely than other types of establishments to participate in a voluntary program known as Alcohol Risk Management (ARM) Express (Toomey et al., 2001). However, other establishment characteristics and underage alcohol sales rates were not associated with participation in the ARM program, suggesting that high-risk alcohol establishments may be just as likely to participate in such programs as moderate- or low-risk establishments.

Of all the variables we examined, asking for proof of age was clearly the most important predictor of whether or not alcohol was sold to an underage-looking decoy; this factor alone explained approximately 35% of the variation in alcohol purchases. Additional bivariate analyses (not shown in tables) revealed that alcohol was purchased by decoys in 99% of the outlets where proof of age was *not* requested, but in only 13% of the outlets where proof of age was requested. In contrast, all other outlet characteristics together explained only 16% of the variation in alcohol sales to decoys. The percentage of outlets in our sample with salesclerks who asked for proof of age was fairly high (76%), though only 34% of the outlets in our sample were participating in the RVP at the time of our study. Greater participation in the RVP

could help to increase the probability that salesclerks will ask for proof of age when potential alcohol buyers appear to be underage.

Asking for proof of age was also more likely on Fridays and Saturdays (81% and 87% of purchase attempts on each day, respectively) as compared to other weekdays (68–72% of purchase attempts on Sunday through Thursday). Thus, the likelihood of selling alcohol to an underage-looking decoy was greater on days when underage youth are presumably less likely to attempt alcohol purchases. It is also noteworthy that off-premise alcohol outlets with a relatively large number of salesclerks, and outlets such as drugstores and liquor stores, were less likely to sell alcohol to an underage-looking decoy. These findings suggest that RVP participation should be targeted to smaller outlets, such as small grocery stores, that may be visited by underage youth on weekdays in addition to weekends. RVPs should also be targeted to outlets with young sales clerks, who appear to be somewhat less likely to ask underage-looking buyers for proof of age. Additional research is also needed to determine how to increase RVP participation by these off-premise outlets.

Findings of this study should be considered in light of several limitations. The sample of off-premise outlets included in this study may not be representative of all off-premise outlets in Oregon, much less the entire U.S., thus limiting the generalizability of our findings. The use of underage-looking decoys instead of real underage youth may have decreased salesclerks' propensity for checking age identification, thus leading to a possible underestimation of the true likelihood that the establishments in our sample would sell alcohol to underage youth, although our findings were consistent with recent OLCC compliance data. Any underestimation of sales rates may have also attenuated the results of analyses designed to assess relationships between outlet characteristics and alcohol sales to underage youth. Finally, as we noted earlier the causal nature of the relationships examined in this study, especially the relationship between RVP status and alcohol sales to decoys, may be open to question as we did not use a true experimental design. More rigorous research is therefore needed to better understand the possible effect that programs such as the RVP may have on alcohol sales to underage youth, and the mechanisms through which such programs may exert their effects. The inconsistent findings of prior research on RBS training (Grube, 1997; Grube & Nygaard, 2005; Pruesser et al., 1994; Saltz, 1997; Toomey et al., 2001) also indicate the need for additional research in this area.

Despite these limitations, our findings have implications for strategies that may help to reduce commercial availability of alcohol to underage youth. For example, more frequent compliance checks by law enforcement agents should be targeted to off-premise outlets that appear to be most likely to sell alcohol to underage patrons, and should be conducted

on all weekdays. State alcohol regulatory agencies should consider implementing comprehensive programs that require training of owners, managers, and salesclerks, encouraging the development and enforcement of clear policies for licensed off-premise outlets (e.g., posting of underage sales warning signs), and providing incentives for compliance with policies to ensure reliable checking of IDs.

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