Alcohol Advertising in Magazines and Underage Readership: Are Underage Youth Disproportionately Exposed?

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Abstract

Background—The question of whether underage youth are disproportionately exposed to alcohol advertising lies at the heart of the public health debate about whether restrictions on alcohol advertising are warranted. The aim of this study was to determine whether alcohol brands popular among underage (ages 12 – 20 years) drinkers ("underage brands") are more likely than others ("other brands") to advertise in magazines with high underage readerships.

Methods—We analyze the advertising of 680 alcohol brands in 49 magazines between 2006 and 2011. Using a random effects probit model, we examine the relationship between a magazine's underage readership and the probability of an underage or other brand advertising in a magazine, controlling for young adult (ages 21–29 years) and total readerships, advertising costs and expenditures, and readership demographics.

Results—We find that underage brands are more likely than other brands to advertise in magazines with a higher percentage of underage readers. Holding all other variables constant at their sample means, the probability of an "other" brand advertising in a magazine remains essentially constant over the range of underage readership from 0.010 (95% CI, 0.007–0.013) at 5 percent to 0.012 (95% CI, 0.008–0.016) at 35 percent. In contrast, the probability of an underage brand advertising nearly quadruples, ranging from 0.025 (95% CI, 0.015–0.035) to 0.096 (95% CI, 0.057–0.135), where underage brands are 7.90 (95% CI, 3.89–11.90) times more likely than other brands to advertise.

Conclusions—Alcohol brands popular among underage drinkers are more likely than other brands to advertise in magazines with high underage readerships, resulting in the disproportionate exposure of underage youth. Current voluntary advertising industry guidelines are not adequate to protect underage youth from high and disproportionate exposure to alcohol advertising in magazines. To limit advertising exposure among underage youth, policy makers may want to consider regulation of alcohol advertising in magazines.

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CONFLICTS OF INTEREST

The authors declare they have no competing interests.

INTRODUCTION

Alcohol use among underage (under 21 years old) youth remains an important public health problem (Department of Health and Human Services, 2016). Although youth alcohol use has declined in the past decade, the prevalence of current (past 30 days) drinking among high school seniors in 2016 was 33.2 percent, and the prevalence of binge drinking (five or more drinks in a row) in the past two weeks was 15.5 percent (Monitoring the Future Survey, 2016). The alcohol beverage industry denies that it promotes to underage youth (Distilled Spirits Council of the United States, 2011; Beer Institute, 2017; Wine Institute, 2017), but underage alcohol use remains a persistent problem, giving rise to concerns about underage exposure to alcohol marketing. The alcohol beverage industry spent at least $3.45 billion in marketing expenditures in 2011 (Federal Trade Commission, 2014). Since multiple longitudinal studies show that exposure to alcohol advertising is associated with underage drinking behavior (Anderson *et al.*, 2009; Smith and Foxcroft, 2009; Gordon *et al.*, 2010; deBruijn *et al.*, 2012; Grenard *et al.*, 2013; Tanski *et al.*, 2015; deBruijn *et al.*, 2016; Morgenstern *et al.*, 2014; Jernigan *et al.*, 2017), the question of whether underage youth are disproportionately exposed to alcohol advertising lies at the heart of the public health debate about whether restrictions on alcohol advertising are warranted.

Most previous research on this question examines the relationship between alcohol advertising placement in magazines and the underage audience of those magazines (Garfield *et al.*, 2003; Nelson, 2006, 2008; Nelson and Young, 2008; Siegel *et al.*, 2008; Ross *et al.*, 2014). Although three published studies find a significant positive relationship between alcohol advertising and underage readership (Garfield *et al.*, 2003; Siegel *et al.*, 2008; Ross *et al.*, 2014), three other studies do not (Nelson, 2006, 2008; Nelson and Young, 2008). All these studies share the limitation that they examine the relationship between aggregate advertising for all alcohol products and underage magazine readership but do not disaggregate advertising by specific brand. The most disaggregated level of analysis in these studies is broad alcohol type (*i.e.*, beer, wine, and spirits). But alcohol brand preferences among underage drinkers are highly concentrated among a few brands (Siegel *et al.*, 2013). Since underage drinkers do not consume the vast majority of advertised brands, an analysis that lumps all brands together likely dilutes the true effect of the underage magazine audience on advertising patterns for the small number of brands that the underage prefer, thus making it difficult to detect such a relationship. This may explain the inconsistent findings of previous studies.

