

Original article

Adolescent Exposure to Alcohol Advertising in Magazines: An Evaluation of Advertising Placement in Relation to Underage Youth Readership

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Abstract

Purpose: To investigate whether alcoholic beverages popular among underage youths are more likely than those less popular among these youths to be advertised in magazines with high underage youth readerships.

Methods: We compared the alcohol advertisement placement in 118 magazines during the period 2002 to 2006 for alcoholic beverages popular among youths to that of alcoholic beverages less likely to be consumed by youths. Using a random effects probit model, we examined the relationship between a magazine's youth (ages 12–20) readership and the probability of youth or nonyouth alcoholic beverage types being advertised in a magazine, controlling for young adult (ages 21–34) readership, cost of advertising, and other factors.

Results: Youth alcoholic beverage types were significantly more likely to be advertised in magazines with higher youth readership. Holding all other variables constant, the ratio of the probability of a youth alcoholic beverage type being advertised to that of a nonyouth alcoholic beverage type being advertised in a given magazine increased from 1.5 to 4.6 as youth readership increased from 0% to 40%. In magazines with the highest levels of youth readership, youth alcoholic beverage types were more than four times more likely to be advertised than nonyouth alcoholic beverage types.

Conclusions: Alcoholic beverages popular among underage youths are more likely than those less popular among youths to be advertised in magazines with high youth readerships. © 2009 Society for Adolescent Medicine. All rights reserved.

Keywords: Adolescent; Adolescent behavior; Advertising as topic; Alcoholic beverages; Alcohol drinking; Beer; Wine

Alcohol use among adolescents is a major public health problem [1–6]. Despite slight declines in the past decade, the 30-day prevalence of alcohol use among high school seniors in 2007 was 44.4% [1]. In 2005, the alcohol industry spent at least \$4 billion in advertising and promotional expenditures [4]. The question of whether this advertising is disproportionately reaching and influencing underage youths

(under 21 years old) lies at the heart of the public health debate about interventions to reduce youth drinking [7–15].

Each of the three major trade associations representing the alcoholic beverage industry has publicly stated that they do not advertise to underage youths [16–18]. Several studies by Nelson [19–21] failed to find a significant relationship between youth readership in magazines and the number of beer, spirits, or wine advertisements in those magazines. Several other studies, however, came to the opposite conclusion [22–28].

A major limitation of the existing research is that these studies do not examine advertising patterns separately for

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alcoholic beverages that are popular among youths versus those that are not popular among youths. Alcohol brands appeal to different age demographics. Aggregating them obscures key differences in brands' popularity among youths. This makes it difficult to determine whether there is some factor, other than youth readership, that explains why alcohol advertisements appear in higher numbers in magazines with higher youth readership. If all alcoholic beverages are advertised similarly with respect to youth readership, there might be some unidentified factor—such as the general desirability of the magazine—which explains the advertising pattern. The finding of a differential pattern of advertising between alcoholic beverages more and less popular among youths would provide stronger evidence that the youth alcoholic beverage types are disproportionately exposing youths to, and possibly influencing youths with, their advertising.

A second limitation of previous studies is that they have all examined the relationship between youth readership and the number of alcohol advertisements in a magazine. It may be more important to analyze the presence or absence of advertising for a particular type of alcoholic beverage in a magazine in the first place.

Third, several of the previous published studies have chosen small magazine samples, no more than 35 [19–23]. Because there are more than 100 national magazines in which alcohol is advertised, investigating a larger sample of magazines is critical to understanding the relationship between advertising placement and youth readership.

In this study, we examine whether types of alcoholic beverages consumed by a large proportion of underage youths are more likely to advertise in magazines with higher youth readerships than types of alcohol less likely to be consumed by youths. The analysis addresses the limitations of previous research by: (a) for the first time (to our knowledge), comparing patterns of alcohol advertising in magazines between types of alcohol more and less popular among youths; (b) examining the presence or absence of alcohol advertisements in a magazine, rather than the number of advertisements; and (c) studying a large sample that includes all magazines for which relevant data were available ($N = 118$).

In addition to examining the relationship between alcohol advertising and youth readership, we also investigate the relationship between alcohol advertising placement and the gender of magazine readers.

