Alcohol Advertising on Boston's Massachusetts Bay Transportation Authority Transit System: An Assessment of Youths' and Adults' Exposure

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Objectives. We investigated the frequency with which alcohol advertisements appeared on Massachusetts Bay Transportation Authority (MBTA) transit lines in Boston, MA, and we calculated adult and youths' exposure to the ads.

Methods. We measured the nature and extent of alcohol advertisements on 4 Boston transit lines on 2 separate weekdays 1 month apart in June and July of 2008. We calculated weekday ad exposure for all passengers (all ages) and for Boston Public School student passengers (aged 11–18 years).

Results. Alcohol ads were viewed an estimated 1 212 960 times across all Boston-area transit passengers during an average weekday, reaching the equivalent of 42.7% of that population. Alcohol ads were viewed an estimated 18 269 times by Boston Public School student transit passengers during an average weekday, reaching the equivalent of 54.1% of that population.

Conclusions. Advertisers reached the equivalent of half of all Boston Public School transit passengers aged 11 to 18 years and the equivalent of nearly half of all transit passengers in the Boston area with an alcohol advertisement each day. Because of the high exposure of underage youths to alcohol advertisements, we recommend that the MBTA prohibit alcohol advertising on the Boston transit system. (*Am J Public Health.* 2009;99:S644–S648. doi:10.2105/AJPH.2008.149906)

Alcohol abuse is associated with an abundance of individual and societal public health problems. In 1998, alcohol abuse cost the United States an estimated $184 billion.[1,2] Long-term drinking can lead to such morbidities as heart disease, cancer, liver disease, and pancreatitis.[1] Public health practitioners are particularly concerned about alcohol use among adolescents and young adults. Miller et al.[3] reported that in 2001 underage drinking accounted for at least 16% of alcohol sales and contributed to 3170 deaths and 2.6 million other harmful events. In 2005, 43.3% of adolescents in grades 9 through 12 reported having consumed at least 1 alcoholic beverage during the previous 30 days, and 25.5% had consumed 5 or more alcoholic drinks consecutively during 1 or more of the past 30 days.[4] Alcohol consumption among youths has been shown to alter brain development, including memory and test-taking abilities,[5] and may lead to an increased risk for heavy drinking in adulthood.[6]

Youths' alcohol consumption in the United States has been increasingly linked to alcohol advertising. Numerous studies have demonstrated a statistically significant relationship between youths' exposure to alcohol ads and an increase in youths' alcohol consumption.[7–9] According to a study by the Center on Alcohol Marketing and Youth, individuals aged between 12 and 20 years are 96 times more likely to observe an advertisement promoting alcohol use than an advertisement discouraging underage drinking.[10] Collins et al.[11] found that seventh-graders in the 75th percentile of alcohol marketing exposure had a 50% greater predicted probability of drinking than adolescents in the 25th percentile of exposure.

Several studies have investigated outdoor alcohol advertising,[12–14] but we are not aware of any previously published research that has attempted to quantify the amount of alcohol advertising on public transportation systems. In a 2007 report, the Marin Institute stated that Boston and New York public transit agencies lag behind national trends in protecting children from alcohol advertising.[15] Other major cities, such as Chicago, Los Angeles, Washington, DC, Philadelphia, and San Francisco, have enacted policies prohibiting alcohol advertising on public transit.[15] For instance, San Francisco, a leader in antialcohol transit legislation, levies a fine of $5000 per day per violation of advertising codes.[15] The Massachusetts Bay Transportation Authority (MBTA) has adopted advertising policies prohibiting tobacco, violence, and nudity because of their inappropriateness for minors;[15] however, the MBTA continues to allow alcohol ads on its public transit system, and alcohol ads are routinely displayed on Boston's MBTA trains and buses.[16] We investigated the frequency with which alcohol advertisements appeared on 4 Boston transit lines, and we assessed the implications for adult and youths' exposure.