In a previous article, we show that analyzing alcohol advertising by specific alcohol type (*i.e.*, rum, vodka, tequila, scotch, whiskey, premium beer, super premium beer, and wine) reveals a strong relationship between alcohol advertising and underage magazine readership for those specific alcohol types popular among underage drinkers but not for those that are unpopular (King *et al.*, 2009). Our research shows that even within a specific alcohol type

(*e.g.*, vodka), underage brand preferences are highly concentrated as underage drinkers do not consume the majority of the brands on the market (Siegel *et al.*, 2013). Consequently, the dilution effect may still persist in analyses of alcohol type that do not further disaggregate to specific alcohol brands.

In this paper, we disaggregate alcohol advertising to the brand level and examine the relationship between the placement of alcohol advertisements in magazines and the underage readership of those magazines separately for alcohol brands popular among underage drinkers and brands that are not. As in previous studies, we control for factors that may also influence a brand's decision to advertise in a specific magazine, including the magazine's young adult, female, and total readerships; advertising cost and expenditures; and readership demographics.

Although youth advertising exposure in digital media is increasing, magazines remain an important medium for alcohol advertising. Total alcohol advertising expenditures in magazines in 2011 were at least $83.5 million (Federal Trade Commission, 2014). While overall ad spending in magazines has declined, some alcohol companies rely heavily on magazine advertising to increase the reach of their advertising relative to cable television, which has smaller audiences. The FTC reported that in 2011, one alcohol company spent 19% of its advertising budget in magazines (Federal Trade Commission, 2014).

Magazines are an important media source of alcohol ad exposure for which brand-specific youth exposure data are available, unlike digital media where data regarding youth exposure to advertising is not commercially available. There are three additional reasons why magazines are the best media to test whether alcohol companies disproportionately place ads where youth will see them: (1) Magazines represent a large portion of advertising spending and therefore a significant allocation of promotional resources (Federal Trade Commission, 2014); (2) Magazine audiences are relatively stable and measured once per year consequently a single audience number is used to estimate magazine exposure (GfK MRI, 2017), unlike television, for example, where the audience varies from telecast to telecast; and (3) Magazine audiences are more highly segmented into unique demographic groups than television audiences (Magazine Publishers of America, 2009). Not only are magazines one of the only media that can be used to determine whether youth are being disproportionately exposed to alcohol advertising, they are, for all these reasons, the medium best suited to study this research question.

MATERIALS AND METHODS

Study Design

Using a random effects probit model on panel data, we analyze whether, controlling for other factors that might affect an alcohol brand's magazine advertising, brands popular among underage drinkers are more likely than other brands to advertise in magazines with a high percentage of underage readers. We also explore the effect of different readership characteristics on the likelihood that an alcohol brand is advertised in a magazine.

Since only the outcome of the advertising decision is observed, the empirical specification uses a binary choice model of advertising behavior. The dependent variable is the presence or absence of advertising for a specific brand in a given magazine in a particular year. We use a random effects probit model to examine the relationship between a magazine's underage readership and the probability of an underage or other brand advertising in the magazine, controlling for its young adult (ages 21–29 years), female, and total readerships; advertising costs and expenditures; issues per year; and readers' medium income.

Selection of Magazines

To create a sample of magazines for analysis, we select all national magazines with complete data on underage (ages 12 – 20 years), young adult (ages 21 – 29 years), female, and total readership and on brand-specific alcohol advertising for the years 2006 to 2011. We exclude magazines that do not accept alcohol advertising. There were a total of 148 magazines in the initial database, of which 99 were missing complete readership and advertising data. Thus, the final sample consists of 49 magazines. A magazine is considered a national edition if the edition is sent to all subscribers nationally and distributed to all "newsstands" and other distribution outlets nationally. A national edition is in contrast with a "regional" edition which may only be sent to a certain metropolitan area or a "demographic edition" which is only sent to subscribers who meet certain demographic criteria.