For ease of exposition, we define solely for the purposes of our study “youth alcoholic beverage types” as those consumed by a large proportion of underage youths and “nonyouth alcoholic beverage types” as those least popular among youths.

Methods

Model of advertising behavior

We model the advertising behavior of alcoholic beverage types in terms of the probability that a given type will be

advertised in a particular magazine. The dependent variable is the presence or absence of advertising for a specific alcoholic beverage type in a given magazine in a given year (2002–2006). Key predictor variables in our model include: (a) the demographic characteristics of a magazine's readership, including the total number of readers (ages 12 and older), the percentage of readers in various demographic subgroups (youth [ages 12–20], young adults [ages 21–34], and males), and the median household income of magazine readers; (b) the cost per thousand of advertising in the magazine (the cost of reaching 1000 readers with a full-page, four-color advertisement); (c) the log of the annual number of magazine issues; and (d) the year.

Because only the outcome of the advertising decision is observed, the empirical specification employs a binary choice model of advertising behavior where the dependent variable is one if a given alcoholic beverage type is advertised in a particular magazine and zero if it is not. We use a random effects probit model to examine the relationship between the presence or absence of alcohol advertising in a magazine and the magazine's readership characteristics. Specifically, we analyze whether, controlling for other factors that might affect the probability of advertising, youth alcoholic beverage types are more likely than nonyouth alcoholic beverage types to advertise in magazines with a high percentage of youth readers.

Classification of youth and nonyouth alcoholic beverage types

Because there are no publicly available data on the prevalence of use of various types of alcoholic beverages (e.g., vodka, rum, premium beer, imported beer, etc.) among underage (<21 years old) youths, we purchased data on youth alcohol consumption from Mediamark Research and Intelligence (MRI, New York, 2008). MRI classifies alcoholic beverages into 18 major types (see Table 1). We obtained 2006 data on the prevalence of use of each of these 18 types of alcoholic beverages during the past 6 months among underage youths ages 18 to 20 (no alcohol consumption data are available for youths younger than 18).

The data on alcohol use among 18- to 20-year-olds is part of a large MRI survey, entitled the *Survey of the American Consumer*. This survey collects information on consumers' (age 18 and above) consumption in 550 categories of consumer products. Product usage is ascertained via in-home, face-to-face interviews with 26,000 consumers annually. For each alcoholic beverage type, respondents are asked how often they have consumed that particular beverage in the past 6 months.

Alcoholic beverage types were classified as youth or nonyouth based on tertiles of 6-month prevalence of use among underage youths (Table 1). The top tertile (six alcoholic beverage types) were classified as youth types. The bottom tertile (six alcoholic beverage types) were classified as nonyouth types. The middle tertile (six alcoholic beverage types) were classified as indeterminate types.

Table 1
Classification of alcoholic beverage types according to 6 month prevalence of use among underage youths

Alcoholic beverage type ^a	Six-month prevalence of use among 18- to 20-year-olds ^b (%)	Classification ^c
Premium beer	24.4	Youth
Low calorie beer	21.3	Youth
Imported beer	18.6	Youth
Vodka	18.3	Youth
Rum	16.7	Youth
Flavored alcoholic beverages	15.7	Youth
Tequila	12.5	Indeterminate
Liqueur	12.2	Indeterminate
Wine	10.6	Indeterminate
Bourbon	9.6	Indeterminate
Popular beer	9.5	Indeterminate
Super premium beer	8.3	Indeterminate
Gin	7.4	Nonyouth
Cognac	7.0	Nonyouth
Malt liquor	6.9	Nonyouth
Brandy	4.3	Nonyouth
Whiskey	3.7	Nonyouth
Scotch	3.6	Nonyouth

^a Alcoholic beverage types are derived according to the system used by Mediamark Research and Intelligence (MRI) to classify alcohol brands. Examples of brands within the beer types are: premium beer (Budweiser, Miller High Life, Miller Genuine Draft); low-calorie beer (Bud Light, Coors Light, Miller Lite); imported beer (Bass Ale, Becks, Heineken); popular beer (Busch); and super premium beer (Amstel Light, Killarney's Red Lager, Samuel Adams, Tequila).

