

RESEARCH REPORT

The ability of young people to purchase alcohol without age identification in northeastern Minnesota, USA

JEAN L. FORSTER, PAUL G. McGOVERN, ALEXANDER C. WAGENAAR, MARK WOLFSON, CHERYL L. PERRY & PAMELA S. ANSTINE

Division of Epidemiology, School of Public Health, University of Minnesota, Minneapolis, USA

Abstract

The purpose of this study was to determine the rate at which young people can purchase alcohol without age identification in off-premises businesses, and the factors which influence the rate of purchase. All retail outlets licensed to sell distilled spirits and/or full strength beer and wine in 28 northern Minnesota communities were visited on different occasions by three 21-year-old female buyers who appeared to be aged 19 or younger. These youthful buyers were able to purchase beer without age identification in 47% of the 336 purchase attempts. Almost four-fifths of the businesses sold beer to these buyers at least once in three attempts. These results provide clear evidence that many commercial off-sale businesses in the US supply alcohol to youthful buyers, and that practices vary significantly by community and by business. These results support the need for greater attention to availability as a factor in teenage drinking patterns.

Introduction

The use of alcohol by youth under the legal drinking age is considered pandemic in the United States. A recent survey indicated a lifetime prevalence of alcohol use of over 90% for high school seniors, and the trend in the United States is for experimentation at younger ages (Johnston, O'Malley & Bachman, 1989; Dryfoos, 1990). The result of this pattern of youthful drinking is high rates of health and social problems, especially intentional and unintentional injury (National Institute on Alcohol Abuse and Alcoholism, 1990; Semlitz & Gold, 1986; Stall *et*

al., 1986). It has been suggested that efforts to understand and change the pattern of alcohol use by youth must address characteristics of the supply of alcohol to minors as well as demand or use patterns (Mosher & Jernigan, 1988; Wagenaar & Farrell, 1989). Recent reviews of primary prevention programs aimed at reducing use of alcohol by youth indicate little evidence to support the efficacy of an educational approach aimed at individual behavior change (Moskowitz, 1989). Efforts to reduce demand may result in changes in knowledge, attitudes and beliefs, but they do not appear to result in long-term changes in drinking behavior (Ellickson & Bell, 1990). The potential importance of addressing alcohol availability in this population is illustrated by the effects of changes in the legal age of

Correspondence to: Dr Jean L. Forster, Division of Epidemiology, School of Public Health, University of Minnesota, 1300 South Second Street, Suite 300, Minneapolis, MN 55454-1015, USA.

sale over time in various states. Alcohol use and alcohol related problems among youth increased in the states where the drinking age was lowered in the 1970s (Wagenaar, 1983), whereas the subsequent increase in the drinking age to 21 in the late 1970s and in the 1980s was accompanied by reduced drinking rates and reduced rates of alcohol-related problems in this age group (DuMouchel, Williams & Zador, 1987; George, *et al.*, 1989; O'Malley & Wagenaar, 1991).

While state and local attempts to regulate alcohol availability include some restrictions which apply to retail alcohol outlets, the actual practices of retailers in restricting availability are not well studied. There is evidence that commercial establishments sell alcohol to underage youth in violation of current statutes and regulations, and are an important source of alcohol for this age group. The beneficial effect of increasing the age of sale cited above occurred despite the fact that these laws were weakly enforced in most areas (Hingson, Scotch & Mangione, 1983; Williams & Lillis, 1986). In a 1986 survey of New York state youth, 16% of the 16- to 20-year-old respondents indicated they had purchased alcohol in the previous month, and fewer than half who attempted to purchase alcohol were asked for proof of age (Hoffmann & Williford, 1986). A national survey of a random sample of 956 students in grades 7-12 found that almost two-thirds of the students who drink reported buying their own alcohol (Department of Health and Human Service, 1991). Although it is clear from these surveys that underage youth purchase alcohol, these self-reports by young people are impossible to validate, and do not describe the patterns and practices of merchants regarding alcohol sales to underage youth.

One approach to determine the extent of the availability of alcohol to youth independent of their self-reports is to carry out purchase attempts with youthful research confederates. The only systematic study of this kind was conducted by the Insurance Institute for Highway Safety during winter, 1990-91 in two areas of New York state and in Washington, DC (Preusser & Williams, 1992). Male purchasers aged 18 to 20 years attempted to purchase beer in a random sample of 100 large and small grocery outlets in each area. The rate of sale of beer to underage purchasers in the study overall was 73.6%. The underage purchasers were less successful in

wealthier neighborhoods, in stores which are part of a regional or national chain compared to neighborhood stores, and in New York state areas compared to Washington, DC, where 97% of the stores approached sold beer to study confederates. This important study provides direct evidence that minors can readily purchase alcoholic beverages, and points to the need for intervention with merchants to reduce sales to minors. However, information is needed from other geographic areas and all kinds of outlets, where policies and practices may differ.