METHODS

The MBTA is the primary transit provider in the Boston region, serving 175 municipalities and communities. The MBTA system includes rapid transit, streetcar, express bus, commuter rail, and commuter boat lines. The rapid transit and streetcar system serves 140 stations on 6 lines. Data collectors assessed alcohol advertisements on 4 Boston transit lines (Red, Orange, Blue, and Green) to obtain a snapshot of alcohol exposure for a transit passenger on a typical weekday. The Red line is the longest and most utilized rapid-transit line (21 miles), and the Blue line is a short rapid-transit line (6 miles). The Green line is a 23-mile streetcar line divided into 4 branches, and the Orange line is an 11-mile rapid-transit line with 19 stations.[17]

Sample and Procedures

During the summer of 2008, data were collected between 9 am and 1 pm on 2 separate

weekend days 1 month apart. This strategy was implemented to maximize sampling variability. According to Titan Outdoor, the company that sells advertising on vehicles for the MBTA (M. Elmin, oral communication, July 2008), advertisements are not typically altered during daytime hours; hence, the time of day when data were collected was not likely to influence our results. The day of the week was also not likely to influence results, as most MBTA advertisements must be purchased for a minimum of 4 weeks. We collected data on weekend mornings because we inferred that those were the times when the transit system would be less crowded, allowing unobstructed views of advertisements and optimal accuracy of data collection.

Starting station locations for each transit line were randomly selected. Three data collectors each sampled 4 consecutive trains for observation on all 4 transit lines on both days of data collection. Each collector observed advertisements on each individual car of all 4 consecutive trains for all 4 transit lines. Observations were limited to advertisements on the interiors and exteriors of the trains and did not include alcohol advertisements in train stations along the transit lines.

MBTA data indicated that a total of 492 cars were operational for the 4 sampled transit lines over 2 typical Saturdays in 2008 (246 cars each day).[18] Data collectors sampled 142 cars over the 2 collection days (Red line=48; Orange line=48; Blue line=32; Green line=14); thus, our sample captured 29% of the number of train cars in operation over 2 typical Saturdays (Table 1).

TABLE 1—Sampling of MBTA Transit Cars by Transit Line on 2 Weekend Days at Peak Hours: Boston, MA, June–July 2008

Line	Total Number of Cars in Operation	Number of Cars Sampled	Percentage Sampled
Red	120	48	40%
Orange	120	48	40%
Blue	48	32	67%
Green	204	14	7%
Total	492	142	29%

Note. MBTA = Metropolitan Boston Transit Authority.

Measures

Sample characteristics. Descriptive statistics were recorded for the total number of cars on each train; the number of cars containing alcohol advertisements; and the type of product (beer, wine, spirits, flavored malt beverages [i.e., "alcopops"], or other), brand (e.g., Budweiser, Maker's Mark), size (11×28 in or 22×21 in), and description (e.g., slogan, images) of each advertisement. When possible, specific alcohol advertisements were photographed (Figures 1 and 2). To ensure consistency, data collectors completed identical data-collection forms indicating all alcohol advertisements observed for each consecutive train sequence on all transit lines. The total number of alcohol advertisements was divided by the number of transit cars sampled to calculate the average number of advertisements per car.

Reach. Reach (the number or size of an audience affected by an advertisement) was measured by total gross impressions and gross rating points (GRPs) for the typical weekday transit passenger (all ages) and for Boston Public School student weekday transit passengers (aged 11–18 years). Gross impressions represent the sum of impressions for an advertising campaign or a combination of advertisements[10] and include multiple exposures for some or all of the population exposed to the advertising. The number of gross impressions for the typical transit passenger in our study was calculated by multiplying the number of passengers on a given weekday by the average number of advertisements. The same procedure was used to calculate the gross impressions for Boston Public School student passengers.

Gross rating points (GRPs) are a standard measure of advertising used to represent the percentage of the target audience reached by an advertisement.[10] GRPs were calculated by separately dividing the gross impressions for Boston metropolitan area transit passengers and for Boston Public School student transit passengers by the total number of people in their respective target populations. Each resulting quotient was then multiplied by 100 to obtain the GRPs for each study population. The total population of the 3 counties in Massachusetts served by the MBTA system (Suffolk County, Middlesex County, and Norfolk County) represented the target population for the typical Boston passenger; the total number of Boston Public School students aged 11 to 18 years served as the target population for the typical youth passenger.

Note. MBTA = Metropolitan Boston Transit Authority.

FIGURE 1—Spirits advertisement observed on MBTA Train: Boston, MA, June–July 2008.

Note. MBTA = Metropolitan Boston Transit Authority.

FIGURE 2—Beer advertisement observed on MBTA Train: Boston, MA, June–July 2008.

RESULTS

Descriptive statistics for alcohol advertisements overall and by transit line are provided in Table 2.