^b Proportion of 18- to 20-year-olds who reported having consumed the alcoholic beverage type during the past 6 months, 2006. Data licensed from Mediamark Research and Intelligence, New York, NY, 2008.

^c Alcoholic beverage types were classified as youth or nonyouth based on tertiles of 6-month prevalence of use among underage youths. The top tertile (six alcoholic beverage types) were classified as youth types. The bottom tertile (six alcoholic beverage types) were classified as nonyouth types. The middle tertile (six alcoholic beverage types) were classified as indeterminate types.

Regression specification

For each alcoholic beverage type, we determined whether that type was advertised in each of the 118 magazines in our sample in each of the 5 years. We created a record for each of these alcoholic beverage type-magazine pairs for each year. Because there are 18 alcoholic beverage types, 118 magazines, and 5 years, the data set comprises 10,620 records. For analyses comparing youth and nonyouth alcoholic beverage types, 7,080 of these records were used (the remaining 3,540 records corresponded to indeterminate types). For each record, the dependent variable is 1 if the alcoholic beverage type was advertised in that magazine in that year and 0 if it was not.

To assess possible differences in the advertising behavior of youth and nonyouth alcoholic beverage types, we constructed an indicator variable, δ , that is 0 for nonyouth types and 1 for youth types and created an additional series of regressors by multiplying each explanatory variable by δ . These interaction variables allow us to estimate separate regression coefficients for youth and nonyouth types. For example, the interaction variable for youth readership is defined as $\delta \times (\% \text{ youth}$

readers). A regression coefficient of zero for this youth readership interaction variable would indicate that youth and nonyouth types are equally likely to be advertised in magazines, regardless of the level of youth readership. A positive coefficient would indicate that youth types are more likely than nonyouth types to be advertised in magazines as youth readership increases, whereas a negative coefficient would indicate that youth types are less likely than nonyouth types to be advertised in magazines as youth readership increases.

In our complete random effects probit model, the probability, P , that a given alcohol type is advertised in a particular magazine is $P = \Phi(y^*)$, where Φ is the cumulative distribution function for the standard normal and

$$y^* = A + A_i\delta + (B + B_i\delta) \times (\% \text{ Youth readers}) + (C + C_i\delta) \times (\% \text{ Young adult readers}) + (D + D_i\delta) \times (\% \text{ Male readers}) + (E + E_i\delta) \times (\text{Median income of magazine readers}) + (F + F_i\delta) \times (\text{Log of number of annual issues of magazine}) + (G + G_i\delta) \times (\text{Total number of magazine readers}) + (H + H_i\delta) \times (\text{Total readers squared}) + (I + I_i\delta) \times (\text{Advertising cost per thousand}) + (J + J_i\delta) \times (\text{Advertising cost per thousand squared}) + (K + K_i\delta) \times (\text{Indicator variable for 2003}) + (L + L_i\delta) \times (\text{Indicator variable for 2004}) + (M + M_i\delta) \times (\text{Indicator variable for 2005}) + (N + N_i\delta) \times (\text{Indicator variable for 2006}) + \text{error}.$$

Here, $\delta = 1$ for youth types and $\delta = 0$ for nonyouth types.

Because our observations are clustered within magazines (we have five observations per magazine) and because magazine quality (an unmeasured variable) may have an effect on advertising, we employed a multilevel or mixed effects model [29–31]. Specifically, we ran a random-effects probit model [32–34]. The advantages of this approach to modeling clustered binary outcome data have been discussed [32–36].

Analyses were conducted using STATA 10.0 (StataCorp LP, College Station, TX, 2007).

Magazine sample selection

To avoid potential bias in magazine selection, we included all magazines with complete (youth, young adult, and total) audience data for the period 2002 to 2006 in which alcoholic beverages were advertised at least once (excluded were magazines that do not accept alcohol advertising and for which alcohol advertising only appears in “demographic editions” read by a subset of the total audience). This resulted in a sample of 118 magazines, out of the 223 national magazines for which MRI reported audience data in any of the 5 years.

Data sources

Magazine advertising data. The presence or absence of alcohol advertising for each of the 18 alcohol types was obtained from data provided by TNS Media Intelligence (New York, 2008), an advertising industry standard for advertising occurrences and expenditures that monitors more than 300 periodicals. From all advertising occurrences, we selected only those that appeared in national editions of publications.