The purpose of this study was to determine the compliance with the Minnesota age of sale law among off-sale (off-premises consumption only) alcohol beverage license holders permitted to sell distilled spirits and/or full-strength (6% alcohol content) beer and wine in 28 communities in the northeastern region of Minnesota. An attempt was made to identify characteristics of the outlets and the communities which were associated with alcohol sales, to understand better how to reduce sales of alcohol to minors.

Methods

This study is part of the baseline data collection efforts of Project Northland, a 5-year (1991-96) community trial located in northern Minnesota, funded by the National Institute on Alcohol Abuse and Alcoholism, and designed to test a combination of community-based strategies to reduce alcohol use by young adolescents (Perry *et al.*, 1993). Minnesota is a predominantly rural state in the north central region of the US, which was settled mainly by northern and eastern European immigrants in the late 1800s. Minnesota also has a relatively high Native American population. Project Northland operates in 28 communities in six northeastern counties in Minnesota where the risk for alcohol-related problems is especially high compared to the rest of the state. The communities in the project range in population from about 300 to 18 000 residents (median 1080), and are located in an area whose main industries are mining, logging and tourism.

Focus groups of local college students who grew up in northern Minnesota were held to identify the common practices of underage youth in attempting to purchase alcohol. The protocol for the alcohol purchase attempts was based on

the results of these focus groups (Wagenaar *et al.*, 1993). To minimize buyer variability, all buyers were female students at the University of Minnesota, and all were 21 years old because the Minnesota state law prohibits purchase or possession of alcohol by those under age 21. Potential buyers were rated for apparent age by an eight-member panel which included employees of alcohol establishments. An average apparent age was computed for each potential buyer, and only those who appeared to be aged 19 or under were employed for this study.

All alcohol purchase attempts were made between 10:00 a.m. and 10:00 p.m. on Fridays and Saturdays. The field team consisted of one buyer and one driver. Buyers were instructed to wear conservative make-up and blue jeans. A 5-dollar bill was carried into the outlet for the purchase. Buyers did not carry a purse, billfold, or any form of identification on their person. The buyers were instructed to select a six-pack of Miller or Budweiser light beer. If more than one salesperson was available buyers were to select a male, or the youngest female, for the purchase. If asked for identification, buyers were to say that it was in the car. If asked their age, they were told to answer honestly. Upon exiting, buyers recorded the outcome of each attempt, as well as the characteristics of the interior of the outlet. The drivers, who were also young-looking female college students, recorded the characteristics of the exterior of each outlet.

A list of licensed retail alcohol outlets permitted to sell distilled spirits and/or full-strength beer and wine, including the type of license and address, was obtained from the State of Minnesota Department of Administration. Outlets which had a license to sell only 3.2% beer were not included on this list. All off-sale outlets with addresses in one of the study communities were included. The resulting sample included 112 outlets in 28 communities. Only off-sale alcohol outlets were included because it was considered unlikely that on-sale outlets (alcohol served for consumption on premises only) would be the source of alcohol to youth in the target age range for the study. All outlets were organized into four routes, and the team was instructed to follow the order on their assigned route. Each outlet was visited on three separate weekends by three different buyers.

Statistical analysis

The outcome variable, purchase success, is defined as successful purchase without age identification. The relationship of purchase success with characteristics of the individual purchase attempt, that is, buyer, salesperson age and sex, and time and day of week, were assessed at the individual purchase attempt level ($n = 336$). These analyses were conducted using Pearson's chi-square test or Mantel's test for trend for tests of crude association, and the Mantel-Haenszel chi-square test or Mantel's extended test for trend when there was adjustment for potential confounders.

Purchase attempts at the same outlet were unlikely to be independent, and this was considered in statistical analyses of the relationship of outlet characteristics to purchase success. The unit of analysis was mean purchase success at each outlet ($n = 112$) and one-way analysis of variance techniques were employed. This latter statistical test was also used to test for the presence of overall community effects. However, to test whether community-level variables were related to purchase success, mixed-model analysis of variance techniques were used with community entered as a random effects term.