Sample Characteristics

Data collectors found a total of 267 alcohol ads over both collection days. The Orange line contained the most ads (203), and the Red line contained the least (5). On average, there were 1.9 alcohol advertisements per car sampled. The Orange line showed the highest number of ads per car sampled (4.2), followed by the Blue (1.5), Green (0.7), and Red (0.1) lines.

Both advertisement sizes (11×28 in and 22×21 in) were found on transit cars. Overall, there were 156 small advertisements (11×28 in) and 111 large advertisements (22×21 in). Only the Orange line displayed more small advertisements (128) than large advertisements (75).

Of the 4 types of products advertised in alcohol ads (wine, beer, spirits, and alcopops), data collectors observed only 2 in ads on the MBTA trains: beer and spirits. Beer advertisements were more prevalent (198) than ads for spirits (69). All beer advertisements featured light beer, and all but 1 spirit ad displayed bourbon whiskey.

TABLE 2—Descriptive Characteristics of Alcohol Advertisements on MBTA Trains by Transit Line on 2 Weekend Days at Peak Hours: Boston, MA, June–July 2008

Line	Total Number of Alcohol Ads	Average Number of Alcohol Ads per Car Sampled	Total Number of Alcohol Ads by Size		Type of Alcohol Advertised	
			11×28 in	22×21 in	Spirits	Beer
Red	5	0.1	3	2	1	4
Orange	203	4.2	128	75	37	166
Blue	49	1.5	25	24	31	18
Green	10	0.7	0	10	0	10
Total	267	1.9[a]	156	111	69	198

Note. MBTA = Metropolitan Boston Transit Authority.
[a]Combined average per car sampled for all lines.

Reach

Average Boston transit passenger GRPs. The GRPs for the typical Boston metro area weekday transit passenger and for the typical Boston Public School student transit passenger are shown in Table 3. MBTA data show that approximately 638 400 passengers used the 4 transit lines observed on a typical weekday in 2006.[19] Data from Table 2 show that there were an average of 1.9 alcohol advertisements present on each transit car. Hence, there were 1 212 960 gross impressions on typical weekday transit passengers per day. Because all 4 Boston transit lines run through Suffolk County, Middlesex County, and Norfolk County, the total population of these counties (2 841 374) was used as the target population to calculate the GRP.[21] Thus, by dividing the number of impressions (1 212 960) by the target population (2 841 374) and multiplying by 100, we estimated that alcohol ads achieved 42.7 GRPs in a typical day among the entire population of Suffolk, Middlesex, and Norfolk counties.

Average Boston Public School student transit passenger GRPs. The estimated GRP calculation for the typical weekday Boston Public School student passenger aged 11 to 18 years is summarized in Table 3. According to the MBTA (M. Dullea, written communication, July 2008), there were 3 461 375 2-way transit transactions (student monthly passes, student fares debited at entry, and student transfers from buses) for the target population during the Boston Public School year calendar in 2007.[20] We divided the total number of transactions by the number of school days in 2007 (n=180), resulting in an estimate of 19 229 student transactions on the average school day. Assuming that each student makes 2 transit transactions per school day, we divided the number of student transactions per day by 2 to calculate that there were 9615 Boston Public School student passengers per school day. We multiplied this number by the average number of alcohol ads per car sampled (1.9; Table 2) to yield an estimate of 18 269 gross impressions per day for

TABLE 3—Audience Exposure Achieved by Alcohol Advertisements on MBTA Trains: Boston, MA, June–July 2008

Passengers	Typical Weekday Ridership	Average Number of Alcohol Ads per Car	Gross Impressions per Day[a]	Audience	Gross Rating Points[b]
Average transit passenger (all ages)	638 400[c]	1.9	1 212 960	2 841 374[d]	42.7
Average Boston Public School student transit passenger (aged 11–18 y)	9615[e]	1.9	18 269	33 776[f]	54.1

Note. MBTA = Metropolitan Boston Transit Authority.
[a]Calculated by multiplying the number of transit passengers on a given weekday by the average number of advertisements (Table 2).
[b]Calculated by dividing the gross impressions per day for each study population by the total number of people in the target audience for that population, and multiplying each quotient by 100.
[c]Average number of transit passengers per weekday.[19]
[d]Combined populations of Suffolk, Middlesex, and Norfolk counties.[20]
[e]Average number of Boston Public School student transit passengers per school day.[21]
[f]Number of youths aged 11 to 18 years enrolled in the Boston Public School system in the 2007–2008 school year.[22]

this population. Finally, we divided the number of gross impressions (18 269) by the number of Boston Public School students enrolled in grades 5 through 12 for the 2007–2008 school year (33 776)[22] and multiplied the quotient by 100 to obtain the GRPs for this population. On the basis of this calculation, we estimated that alcohol advertisements achieved a total of 54.1 GRPs in a typical weekday among Boston Public School students aged 11 to 18 years.