Magazine audience data. Magazine readership information was obtained from MRI (2008), which publishes its data twice per year (for adults 18 years and older) and annually (for teens). We drew audience estimates from the MRI spring adult studies, semiannual surveys of a national probability sample of approximately 13,000 respondents 18 years and older per wave, using face-to-face interviews supplemented by a self-administered questionnaire. Additional youth audience estimates came from MRI's Teenmark surveys of approximately 2,300 teens (ages 12–17) per year, using a mailed questionnaire. These are the advertising industry standard surveys for measuring magazine audiences.

Median household income was adjusted to 2006 dollars using the Consumer Price Index (CPI-U).

Cost of advertising. The cost of a full-page, four-color advertisement in each magazine for each year was obtained from SRDS Consumer Magazine Advertising Source (Des Plaines, IL). Advertising costs were adjusted to 2006 dollars using the Producer Price Index (PPI).

Results

There were a total of 13,513 alcohol advertisements in the 118 sample magazines during the 5-year study period (Table 2). Whereas 23.1% of advertisements for nonyouth alcoholic beverage types appeared in magazines with high (20%–30%) or very high (30%–40%) youth readership, 42.9% of advertisements for youth alcoholic beverage types were placed in these magazines.

In probit regression analyses stratified by alcoholic beverage type (youth versus nonyouth), there was no significant relationship between youth readership and advertisement placement for nonyouth types (Table 2). In contrast, youth types were significantly more likely to advertise in

magazines as youth readership increased. There was also a positive relationship between advertising placement and young adult readership for youth types, but not nonyouth types. This indicates that advertising for nonyouth types was unrelated to either youth or young adult readership, whereas youth types were more likely to advertise as either youth readership or young adult readership increased.

In our final probit regression model (that included both youth and nonyouth alcohol types), the regression coefficient for percentage youth readers was not significantly different from zero, indicating that the likelihood of nonyouth alcoholic beverage types being advertised in a magazine was not related to youth readership (Table 3). The coefficient for the youth readership interaction term was positive and statistically significant, indicating that the relationship between advertising placement and youth readership differed for youth and nonyouth types. Youth alcoholic beverage types were significantly more likely to be advertised in magazines as youth readership increased, even after controlling for young adult readership.

The probability of a nonyouth alcoholic beverage type being advertised in a magazine was relatively stable (4.7%–9.6%) over the entire range of youth readership in our sample (Figure 1). The probability of a youth alcoholic beverage type being advertised in a magazine increased from 7.1% to 44.2% over the range of youth readership.

Using the data from Table 1, we then calculated how much more likely youth alcoholic beverage types were to advertise in a magazine at a given level of youth readership than adult alcoholic beverage types (Figure 2). We calculated this ratio of advertising probabilities for the entire range of youth readership in our sample. The ratio of the probability of a youth alcoholic beverage type being advertised in a magazine to that of a nonyouth alcoholic beverage type being advertised in that magazine increased from 1.5 to 4.6 as youth

Table 2

Alcohol advertising patterns and random effects probit model coefficients for youth and young adult readership by alcoholic beverage type: youth, nonyouth, and indeterminate^a

	Nonyouth types	Indeterminate types	Youth types
Total advertisements 2002–2006 (N = 13,513)	2,837 (21.0%)	5,108 (37.8%)	5,568 (41.2%)
Total advertisements by youth readership of magazine ^b			
Low (0–10%)	1,537 (53.8%)	3,009 (58.9%)	1,955 (35.1%)
Medium (10%–20%)	642 (22.5%)	793 (15.5%)	1,222 (21.9%)
High (20%–30%)	542 (19.0%)	1,090 (21.3%)	1,851 (33.2%)
Very high (30%–40%)	116 (4.1%)	216 (4.2%)	540 (9.7%)
Average youth readership of magazines advertised in (%)	11.93	11.34	14.84
Probit coefficient ^c for percentage youth ^d readers (95% confidence interval)	0.06 (–0.14, 0.26)	0.08 (–0.09, 0.26)	0.34 (0.16, 0.51)
Probit coefficient ^c for percentage young adult ^d readers (95% confidence interval)	0.06 (–0.14, 0.27)	0.19 (0.03, 0.35)	0.26 (0.09, 0.43)

^a Alcoholic beverage types were classified as youth or nonyouth based on tertiles of 6-month prevalence of use among underage youths. The top tertile (six alcoholic beverage types) were classified as youth alcoholic beverage types. The bottom tertile (six alcoholic beverage types) were classified as nonyouth alcoholic beverage types. The middle tertile (six alcoholic beverage types) were classified as indeterminate types. See Table 1.