For analyses including community as an independent variable, communities with fewer than three outlets were merged with a neighboring community if one was available; six small communities were combined with another in this way, and seven were deleted from these analyses because no neighboring community was available. As a result, 10 outlets and 30 purchase attempts (fewer than 10% of the total) were omitted from the analyses where community was examined.

All variables which predicted successful purchase in bivariate analyses ($p < 0.05$) were included in a backward selection stepwise logistic regression to identify variables which were independently associated with purchase success. Since this analysis occurred at the level of the individual purchase, chi-square statistics for outlet-level and community-level variables were adjusted downward to account for extra-binomial variability due to outlet and community.

All statistical analyses were carried out using the SAS statistical package (SAS Institute Inc., 1989).

Table 1. Alcohol purchase outcome by buyer

Buyer's mean estimated age (years)	Success (%)	Attempts
17.3	23	81
17.8	33	61
18.0	75	56
18.8	56	71
19.2	57	67
Total	47	336 Attempts 112 Outlets

Mantel's test for trend $\chi^2 = 18.4$, 1 df; $p = 0.009$.

Table 2. Consistency of purchase outcome within alcohol outlet

Successful purchases in 3 attempts	Outlets (%)	Number of outlets
0	21	24
1	38	43
2	17	19
3	23	26
Total	100	112

Goodness of fit $\chi^2 = 29.12$, 3 df; $p < 0.0001$.

Results

The young women employed as confederates in this study, all rated to appear to be age 17–19 years, were able to purchase beer without age identification in 47% of the 336 total purchase attempts made in this study. Purchase outcome varied by buyer, with overall success ranging from 23% to 75% for individual buyers (Table 1). Buyers' purchase rate was related to their average perceived age as estimated by the panel, with those appearing older more successful than those appearing relatively younger. However, even after adjusting for perceived buyer age, the variation in purchase success by buyer remained highly significant (χ^2 [3 df] = 27.2, $p < 0.001$). Thus, all subsequent analyses were adjusted for buyer effect.

Almost four-fifths of the businesses sold beer to our confederate buyers at least once in three attempts (Table 2), and almost one-fourth of the businesses sold beer without age identification each of the three times. These data show a highly significant lack of fit to the expected binomial distribution, revealing that individual businesses were more internally consistent in their sales practices than could be expected by chance. However none of the business-specific variables which we measured (location of the business [downtown, perimeter or residential], degree of

exterior maintenance, number of other customers during the purchase attempt or type of business [liquor store, bar/liquor store or bar]) were associated with purchase outcome.

As Table 3 illustrates, communities varied dramatically in the rate of successful purchase, with values ranging from 18 to 90% by community. In an attempt to explain these differences by community, several community level variables were examined. Neither community population, nor number of outlets, nor population density of outlets within communities, was associated with purchase success.

Characteristics of individual purchase attempts were predictive of the purchase attempt outcome. As Table 4 shows, younger salespersons were more likely to sell beer to our confederates than those estimated by the buyer to be over the age of 30. However, male and female salespersons sold without age identification with approximately equal frequency. Purchase attempts made on Friday were less successful than those made on Saturday, and those made late in the day were less successful than attempts made before 3 p.m. (Table 5). Almost all the attempts made early in the day were made on Saturday, so day of week and time of day were confounded. Stepwise multivariate logistic regression revealed that only buyer and community independently

Table 3. Alcohol purchase outcome* by community

Community	Success (%)	Outlets
A	56	6
B	37	17
C	25	4
D	33	4
E	22	3
F	36	13
G	58	4
H	61	6
I	33	4
J	89	9
K	18	11
L	90	7
M	50	4
N	73	5
O	33	5
Total	47	102

F(14.86) = 2.85; $p = 0.0015$. *Adjusted for buyer success.

predicted purchase success ($p < 0.05$) although estimated age of salesperson was marginally significant ($p = 0.07$).

Discussion

These results provide clear evidence that many commercial businesses supply alcohol to youthful buyers without requiring age identification. The buyers in this study were successful in almost half the attempts, and they were successful at least once in three tries at almost 80% of the businesses. We believe that these results represent a conservative estimate of alcohol avail-

ability to minors. First, attempts were made at all licensed off-sale businesses in the community (except 3.2% beer license-holders), not just those where one might expect young people to be able to buy alcohol; and secondly, the purchase attempts were made in businesses in small towns, where clerks could be expected to know their clientele and be suspicious of strangers attempting to purchase.