Selection of Alcohol Brands

We select all alcohol brands for which complete data on magazine advertising are available from 2006 to 2011 and for which the brand preferences among underage drinkers are available based on the only published survey, which was conducted in 2011, the last year in our analysis (Siegel *et al.*, 2013).

Sources of Data

From Nielsen AdIntel, a standard advertising industry data source, we determine whether each alcohol brand was advertised in each of the 49 magazines in each year from 2006 to 2011 and each brand's total advertising expenditures among these magazines in each year (Nielsen, 2011–2012). These expenditure estimates are based on the number of pages of advertising and the price per page set by the magazine, not the actual cost of advertising negotiated with a publisher. We adjust total annual advertising expenditures to 2010 dollars using the Producer Price Index for advertising (Bureau of Labor Statistics, 2016). There were no alcohol brands with incomplete data on magazine advertising. If the ad appeared, it was captured by Nielsen and included in the study. We chose to analyze advertising placement on an annual basis rather than on a monthly basis because of the instability of advertising of a particular brand across months; annual patterns of advertising tend to be much more stable.

We use the Growth from Knowledge, Media Market Research & Intelligence (GfK MRI) Adult Survey (GfK MRI, 2006–2011a), another standard advertising data source, to extract data for each magazine in each year on the numbers of 18- to 20-year-old readers, young adult readers, female readers, and adult readers; the median household income of readers; the number of annual issues; and the price of a four page, full color advertisement.

Readership is determined by GfK MRI using the national Survey of the American Consumer. This is an in-person interview conducted in 55,000 households. Participants are shown magazine covers and asked if they have looked into the magazine in the past 6 months.

Since advertising prices are not available in all years for all magazines, we impute missing prices from the magazine's prices in other years for approximately 25 percent of the sample. From the GfK MRI TwelvePlus Survey (GfK MRI, 2006–2011b), we obtain the number of 12- to 17-year-old readers. We adjust the median household income and the cost of an advertisement to 2010 dollars using the Consumer Price Index and the Producer Price Index for advertising, respectively (Bureau of Labor Statistics, 2016).

Classification of Underage and Other Brands

Recent research by Siegel *et al.* identifies those alcohol brands most frequently consumed by underage drinkers (Siegel *et al.*, 2013). For convenience in reference, we denote the 24 alcohol brands in our sample consumed by 5 percent or more of underage drinkers as "underage brands": Absolut, Bacardi, Bacardi Malt, Bailey's Irish Cream, Blue Moon, Bud Light, Budweiser, Captain Morgan, Coors Light, Corona, Corona Light, Grey Goose, Heineken, Hennessy, Jack Daniel's, Jose Cuervo, Keystone Light, Malibu, Mike's, Miller Lite, Patron, Smirnoff, Smirnoff Malt, and UV. We refer to all other alcohol brands as "other brands". Although Four Loko was also consumed by more than 5 percent of underage drinkers in our sample, there were no advertisements for this brand in any of the magazines during the study period so it does not enter into the analysis.

The youth alcohol brand preferences were derived from an internet-based survey of a national sample of 1,031 underage youth, ages 13–20, who reported having consumed alcohol in the past 30 days (Siegel et al., 2013). The survey was administered using the GfK Knowledge Networks internet panel, which consists of approximately 50,000 adults and 3,000 youths who were selected using random-digit-dialing and address-based sampling (Knowledge Networks, 2012). The validity of the survey was established by comparing results for 18–20 year-olds with those obtained in the GfK MRI Survey of the Adult Consumer (Siegel et al., 2011).