^b Youth readership levels of magazines (low, medium, high, and very high) are arbitrary categories used to compare the distribution of advertisements among magazines by youth readership among nonyouth, indeterminate, and youth alcoholic beverage types.

^c Probit coefficient from random effects probit model specified in paper, but without interaction terms (regression restricted to either youth or nonyouth alcoholic beverage types).

^d Percentage youth readers is the proportion of readers ages 12 to 20 to total readers (ages 12+) based on the average issue audience as reported by MRI. Percentage young adult readers is the proportion of readers ages 21 to 34 to total readers.

readership increased from 0% to 40%. Thus, in magazines with the highest levels of youth readership, youth alcoholic beverage types were more than four times more likely to be advertised than nonyouth types.

We conducted a series of sensitivity analyses to examine whether the method used to classify alcohol types as youth or nonyouth affected the results. Instead of omitting the middle tertile, we used all 18 categories and examined the results using three different cut points to separate youth and nonyouth types based on the percentage of underage youths who reported having consumed each alcoholic beverage type during the past 6 months: (a) at a 6-month prevalence of 15%; (b) at a 6-month prevalence of 12%; and (c) at a 6-month prevalence of 10%. In each case, the results were the same: youth types, but not nonyouth types, were significantly more likely to be advertised in magazines as youth readership increased.

Discussion

Using a large sample of magazines ($N = 118$) over a 5-year period, we found that even after controlling for young adult magazine readership, the percentage of a maga-

Table 3

Results from random effects probit regression model: the effect of magazine readership characteristics on the probability of an alcoholic beverage type being advertised in a magazine

Independent variable ^a	Coefficient (95% confidence interval)
% Youth readers	0.093 (−0.070, 0.255)
δ^* (% Youth readers)	0.238** (0.097, 0.379)
% Young adult readers	0.008 (−0.155, 0.171)
δ^* (% Young adult readers)	0.264** (0.131, 0.396)
% Male readers	0.144** (0.085, 0.203)
δ^* (% Male readers)	−0.098** (−0.135, −0.061)
Total readership	0.116** (0.028, 0.203)
δ^* (Total readership)	−0.018 (−0.089, 0.054)
Total readership squared	−0.005** (−0.008, −0.002)
δ^* (Total readership squared)	0.003** (0.000, 0.006)
Ad cost per thousand readers	0.017 (−0.024, 0.059)
δ^* (Ad cost per thousand readers)	0.020 (−0.012, 0.053)
Ad cost per thousand readers squared	−0.0002 (−0.0008, 0.0003)
δ^* (Ad cost per thousand readers squared)	−0.0001 (−0.0007, 0.0003)
Median income of magazine readers	0.003 (−0.008, 0.014)
δ^* (Median income of magazine readers)	0.014** (0.006, 0.023)
Log of annual number of magazine issues	0.320** (0.040, 0.599)
δ^* (Log of annual number of magazine issues)	−0.161* (−0.325, 0.003)
Indicator variable for 2003	−0.190** (−0.377, −0.003)
δ^* (Indicator variable for 2003)	0.129 (−0.120, 0.379)
Indicator variable for 2004	−0.374** (−0.567, −0.181)
δ^* (Indicator variable for 2004)	0.330** (0.077, 0.583)
Indicator variable for 2005	−0.594** (−0.798, −0.390)
δ^* (Indicator variable for 2005)	0.566** (0.304, 0.828)
Indicator variable for 2006	−0.582** (−0.783, −0.381)
δ^* (Indicator variable for 2006)	0.256* (−0.011, 0.524)
Constant	−3.659** (−4.951, −2.367)
δ	−1.317** (−2.220, −0.414)

^a δ is 0 for nonyouth alcohol types and 1 for youth alcohol types.

