

Alcohol Home Delivery Services: A Source of Alcohol for Underage Drinkers*

LINDA A. FLETCHER, B.A., TRACI L. TOOMEY, PH.D., ALEXANDER C. WAGENAAR, PH.D.,
BRIAN SHORT, M.S., M.P.H.,[†] AND MARK L. WILLENBRING, M.D.[†]

Division of Epidemiology, School of Public Health, University of Minnesota, 1300 South Second Street, Suite 300, Minneapolis, Minnesota 55454

ABSTRACT. *Objective:* This study describes the use of alcohol home delivery services by underage drinkers, and characteristics of grocery and liquor stores that deliver alcohol. The availability of alcohol home delivery services across the United States is also described. *Method:* Individuals surveyed were from 15 small- and medium-sized midwestern communities. Of all enrolled 12th graders, 83.5% ($N = 4,487$) responded, and of a randomly selected cohort of 18- to 20-year-olds, 93.9% ($N = 1,721$) responded. All grocery stores that sold alcohol and liquor stores in the corresponding communities were invited to participate in the study and 124 (92.5%) of those businesses completed surveys regarding outlet characteristics and practices. Data for the surveys were based on a nested cross-sectional design with individual respondents nested within the 15 communities. *Results:* Purchases of delivered alcohol were made by 10% of 12th graders and 7.3% of 18- to 20-year-olds

within the past year; 20.2% of outlets delivered alcohol. Using bivariate analyses, purchasing delivered alcohol was associated with male gender, high-risk drinking (drinking five or more drinks on an occasion), more recent and more frequent drinking. Providing delivery services was more common among outlets selling keg beer and/or single servings. Multivariate analyses revealed positive associations between purchasing delivered alcohol and male gender for the 12th graders, and high risk and more recent drinking for both the 12th graders and 18- to 20-year-olds. For outlets, selling keg beer was positively associated with providing delivery services. A separate survey indicated that home delivery services appear to be available in many areas of the country. *Conclusions:* Home delivery is a previously unidentified source of alcohol for underage drinkers that could be curtailed with effective alcohol policies. (*J. Stud. Alcohol* 61: 81-84, 2000)

DESPITE THE MINIMUM legal drinking age of 21, young people who are under age 21 can easily obtain alcohol (Jones-Webb et al., 1997; Wagenaar et al., 1996). Throughout the United States, alcohol is readily available to young people who attempt to buy it through commercial sources. Sales rates to underage youth vary by community. Estimates of rates of sale range from 33% to 97% (Forster et al., 1994, 1995; Grube, 1997; O'Leary et al., 1994; Preusser and Williams, 1992; Preusser et al., 1994). As young people age, they increasingly obtain alcohol from commercial sources; 3% of 9th graders, 9% of 12th graders and 14% of 18- to 20-year-olds obtained alcohol directly from a commercial establishment on their most recent drinking occasion (Wagenaar et al., 1996).

Noncommercial sources, e.g., older friends, siblings and coworkers, are also important sources of alcohol (Goldsmith, 1988; Smart et al., 1996; Wagenaar et al., 1993, 1996). One study found that adults 21 years of age or older are the most common source of alcohol for individuals in the 9th and 12th grades and for those 18 to 20 years of age. Individuals under age 21 are the second most common source of alcohol for 9th and 12th graders (Wagenaar et al., 1996).

Young people's access to alcohol through commercial and noncommercial sources may be increased by means of alcohol home delivery services; however, this has not been previously studied. Alcohol home delivery services are a unique form of alcohol availability in that the sale occurs privately, away from commercial outlets, making it less likely to be observed by other customers, outlet management, surveillance cameras or enforcement agents. Outlet employees may perceive less risk of being observed and incurring consequences, such as fines or firing, for selling to an underage person. Outlets that have systems in place to monitor employee sales are less likely to sell to individuals who appear to be underage (Wolfson et al., 1996a). Young people may feel more comfortable attempting to buy alcohol in unmonitored home-delivery settings, believing they are less likely to be caught making an illegal alcohol purchase. Young people's perceptions about the level of risk involved in obtaining alcohol may affect their use of certain sources for alcohol (Wagenaar et al., 1996).

Received: October 16, 1997. Revision: September 29, 1998.