This study clearly indicates that individual purchases within an outlet are highly correlated, suggesting that businesses may differ in characteristics and/or practices that affect likelihood of alcohol sales to minors. While our analyses of observed characteristics of the outlets did not reveal any associations with sale to minors, a follow-up survey of the managers of these businesses suggest that formal training and having managers on the premises at all times are associated with lower successful buy rates, at least in bars (Wolfson *et al.*, 1992). Communities in this study also varied by purchase success despite that the communities themselves are relatively homogeneous. While our analyses did not reveal characteristics of communities which would explain these differences, variables for which we have no information, such as enforcement patterns and practices or the occurrence of publicized events such as crashes where alcohol was involved, may differ across communities. These results imply that opportunity exists for reducing youth access to alcohol, because some businesses and some communities are successful in preventing alcohol sales to youth. More work needs to be done to identify the characteristics and conditions of communities and outlets which contribute to reduced commercial access.

Table 4. Alcohol purchase outcome* by salesperson age and sex

	Success (%)	Attempts
Salesperson age (estimated)		
≤ 30	55	130
> 30	43	206
Mantel-Haenszel $\chi^2 = 5.10$, 1 df; $p = 0.024$		
Salesperson sex		
Male	48	163
Female	46	173
Mantel-Haenszel $\chi^2 = 0.69$, 1 df; $p > 0.25$		
Total	47	336

*Adjusted for buyer success.

Table 5. Alcohol purchase outcome* by time of day, day of week

	Success (%)	Attempts
Time		
10 a.m.-3 p.m.	65	90
3 p.m.-5 p.m.	38	92
5 p.m.-7 p.m.	38	85
7 p.m.-10:30 p.m.	49	69
Mantel-Haenszel $\chi^2 = 15.52$, 3 df; $p < 0.001$		
Day		
Friday	34	130
Saturday	56	205
Mantel-Haenszel $\chi^2 = 6.95$, 1 df; $p = 0.008$		

*Adjusted for buyer success.

The variability in purchase success among the five buyers employed in this study, despite careful selection and training, suggests that study design and data collection methods are very important issues in studies of this kind. Multiple purchase attempts at each business by different buyers are essential to permit adjustment for buyer effects. While it was not possible in this study, it is clearly desirable to randomly assign buyer to outlet or at least to community to avoid possible confounding between buyer success and community or outlet success.

The generalizability of these results is limited by the fact that all purchase attempts were conducted in small towns in Northeastern Minnesota, a region whose ethnic traditions and culture support alcohol use in a variety of situations, and which has historically resisted alcohol control measures. However, this describes the situation in many rural areas of the US and there is no reason to believe that these results are specific to Northeastern Minnesota. It is important to note that on-sale license-holders were not included in the study, nor were outlets licensed to sell 3.2% beer. It would be quite interesting to compare these results cross-nationally; however, we know of no data which would allow speculation about the commercial availability of alcohol to minors internationally. These results are sufficiently compelling to suggest that more studies of alcohol availability which are carefully controlled and include a variety of geographic locations are needed. A final caveat concerning these types of studies is that what is measured is willingness of outlets to sell alcohol, not, strictly speaking, availability of alcohol to young people. For example, one outlet in a community may be

sufficient to supply a large number of underage youth, even if all other outlets refuse to sell to minors. These results probably underestimate actual availability since a high proportion of outlets were willing to sell to young people in many communities, suggesting minors would have no difficulty finding an outlet which would provide alcohol to them.

The ready availability of beer without age identification in nearly 30 communities that was demonstrated in this study suggests that the sale of alcohol to youth is a widespread problem, and supports the need for greater attention to availability as a factor in teenage drinking patterns. Business practices concerning selection, training and monitoring of salespeople, internal and external signs, and monitoring of the exterior to prevent young people from congregating may be implemented to reduce likelihood of sales to minors. In communities, location of alcohol businesses, degree of surveillance and enforcement of age of sale provisions, and advertising practices are all factors which may influence availability of alcohol to youth from commercial establishments.

References

- DEPARTMENT OF HEALTH AND HUMAN SERVICE (1991) *Youth and alcohol: a national survey*, June 1991. (Office of Inspector General)
- DRYFOOS, J. G. (1990) *Adolescents at Risk*. (New York, Oxford University Press).
- DUMOUCHEL, W., WILLIAMS, A. F. & ZADOR, P. L. (1987) Raising the alcohol purchase age, *Journal of Legal Studies*, 16, pp. 249-266.
- ELICKSON, P. L. & BELL, R. M. (1990) *Prospects for Preventing Drug Use among Young Adolescents*, (Santa Monica, Rand Corporation).