Estimation of Advertising Probabilities

For each alcohol brand, we determine whether that brand was advertised in each of the 49 magazines in our sample in each of the six years. We create a record for each of these alcohol brand-magazine pairs for each year. Since there are 680 alcohol brands, 49 magazines, and six years, the potential sample comprises 199,920 records, but readership data are not measured in all magazines in all years. In comparing underage to other alcohol brands, we use only those magazines for which we have measured readership data in all six years of our sample, which yields 194,480 records. For each record, the dependent variable is 1 if the alcohol brand was advertised in that magazine in that year and 0 if it was not.

To assess possible differences in the advertising behavior of underage and other brands, we construct an indicator variable, δ, that is 1 for underage brands and 0 for other brands, and create an additional series of regressors by multiplying each explanatory variable by δ.

These interaction variables allow us to estimate separate regression coefficients for underage and other alcohol brands. For example, the interaction variable for underage readership is defined as δ*(% Underage Readers). A regression coefficient of zero for this underage readership interaction variable would indicate that underage and other brands are equally likely to be advertised in magazines, regardless of the level of underage readership. A positive coefficient would indicate that underage brands are more likely than other brands to be advertised in magazines as underage readership increases, whereas a negative coefficient would indicate that underage brands are less likely than other brands to be advertised in magazines as underage readership increases.

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

$$y* = (A + A_i\delta)\,(\%\ Underage\ Readers) + (B + B_i\delta)\,(\%\ Young\ Adult\ Readers)$$
$$+ (C + C_i\delta)\,(\%\ Female\ Readers) + (D + D_i\delta)\,(Total\ Readers) + (E + E_i\delta)\,(Household\ Income)$$
$$+ (F + F_i\delta)\,(Ad\ Price) + (G + G_i\delta)\,(Total\ Advertising\ Expenditures)$$
$$+ (H + H_i\delta)\,(Issues\ per\ Year) + I + I_i\delta + J*2007 + K*2008 + L*2009 + M*2010 + N*2011$$
$$+ Error$$

Here δ=1 for underage alcohol brands and δ=0 for other brands.

Since our observations are clustered within magazines (six observations per magazine) and since magazine quality (an unmeasured variable) may have an effect on advertising, we employ a multi-level or mixed effects model (Raudenbush and Bryk, 2002; Frees, 2004; Desai and Begg, 2008). Specifically, we run a random effects probit model (Conway, 1990; Guilkey and Murphy, 1993; Wooldridge, 2001). The advantages of this approach to modeling clustered binary outcome data have been discussed (Conway, 1990; Neuhaus, 1992; Guilkey and Murphy, 1993; Wooldridge, 2001). All analyses use the statistical software STATA 13.0 (StataCorp, 2007).

RESULTS

Descriptive Analysis

During the study period, there were a total of 6,626 alcohol advertisements, representing a total expenditure of $1.0 billion, in the 49 magazines (Table 1). The total number of ads per magazine ranged from one (*Allure*, *Essence*, and *Motorcyclist*) to 578 (*Rolling Stone*), and the total advertising expenditures ranged from $39,200 (*Motorcyclist*) to $139.4 million (*Sports Illustrated*). The 23 underage brands accounted for 37.9 percent of the advertisements (2,511) and 41.0 percent of the expenditures ($414 million). Underage brands placed 71.2 percent of their advertisements and spent 74.9 percent of their expenditures in magazines with greater than 15 percent underage readership, while other brands placed 59.5 percent of their advertisements and spent 63.3 percent of their expenditures in these magazines.

Probit Regression Analysis

Four magazine readership variables – underage readership, young adult readership, female readership, and median household income – have statistically significant effects on the probability that an alcohol brand is advertised in a given magazine (Table 2). Four other variables – price of an advertisement, total advertising expenditures of a brand among all magazines in the sample, and indicator variables for 2007 and 2008 – are also statistically significant (Table 2).

The coefficient for the underage readership interaction variable is positive and statistically significant indicating that the relationship between advertising and underage readership differs for underage and other brands. Underage brands are increasingly more likely than other brands to advertise in magazines as a percentage of underage readers increases (Fig. 1). The coefficient for the underage readership variable is smaller and not significantly different from zero indicating that although other brands may be more likely to advertise in magazines as the percentage of underage readers increases, any increase in the probability of advertising is smaller than for underage brands and not statistically significant.