*This study was supported in part by a Health Services Research and Development Merit Review grant to Mark L. Willenbring from the Department of Veterans Affairs, and also by National Institute on Alcohol Abuse and Alcoholism (NIAAA) and the Center for Substance Abuse Prevention grant R01AA90142 (Alexander C. Wagenaar, Principal Investigator) to the University of Minnesota School of Public Health and NIAAA grant R01AA10426 (Alexander C. Wagenaar, Principal Investigator).

[†]Brian Short is with the Department of Family Practice and Community Health, Medical School, University of Minnesota, Minneapolis. Mark L. Willenbring is with the Department of Psychiatry, Minneapolis VA Medical Center, & the Department of Psychiatry, University of Minnesota, Minneapolis.

Through sales to older teens, alcohol home delivery services may also serve as an important noncommercial, secondary source of alcohol for underage drinkers. Delivery services are convenient when large orders are placed for parties or events involving drinking, and parties are an important source of alcohol for young people in their early- to mid-teen years (Wagenaar et al., 1993). A single (legal or illegal) sale of alcohol through delivery may therefore lead to illegal underage drinking and unintended consequences on a larger scale.

This article assesses use of alcohol delivery services by underage individuals, business practices and characteristics of off-sale retail alcohol outlets that provide delivery, and the number of states that allow delivery services.

Method

Data presented here are from follow-up surveys of the Communities Mobilizing for Change on Alcohol (CMCA) project, which included 15 communities with populations ranging from 8,029 to 64,797 (average of 20,836) in Minnesota and Wisconsin (see Wagenaar et al., 1994). CMCA communities were: (1) within a 5-hour drive of the University of Minnesota, (2) at least 25 miles from other eligible communities, (3) had at least 200 students in the 9th grade and (4) primarily drew their students from no more than three municipalities.

Three surveys were conducted as part of CMCA: a student survey of 12th graders, a young adult survey of 18- to 20-year-olds and a survey of commercial alcohol outlets. All subjects surveyed gave informed consent. Parents of 12th graders under age 18 provided passive consent. The student survey was conducted during class sessions by trained researchers and consisted of a self-report questionnaire. Surveys were completed by 83.5% (4,487) of the 5,374 enrolled 12th graders. Respondents were 94% white and 51.1% female, with a mean age of 17.3 years.

For the young adult survey, we selected a random group of 18- to 20-year-olds from a list derived from driver's license records and college directories. From this group, sequential subsets of 50 names stratified by community were selected at random and confirmed to be residents of the participating communities and eligible for the study. Of these young adults, 93.9% (1,721) provided data for the analyses reported in this article; 112 refused to participate. Respondents were 95.7% white and 51.7% male, with a mean age of 19.1 years. The student and young adult surveys took, on average, 25 minutes to complete. All subjects were included in the analyses even if they had not drunk alcohol in the last year.

Data for both the student and young adult surveys were based on a nested cross-sectional design with individual respondents nested within the 15 communities. For the student and young adult analyses, the dependent variable was whether, in the past year, they had purchased alcohol that was

delivered by a store to a home or an individual. This would include alcohol purchases delivered directly from an outlet, as well as alcohol purchases delivered to someone else who then resold the alcohol (such as at a party). Independent variables included: gender, time of the respondent's last drinking occasion, number of drinking occasions in the previous month and whether the respondent had five or more drinks on one occasion in the last 2 weeks (high-risk drinkers).

For the commercial outlet survey, managers and owners of all grocery stores licensed to sell alcohol and all off-sale liquor stores in the 15 communities were surveyed. Surveys were obtained from 92.5% (124) of the total 134 grocery and liquor stores. For outlet analyses, the dependent variable was whether the outlet provided alcohol home delivery services. Independent measures were: whether alcohol is sold by the single serving, average length of staff employment, whether the business is part of a chain or franchise, length of ownership of current license, whether kegs or party balls are sold and whether the business has a system to monitor employees' compliance with age-of-sale laws.

We also conducted a mail survey of U.S. state alcohol beverage control (ABC) agencies and legislative research bureaus, inquiring about state alcohol policies, including whether the state allows retailers to provide home deliveries of alcohol. Response rates were 84% for ABC agencies and 58% for legislative research bureaus. We received at least one of the two surveys from 94% of the states.