* Coefficient is significant at the 90% level ($p < .10$).

** Coefficient is significant at the 95% level ($p < .05$).

zine's youth readers was an important predictor of which alcoholic beverages were advertised in a magazine. Youth readership was a significant factor in advertising placement for youth alcoholic beverage types, but not for nonyouth alcoholic beverage types.

Because we found a different pattern of advertising placement with respect to youth readership for youth and nonyouth alcoholic beverage types, we believe this is the strongest evidence to date that certain alcohol types—namely, those consumed by relatively large proportions of youths—are advertised disproportionately in magazines with higher youth readership, resulting in disproportionately high youth exposure to alcoholic beverage advertising.

This study provides evidence that not all alcoholic beverages are advertised similarly with respect to youth readership. Previous studies that examined this issue (including our own) are limited by the problem of lumping together types of alcohol that are and are not consumed frequently by underage youths. This would tend to obscure any underlying relationship between advertising and youth readership, because as we found here, many types of alcohol that are not consumed frequently by youths are not advertised in magazines with higher youth readership. Even these results may underestimate the true relationship between youth readership and advertising because we have used only a crude breakdown of alcoholic beverage types. A more sensitive analysis would examine specific brands of alcohol (e.g., Bud Light, Miller Genuine Draft, Mike's Hard Lemonade, Absolut Apeach, Bacardi Limon, etc.). This is an important direction for future research.

Although not the primary aim of this article, our results show that nonyouth, but not youth, alcoholic beverage types are more likely to be advertised in magazines with higher male readership. Because the nonyouth alcoholic beverage category is made up primarily of spirits, this result probably reflects the previously reported finding that exposure to spirits advertisements is higher among males than females, whereas exposure to flavored alcoholic beverages (which is one of the youth beverage types) advertising is higher among females than males [37].

There are four potential limitations to this study. First, our classification of youth versus nonyouth alcoholic beverage types is based on consumption data for 18- to 20-year-olds. Ideally, one would like to have data for 12- to 20-year-olds. Unfortunately, there are no national youth surveys that collect such information. For example, The Monitoring the Future study ascertains cigarette brands, but not alcohol types or brands. The Youth Risk Behavior Survey asks an alcohol beverage preference question, but it is limited to broad categories (i.e., liquor, beer, wine, wine cooler, malt beverage, and other), and in 2005, was only asked in four states [38]. The National Survey on Drug Use and Health does not ascertain alcohol type or brand preference. The National Survey of American Attitudes on Substance Abuse only ascertained broad categories of alcohol consumption (i.e., mixed liquor, liquor straight, wine, beer, and other) [39].

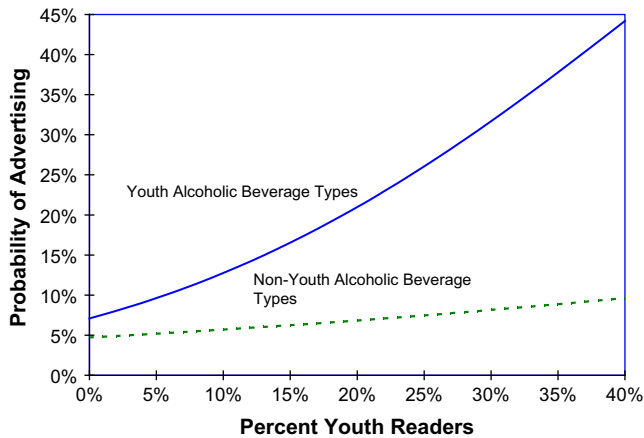


Figure 1. Probability of being advertised in magazines for youth versus non-youth alcoholic beverage types. Probability that an alcoholic beverage type is advertised in a magazine as a function of the magazine’s percentage of youth readers, holding other variables at their sample mean values.

In the absence of data on the actual alcoholic beverage preferences of the entire 12- to 20-year-old age group, one must rely on industry data and the data on beverage preferences among 18- to 20-year-olds to determine the types of drinks that are popular among a subset of underage youths. Moreover, because the MRI data are the data available to and used by the alcohol industry in determining advertising placements, these are relevant to use for the purposes of this analysis. In other words, although the actual preferences of all underage youths (ages 12–20) are unknown, this analysis explores whether there is a relationship between the existing data available to the industry on beverage preferences of those under age 21 and the placement of ads for those alcoholic beverages preferred by youths under age 21 based on these data.