Positive and significant coefficients for young adult readership and its interaction variable reveal that both underage and other brands are more likely to advertise in magazines with higher young adult readerships and that the increase in probability is greater for underage than other brands. Both underage and other brands are more likely to advertise in magazines with higher median household income readerships and less likely to advertise in magazines with higher female readerships with no difference between underage and other brands since the coefficient on median household income is positive and significant while that on female readership is negative and significant and the corresponding interaction terms are not statistically significant. Similarly, both underage and other brands are less likely to advertise in magazines with higher advertising prices with no significant differences between underage and other brands. Finally, both underage and other brands with larger budgets, as reflected in their total advertising expenditures, are more likely to advertise, although less so for underage brands.

Holding all other variables constant at their sample means, the probability of an other brand advertising in a magazine remains essentially constant over the range of underage readership from 0.010 (95% CI, 0.007 – 0.013) at an underage readership of 5 percent (the lowest in the sample is 2.6 percent) to 0.012 (95% CI, 0.008 – 0.016) at an underage readership of 35 percent (the highest in the sample is 35.1 percent) (Fig. 1). In contrast, the probability of an underage brand advertising in a magazine nearly quadruples from 0.025 (95% CI, 0.015 – 0.035) to 0.096 (95% CI, 0.057 – 0.135) over the same range.

The ratio of the probability of advertising for an underage brand compared to an other brand increases with increasing underage readership (Fig. 2). At an underage readership of 5 percent with all other variables at their mean values, the ratio of advertising probabilities is 2.56 (95% CI, 1.27 – 3.86). At an underage readership of 35 percent, the ratio jumps to 7.90 (95% CI, 3.89 – 11.90). Underage brands are 2.6 to 7.9 times more likely than other brands to advertise over the range of underage readership from 5 percent to 35 percent.

Sensitivity Analyses

To test whether the study findings are sensitive to the definition of a youth brand, we repeat the probit regression analyses using two alternate definitions: (1) youth brands defined as those consumed by 10 percent or more of underage drinkers; and (2) youth brands defined as those consumed by 2 percent or more of underage drinkers. In both cases, the coefficient for the underage readership interaction variable remains positive and statistically significant. The regression coefficient for the interaction variable is 2.01 (95% CI, 0.84–3.18) for a 5% cutoff, 2.58 (95% CI, 1.33–3.84) for a 10% cutoff, and 1.57 (95% CI, 0.28–2.85) for a 2% cutoff.

To test whether the study findings are sensitive to the inclusion of magazines with few alcohol advertisements, we restrict the analysis to magazines with no fewer than 10 alcohol advertisements over the six-year study period. In this analysis, the underage readership interaction term remains positive (2.70) and statistically significant (95% CI, 0.91–4.49).

DISCUSSION

To the best of our knowledge, this research is the first to examine the relationship between brand-specific alcohol advertising and underage readership among a large sample of the most widely read magazines during a six year period. This is also the first study, to our knowledge, of alcohol advertising in magazines that compares advertising patterns for brands consumed by underage drinkers with those consumed primarily by adults. We find that underage brands are more likely than other brands to advertise in magazines with a higher percentage of underage readers.

Although in previous studies young adult readership is a potential confounder of the observed relationship between advertising and underage readership, our analysis controls for the effects of young adult readership on the likelihood of an alcohol brand advertising in a magazine. Both underage and other brands are more likely to advertise in magazines as young adult readership increases, but even after controlling for this effect, underage brands are still significantly more likely than other brands to advertise in magazines with higher underage readerships.

These results suggest that one reason for inconsistency in the existing literature is the aggregation of all alcohol brands, most of which are not consumed to any substantial degree by underage drinkers and would not be expected to be disproportionately advertised towards that group. One important implication of our findings is that the alcohol beverage industry's self-regulatory advertising code, which precludes advertising in magazines with greater than 28.4 percent underage readership (Ross *et al.*, 2016), fails to protect underage youth from disproportionate exposure. This is not surprising because of the 66 magazines for which Nielsen continually monitored underage readership during the study period, only two had youth readership greater than 28.4 percent.