We conducted a series of mixed-model logistic regressions using SAS/Glimmix, a mixed-model logistic regression program especially suited to the analysis of data from a complex survey design (Murray and Wolfinger, 1994; SAS Institute Inc., 1992). We completed bivariate and multivariate analyses for the student, young adult and outlet surveys. Backward selection techniques were used to derive the final multivariate models. We reported *F* tests with denominator degrees of freedom greater than 100 as chi-square tests based on numerator degrees of freedom.

Results

Bivariate results from CMCA surveys

Of 12th graders, 10% (447/4,469) indicated purchasing alcohol delivered by a store to a home or an individual in the past year, compared to 7.3% (125/1,720) of 18- to 20-year-olds ($\chi^2 = 10.73$, 1 df, $p = .001$). Within both age strata, those who purchased delivered alcohol were more likely to be male, to have engaged in high-risk drinking in the last 2 weeks, and to have engaged in more recent and more frequent drinking in the previous month (see Table 1).

Of the 124 grocery stores and liquor outlets, 20.2% reported providing alcohol home delivery services. Providing delivery services is associated with selling alcohol by the single serving (odds ratio [OR] = 2.77; $\chi^2 = 4.53$, 1 df,

TABLE 1. Characteristics of 12th graders and 18- to 20-year-olds: Comparisons as a function of having purchased home-delivered alcohol in the past year (bivariate analyses)

	Relationship to purchasing home-delivered alcohol in the past year	
	12th graders (N = 4,469)	18- to 20-year-olds (N = 1,720)
Males (compared to females)	OR = 1.36 $\chi^2 = 9.39, 1 \text{ df}$ $p = .0022$	OR = 1.74 $\chi^2 = 8.46, 1 \text{ df}$ $p = .0037$
High-risk drinking ^a last 2 weeks (vs no high-risk drinking last 2 weeks)	OR = 4.26 $\chi^2 = 192.86, 1 \text{ df}$ $p = .0001$	OR = 3.26 $\chi^2 = 39.34, 1 \text{ df}$ $p = .0001$
Time since last drinking occasion (vs no drinking in last year)		
Last week	OR = 14.23	OR = 44.12
Last month	OR = 7.69	OR = 20.61
Last year	OR = 4.53 $\chi^2 = 53.18, 3 \text{ df}$ $p = .0001$	OR = 15.75 $\chi^2 = 10.54, 3 \text{ df}$ $p = .0001$
Number of drinking occasions last month (compared with 6+)		
0	OR = 0.14	OR = 0.15
1-2	OR = 0.32	OR = 0.35
3-5	OR = 0.47 $\chi^2 = 75.20, 3 \text{ df}$ $p = .0001$	OR = 0.71 $\chi^2 = 16.27, 3 \text{ df}$ $p = .0001$

Note: OR = odds ratio. Discrepancies in sample size are due to missing data.
^aFive or more drinks on a single occasion.

$p = .04$) and selling kegs (OR = 5.53; $\chi^2 = 4.90, 1 \text{ df}$, $p = .03$). None of the other outlet policies or characteristics were significantly related to home delivery services.

Multivariate results from CMCA surveys

For 12th-grade students, gender, high-risk drinking in the last 2 weeks and more recent drinking were significantly associated with having purchased home-delivered alcohol in the past year. High-risk drinking and more recent drinking were related to having purchased delivered alcohol for 18- to 20-year-olds (see Table 2). For outlets, only selling alcohol by the keg was positively related to providing alcohol sales through delivery (OR = 5.5; $\chi^2 = 4.90, 1 \text{ df}$, $p = .03$.)

Survey results from ABC agencies and legislative research bureaus

Regarding legal restrictions on home delivery, 52% (22 of 42) of the responding ABC agencies and 59% (17 of 29) of the responding legislative research bureaus indicated that home delivery of alcohol was allowed in their state (with varying degrees of restrictions on delivery). We observed discrepancies in seven states where one survey indicated delivery was allowed in the state and the other survey indicated it was not.