It is also worth noting that the use of consumption data for 18- to 20-year-olds may actually be obscuring the true

differences between youth and nonyouth alcohol types, thus biasing our results toward the null hypothesis of no difference in advertisement placement between youth and nonyouth types. Our preliminary work highlights the need for a national survey that ascertains the alcohol type and brand preferences of the entire 12- to 20-year-old age group.

Second, youth and young adult readership are correlated in our data (pair-wise correlation $r = +.66$). One might argue that the observed effect of youth readership arises from an overlapping effect of young adult readership. We found, however, that the coefficients for both the youth and young adult readership interaction terms were statistically significant. If the effect were due solely to the presence of young adults in a magazine’s readership, we would not expect the youth readership interaction term to be significant. The level of correlation between youth and young adult readership was low enough that with the large sample size, we were able to differentiate the effects of these two variables, despite the colinearity. It is unlikely, therefore, that our findings are explained by the hypothesis that alcohol advertising is related only to young adult and not to youth readership. In our earlier study of cigarette advertising, we were similarly able to differentiate the effects of youth and young adult magazine readership, demonstrating that there was a significant relationship between youth readership and the presence of cigarette advertising in magazines, despite correlation between youth and young adult readerships [40].

Third, there are inherent limitations in the surveys used by MRI to derive audience composition. Although the MRI methodology may underreport relative readership of persons under age 18, these are the data most commonly used by advertisers to make marketing decisions [26] and used by the industry to monitor compliance with their own code provisions [18].

Fourth, because intent is a state of mind, one cannot directly prove an intent to target youths from an analytic

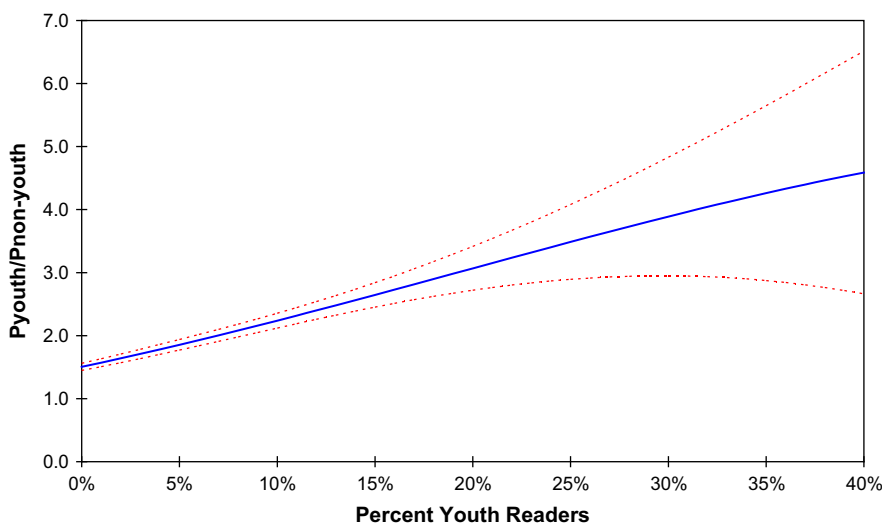


Figure 2. Ratio of probability of being advertised in magazines: youth/nonyouth alcoholic beverage types. Ratio of probabilities that a youth versus nonyouth alcoholic beverage type is advertised in a magazine as a function of youth readership, holding other variables at their sample mean values. Dashed lines represent 95% confidence interval.

study such as this one, even though the data demonstrate a relationship between advertising and youth readership for youth alcohol types. Regardless of intent, our findings show that youths are disproportionately exposed to advertising by precisely those types of alcoholic beverages that they drink most heavily.

Our findings provide new evidence that alcoholic beverages popular among youths are more likely to be advertised in magazines with high youth readership than those less popular among youths. This suggests that, contrary to the findings of the Federal Trade Commission [4], current alcohol industry self-regulation may be insufficient to protect youths from disproportionate exposure to advertising for the alcoholic beverages they are most likely to consume.

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