DISCUSSION

To the best of our knowledge, this is the first study to quantify youths' and adults' exposure to alcohol advertisements on a public transit system. We found that on the subway and streetcar component of the Boston rapid transit system, alcohol advertisements achieved 42.7 GRPs in a typical weekday among all transit passengers and 54.1 GRPs in a typical weekday among Boston Public School student transit passengers aged 11 to 18 years. This means that in the Boston metropolitan area, alcohol advertisers were able to reach the equivalent of half of all Boston Public School student transit passengers aged 11 to 18 years and the equivalent of nearly half of all transit passengers with an alcohol advertisement each day. Because our data do not include advertisements in the stations along the transit lines or on MBTA buses, our findings greatly underestimate the actual extent of alcohol advertisement exposure achieved through the Boston transit system. These findings have important implications for public health practitioners and policymakers seeking to address the problem of underage drinking, particularly given the well-documented research[7–12] linking youths' exposure to alcohol ads with underage drinking.

Limitations

One limitation of our study is that we collected data during weekend days, when fewer train cars were in operation; nearly twice as many MBTA train cars (468) were in operation during peak weekday hours. However, we inferred that a similar proportion of alcohol advertisements would be present during a weekday, and our sampling proportion of 29% is substantial.

Because the 4 lines have different numbers of cars in operation per line, different percentages of cars were sampled across the 4 lines. This is a potential limitation because it means that the potential errors in our estimates are different across the lines. However, even for the line with the smallest percentage of cars sampled (Green line, 7% of cars sampled), the percentage of cars sampled was still relatively high.

In addition, the advertisements were observed during the summer months, when school is not in session. Hence, we acknowledge that seasonal variability in advertising could affect our results for Boston Public School student transit passengers. Moreover, our population and student transaction data were obtained from 2007, but MBTA weekday ridership data were only available from 2006. We acknowledge that this difference could alter our exposure calculations.

Finally, the MBTA has reported that student transaction data for individuals aged 17 years and younger is difficult to estimate because youths in that category cannot or do not fill in survey data (S. Clarey, written communication, February 2009). The MBTA could only provide student transaction data for Boston Public School students, so results pertain to this population only and are not generalizable to other populations of youths.

Implications

According to the Marin Institute's 2007 report, data collected from the 2004 MBTA budget show that alcohol advertising represented only 0.1% of the transit system's total revenue.[15] However, the advertising that constitutes such a small percentage of the transit system's income contributes to serious consequences for underage drinkers and increased costs for the Commonwealth of Massachusetts. Underage drinking cost the citizens of Massachusetts approximately $1.4 billion dollars in 2005 (e.g., violence among youths, traffic crashes, property crime, high-risk sex, alcohol treatment), roughly $2427 per year for each youth in the state.[3,23] Given the overabundance of public health problems associated with alcohol abuse—such as violence, injuries from motor vehicle crashes, homicides and suicides (the leading causes of death among youth), high health care costs, low worker productivity, homelessness, increased risky sexual behavior, illicit drug use, and academic failure—and the link between underage drinking and long-term health effects, it seems appropriate to recommend that the MBTA prohibit alcohol advertising on the Boston transit system. Future researchers may wish to thoroughly investigate the socioeconomic and ethnic characteristics of the communities served by each line to determine whether alcohol advertisements are targeted toward populations already experiencing health disparities. ■

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This article was accepted May 21, 2009.

Contributors

J.A. Nyborn drafted the introduction, Methods, and Results sections. K. Wukitsch drafted the discussion section, revised the article, and contacted organizations for background information. S. Nhean created data-collection forms, supervised data storage, and prepared the draft for submission. J.A. Nyborn, K. Wukitsch, and S. Nhean were responsible for designing the study and analyzing and interpreting data. M. Siegel originated the study, supervised the study, and reviewed the article for intellectual content.

Acknowledgments

We are grateful to Sarah Christy for her valuable advice regarding alcohol advertising on the Boston transit system.

Human Participant Protection

No protocol approval was required because this study did not involve human participants.

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