TABLE 2. Adjusted multivariate analyses: Factors related to purchasing alcohol that was delivered to a home or individual in the last year

	OR	χ^2	p
12th graders (n = 4,454)			
Males (compared to females)	1.23	4.01, 1 df	.0453
High-risk drinking ^a last 2 weeks (vs no high-risk drinking last 2 weeks)	2.15	27.53, 1 df	.0001
Time since last drinking occasion (vs no drinking in last year)			
Last week	7.80	18.75, 3 df	.0001
Last month	6.29		
Last year	4.71		
18- to 20-year olds (n = 1,720)			
High-risk drinking ^a last 2 weeks (vs no high-risk drinking last 2 weeks)	1.73	5.31, 1 df	.0213
Time since last drinking occasion (vs no drinking in last year)			
Last week	31.77	5.08, 3 df	.0017
Last month	18.05		
Last year	16.05		

Note: OR = odds ratio. Discrepancies in sample size are due to missing data.
^aFive or more drinks on a single occasion.

Discussion

Home delivery provides a source of alcohol for underage drinkers. An unexpected finding was that 12th graders were significantly more likely than 18- to 20-year-olds to have purchased delivered alcohol, possibly because older drinkers may be able to more easily make direct alcohol purchases at an outlet and have less need for unmonitored delivery services. The results of the study raise the possibility that, through delivery services, young drinkers are able to access alcohol more regularly at an earlier age. The implications of this are serious, as drinking at an earlier age has been linked with a higher risk of future alcohol-related problems (Gonzalez, 1989; Grant and Dawson, 1997; Robins, 1978). For both age groups, multivariate results indicate that more recent drinking and high-risk drinking were associated with purchasing delivered alcohol; for these individuals, alcohol consumption may more often take place in the context of events involving heavier or problem drinking.

Outlet policies may be related to an outlet's propensity to sell alcohol to underage drinkers (Forster et al., 1995; Wolfson et al., 1996a, 1996b). Outlets providing delivery services were more likely to sell keg beer; this finding has implications for the prevention of underage drinking since beer kegs are common at parties attended by high school students and by episodic heavy-drinking teenagers (Wagenaar et al., 1993). Kegs delivered to homes are not only a source of alcohol for the purchaser but also for the potentially large numbers of young people who drink at parties. In the absence of

restrictions on home delivery, other policies such as keg registration may be necessary to identify the keg purchaser who supplies alcohol to underage drinkers.

There are several limitations to this study. First, the findings are from small and mid-sized midwestern communities, and alcohol delivery services may be more common in urban areas. We analyzed yellow-page telephone directories from 248 U.S. cities with populations over 100,000. Overall, 104 (41.9%) of the city directories contained one or more outlet advertisements for alcohol delivery. Similar to results from the ABC and legislative research bureau surveys, we found alcohol delivery advertisements in at least one city yellow pages for 26 of the 50 states. For the 50 largest U.S. cities by population, 36 (72%) of the corresponding telephone directories contained one or more delivery advertisements (Fletcher et al., 1996). Major metropolitan areas may, therefore, have a higher prevalence of delivery service availability and use. In addition, data presented here do not reveal the frequency of delivery use or whether delivery purchases served as a primary source of alcohol (respondent bought alcohol directly from deliverer) versus a secondary source (respondent bought from someone else who obtained alcohol from a home delivery).

Alcohol home delivery services appear to be one of a number of sources of alcohol for underage drinkers. Approximately half of the U.S. states allow home delivery of alcohol (although, given the complexity of state laws, in-depth legal research would be required to accurately identify legal availability of alcohol home delivery services). Knowledge of the sources of alcohol to underage drinkers is an important step in developing policies that help reduce youth alcohol access and resulting injuries, violence and social problems. Placing restrictions on or more closely monitoring home deliveries of alcohol may be part of a larger set of policies that need to be implemented. Policy measures that target alcohol sales via delivery may particularly affect younger drinkers and those at greater risk for alcohol-related problems.