- GEORGE, W. H., CROWE, L. C., ABWENDER, D. & SKINNER, J. B. (1989) Effects of raising the drinking age to 21 years in New York State on self-reported consumption by college students, *Journal of Applied Social Psychology*, 19, pp. 623-635.
- HINGSON, R. W., SCOTCH, N. & MANGIONE T. (1983) Impact of legislation raising the legal drinking age in Massachusetts from 18 to 20, *American Journal of Public Health*, 73, pp. 163-170.
- HOFFMANN, B. J. & WILLIFORD, W. (1986) *A Gateway to Impaired Driving: Alcohol Purchasing Practices of 16 to 20 year old New York Residents* (New York State Division of Alcoholism and Alcohol Abuse).
- JOHNSTON, L. D., O'MALLEY, P. M. & BACHMAN, J. G. (1989) *Drug Use, Drinking, and Smoking: National Survey Results from High School, College, and Young Adults Populations 1975-1988* (Rockville, MD, National Drug Abuse).
- MOSHER, J. F. & JERNIGAN, D. H. (1988) Public action and awareness to reduce alcohol-related problems: a plan of action, *Journal of Public Health Policy*, 9, pp. 17-41.
- MOSKOWITZ, J. M. (1989) The primary prevention of alcohol problems: a critical review of the research literature, *Journal of Studies on Alcohol*, 50, pp. 54-88.
- NATIONAL INSTITUTE ON ALCOHOL ABUSE AND ALCOHOLISM (1990) *Alcohol and Health* (Washington, DC, US Department of Health and Human Services).
- O'MALLEY, P. & WAGENAAR, A. C. (1991) Effects of minimum age laws on alcohol use, related behaviors, and traffic crash involvement among American youth 1976-1987, *Journal of Studies on Alcohol*, 52, pp. 478-491.
- PERRY, C. L., WILLIAMS, C. L., FORSTER, J. L., WOLFSON, M., WAGENAAR, A. C., FINNEGAN, J. R., MCGOVERN, P. G., VELEN-MORTENSON, S., KOMRO, K. A. & ANSTINE, P. (1993) Background, conceptualization, and design of a communitywide research program on adolescent alcohol use: Project Northland, *Health Education Research*, 8, pp. 125-136.
- PREUSSER, D. F. & WILLIAMS, A. F. (1992) Sales of alcohol to underage purchasers in three New York counties and Washington, DC, *Journal of Public Health Policy*, 13, pp. 306-317.
- SAS INSTITUTE INC. (1989) *SAS/STAT Guide*, Vol 1 & 2, Version 6, 4th Edn. (Cary, NC, SAS Institute Inc).
- SEMLITZ, L. & GOLD M. S. (1986) Adolescent drug abuse, *Psychiatry Clinics of North America*, 9, pp. 455-473.
- STALL, R., WILEY, J. A., MCKUSICK, L., COATES, T. J. & OSTROW, D. (1986) Alcohol and drug use during sexual activity and compliance with safe sex guidelines for AIDS, *Health Education Quarterly*, 13, pp. 359-371.
- WAGENAAR, A. C. (1983) *Alcohol, Young Drivers, and Traffic Accidents: Effects of Minimum Age Laws* (Lexington, Mass, DC Health).
- WAGENAAR, A. C. & FARRELL, S. (1989) Alcohol beverage control policies: Their role in preventing alcohol-impaired driving, *Surgeon General's Workshop on Drunk Driving, Background Papers*, p. 1014. (Washington, DC, Office of the Surgeon General, US Department of Health and Human Services).
- WAGENAAR, A. C., FINNEGAN, J. R., WOLFSON, M., ANSTINE, P. S., WILLIAMS, C. L. & PERRY, C. L. (1993) Where and how adolescents obtain alcoholic beverages, *Public Health Reports*, 108, 4, pp. 459-464.
- WILLIAMS, T. P. & LILLIS, R. P. (1986) Changes in alcohol consumption by 18-year-olds following an increase in New York State's purchase age to 19, *Journal of Studies on Alcohol*, 47, pp. 290-296.
- WOLFSON, M., FORSTER, J. L., FINNEGAN, J. R., WAGENAAR, A. C., PERRY, C. L., WILLIAMS, C. L., & ANSTINE, P. S. (1992) Characteristics, policies, and practices of alcohol outlets and sales to youth. *Paper presented at the Annual Meeting, Society for Behavioral Medicine*, New York City, 25-28 March, 1992.