Our findings have some caveats. First, although it is unlikely that our findings are explained entirely by the hypothesis that alcohol brand advertising is related to young adult, rather than underage readership, some of the observed effect of underage readership may arise from an

overlapping effect of young adult readership. However, we our previous research has documented that there are major differences in alcohol brand preferences between underage drinkers and young adults, especially for flavored alcoholic beverages, light beer, and flavored spirits (Siegel et al., 2015).

Second, the study does not allow us to make inferences regarding the potential role of alcohol advertising in magazines on drinking behavior, including drinking initiation, among underage youth. Third, the results of the study do not necessarily imply that alcohol beverage companies are intentionally targeting underage readers in their magazine advertising, even though the data demonstrate a brand-specific relationship between advertising and underage readership.

CONCLUSIONS

Despite these qualifications, our findings provide new evidence that alcohol advertising in magazines is correlated with underage readership and that this relationship is different for underage and other alcohol brands. Underage youth are more heavily exposed to magazine alcohol advertising for brands that are popular among underage drinkers than for brands consumed almost exclusively by adults. This finding has important public health policy implications. Other studies show that youth exposure to alcohol marketing is associated with alcohol initiation and heavier consumption (Anderson *et al.*, 2009; Smith and Foxcroft, 2009; Gordon *et al.*, 2010; deBruijn *et al.*, 2012; Grenard *et al.*, 2013; Tanski *et al.*, 2015; deBruijn *et al.*, 2016; Morgenstern *et al.*, 2014; Jernigan *et al.*, 2017). By demonstrating that alcohol advertising in magazines is related to underage readership, the results of this study strengthen the justification for regulating alcohol advertising in magazines to reduce underage advertising exposure and underage drinking.

Acknowledgments

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Fig. 1.
Probability that an alcohol brand is advertised in a magazine as a function of the magazine's percentage of underage readers, holding all other variables fixed at their mean values in the sample: underage versus other alcohol brands (95% confidence intervals shown).