References

- FLETCHER, L.A., NUGENT, S.M., AHERN, S.M. and WILLENBRING, M.L. The use of alcohol home delivery services by male problem drinkers: A preliminary report. *J. Subst. Abuse* 8: 251-261, 1996.
- FORSTER, J.L., MCGOVERN, P.G., WAGENAAR, A.C., WOLFSON, M., PERRY, C.L. AND ANSTINE, P.S. The ability of young people to purchase alcohol without age identification in northeastern Minnesota, USA. *Addiction* 89: 699-705, 1994.
- FORSTER, J.L., MURRAY, D.M., WOLFSON, M. AND WAGENAAR, A.C. Commercial availability of alcohol to young people: Results of alcohol purchase attempts. *Prev. Med.* 24: 342-347, 1995.
- GOLDSMITH, H. Illicit alcohol procurement by underage persons: Prevention implications and strategies for melioration. *J. Offend. Counsel. Serv. Rehab.* 13: 133-162, 1988.
- GONZALEZ, G.M. Early onset of drinking as a predictor of alcohol consumption and alcohol-related problems in college. *J. Drug Educ.* 19: 225-230, 1989.
- GRANT, B.F. AND DAWSON, D.A. Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *J. Subst. Abuse* 9: 103-110, 1997.
- GRUBE, J.W. Preventing sales of alcohol to minors: Results from a community trial. *Addiction* 92 (Suppl. No. 2): S251-S260, 1997.
- JONES-WEBB, R., TOOMEY, T., MINER, K., WAGENAAR, A.C., WOLFSON, M. AND POON, R. Why and in what context adolescents obtain alcohol from adults: A pilot study. *Subst. Use Misuse* 32: 219-228, 1997.
- MURRAY, D.M. AND WOLFINGER, R.D. Analysis issues in the evaluation of community trials: Progress toward solutions in SAS/STAT MIXED. *J. Commun. Psychol. CSAP Special Issue*: 140-154, 1994.
- O'LEARY, D., GORMAN, D.M. AND SPEER, P.W. The sale of alcoholic beverages to minors. *Pub. Hlth Rep.* 109: 816-818, 1994.
- PREUSSER, D.F. AND WILLIAMS, A.F. Sales of alcohol to underage purchasers in three New York counties and Washington D.C. *J. Publ. Hlth Policy* 13: 306-317, 1992.
- PREUSSER, D.F., WILLIAMS, A.F. AND WEINSTEIN, H.B. Policing underage alcohol sales. *J. Safety Res.* 25: 127-133, 1994.
- ROBINS, L.N. Sturdy childhood predictors of adult antisocial behaviour: Replications from longitudinal studies. *Psychol. Med.* 8: 611-622, 1978.
- SAS INSTITUTE, INC. SAS Technical Report P-229. SAS/STAT Software: Changes and Enhancements, Release 6.07, Cary, NC: SAS Institute, Inc., 1992, pp. 287-368.
- SMART, R.G., ADLAF, E.M. AND WALSH, G.W. Procurement of alcohol and underage drinking among adolescents in Ontario. *J. Stud. Alcohol* 57: 419-424, 1996.
- WAGENAAR, A.C., FINNEGAN, J.R., WOLFSON, M., ANSTINE, P.S., WILLIAMS, C.L. AND PERRY, C.L. Where and how adolescents obtain alcoholic beverages. *Publ. Hlth Rep.* 108: 459-464, 1993.
- WAGENAAR, A.C., MURRAY, D.M., WOLFSON, M., FORSTER, J.L. AND FINNEGAN, J.R. Communities mobilizing for change on alcohol: Design of a randomized community trial. *J. Commun. Psychol. CSAP Special Issue*: 79-101, 1994.
- WAGENAAR, A.C., TOOMEY, T.L., MURRAY, D.M., SHORT, B.J., WOLFSON, M. AND JONES-WEBB, R. Sources of alcohol for underage drinkers. *J. Stud. Alcohol* 57: 325-333, 1996.
- WOLFSON, M., TOOMEY, T.L., FORSTER, J.L., WAGENAAR, A.C., MCGOVERN, P.G. AND PERRY, C.L. Characteristics, policies and practices of alcohol outlets and sales to underage persons. *J. Stud. Alcohol* 57: 670-674, 1996a.
- WOLFSON, M., TOOMEY, T.L., MURRAY, D.M., FORSTER, J.L., SHORT, B.J. AND WAGENAAR, A.C. Alcohol outlet policies and practices concerning sales to underage people. *Addiction* 91: 589-602, 1996b.