Fig. 2.
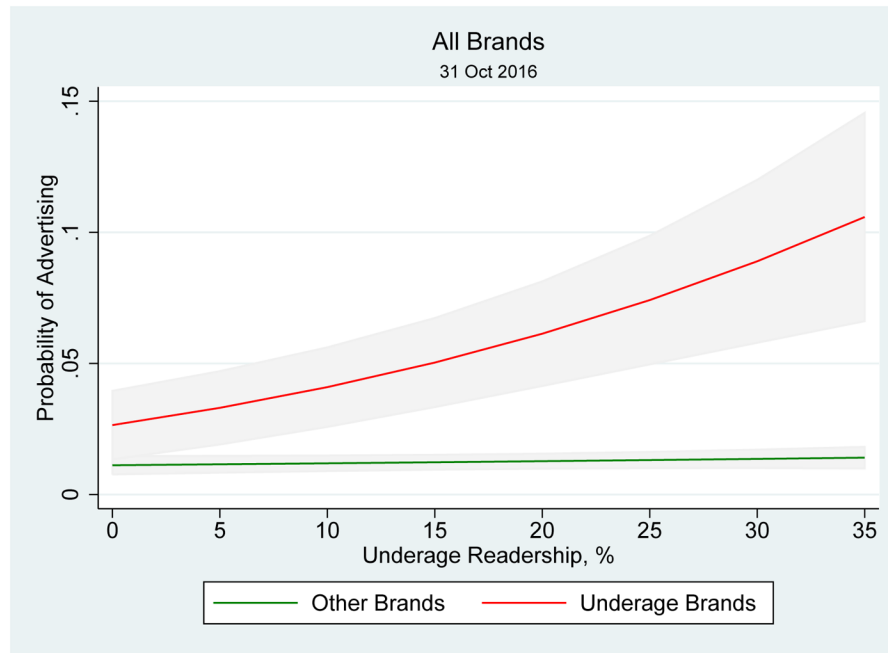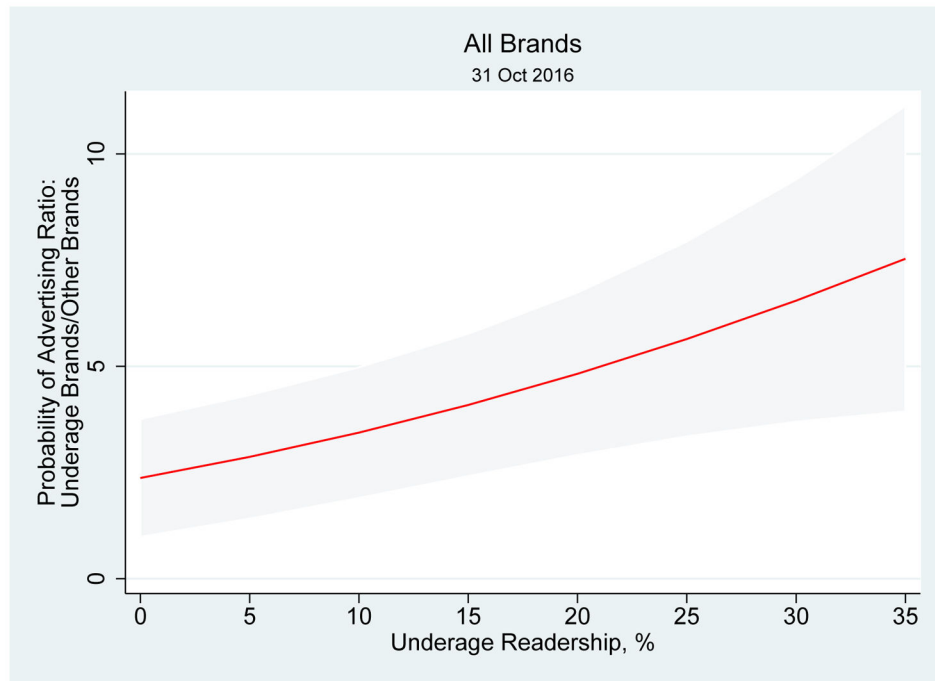Ratio of the probability that an underage alcohol brand is advertised in a magazine to the probability that an other brand is advertised in that magazine as a function of the magazine's percentage of underage readers, holding all other variables fixed at their mean values in the sample (95% confidence intervals shown).

Table 1

Readership Characteristics and Alcohol Advertising in 49 Magazines[a]

Magazine	Average (2006 – 2011)				Total (2006 – 2011)	
	Underage readers, millions	Young adult readers, millions	Percentage of youth readers	Percentage of young adult readers	Number Of ads	Total advertising, $ in millions
Allure	2.1	1.9	28.5	25.8	1	0.1
Automobile	0.9	0.7	20.3	16.2	3	0.2
Better Homes and Gardens	2.0	4.3	5.0	10.7	2	0.9
Brides	1.1	2.0	16.8	32.0	12	1.2
Car & Driver	1.8	2.4	15.8	21.2	25	4.2
Cosmopolitan	3.8	5.9	19.7	30.5	163	39.4
Details	0.2	0.4	15.7	27.6	231	14.9
ESPN The Magazine	4.5	4.1	26.9	24.6	415	80.1
Ebony	2.0	2.0	16.7	16.9	61	3.3
Elle	1.5	1.6	24.2	25.4	153	19.9
Entertainment Weekly	1.7	2.7	14.4	23.6	180	26.0
Esquire	0.3	0.5	10.4	16.0	471	52.8
Essence	1.4	1.6	15.8	18.1	54	4.2
Family Circle	0.9	1.5	4.5	7.2	1	0.3
First For Women	0.3	0.3	6.7	7.6	3	0.3
GQ	1.0	1.9	14.3	28.4	536	69.3
Glamour	2.7	3.4	20.2	25.3	40	6.7
Good Housekeeping	0.8	1.8	3.2	7.2	5	1.9
Harpers Bazaar	0.4	0.5	11.8	16.5	68	6.7
In Style	1.9	2.6	17.8	24.3	261	32.7
Jet	1.6	1.4	18.3	16.0	93	3.0
Marie Claire	0.7	1.0	18.0	24.7	139	15.5
Martha Stewart Living	0.6	1.4	4.9	12.2	37	5.4
Maxim	2.0	4.9	15.2	37.9	512	124.5
Mens Fitness	1.2	2.0	14.3	24.9	77	6.4
Mens Health	1.2	2.7	9.8	22.4	84	13.7

Magazine	Average (2006 – 2011)				Total (2006 – 2011)	
	Underage readers, millions	Young adult readers, millions	Percentage of youth readers	Percentage of young adult readers	Number Of ads	Total advertising, $ in millions
Mens Journal	0.3	0.7	8.7	18.3	404	38.6
Motor Trend	1.2	1.5	15.7	19.4	10	1.5
Motorcyclist	0.6	0.5	18.7	15.7	1	0.0
National Geographic	4.3	4.7	12.7	13.6	9	2.0
Newsweek	1.3	2.0	7.9	12.0	13	1.7
O, Oprah Magazine	1.3	1.9	8.2	11.8	18	2.6
People	7.0	8.5	14.8	18.0	106	25.3
Popular Mechanics	0.9	1.4	10.2	15.2	15	1.8
Reader's Digest	2.4	2.6	7.5	8.0	3	0.8
Real Simple	0.4	1.0	4.8	13.2	88	13.4
Redbook	0.5	0.9	5.1	10.4	15	2.3
Road & Track	0.8	0.9	13.2	15.7	4	0.5
Rolling Stone	3.2	3.7	23.6	27.3	578	89.8
Self	0.8	1.4	12.5	21.9	34	4.8
Shape	0.6	1.5	9.7	24.4	76	11.2
Spin	0.4	0.6	19.4	30.5	337	19.4
Sports Illustrated	4.7	4.2	20.5	18.1	438	139.4
Star	2.0	2.4	17.8	21.7	37	4.3
Time	2.2	2.8	10.6	13.3	24	7.5
Us Weekly	2.3	4.0	16.7	29.9	350	49.8
Vanity Fair	1.0	1.4	14.5	19.1	233	35.6
Vogue	2.9	2.8	23.2	22.1	123	18.4
W Magazine	0.3	0.4	16.5	23.1	83	7.1
Total					6626	1,011.7
Average per Magazine	1.6	2.2	14.3	19.7		

[a] Data are from Growth from Knowledge, Media Market Research & Intelligence TwelvePlus and Adult Surveys (GfK MRI, 2006–2011a,b).

Table 2

Results from Probit Regression Model: The Effect of Magazine Readership Characteristics on the Probability of an Alcohol Brand Advertising in a Magazine.

Variable[a]	Coefficient estimate (CI)	P value
Underage readers, %	0.47(−0.22 – 1.16)	0.180
δ * (Underage readers, %)	2.01(0.84 – 3.18)	0.001
Young adult readers, %	2.48(1.93 – 3.04)	P <0.001
δ * (Young adult readers, %)	3.09(1.33 – 4.84)	0.001
Female readers, %	−0.34(−0.49 - −0.19)	P <0.001
δ * (Female readers, %)	−0.42(−0.93 - 0.09)	0.110
Total readership	−1.91(−9.42 - 5.60)	0.618
δ * (Total readership)	−2.24(−1.97 - 1.52)	0.802
Household income	1.28(0.86 – 1.69)	P <0.001
δ * (Household income)	0.14(−0.88 – 1.16)	0.788
Ad price	−0.82(−1.52 - −0.12)	0.022
δ * (Ad price)	1.22(−0.20 – 2.64)	0.091
Total advertising expenditures	3.34(2.29 – 4.38)	P <0.001
δ * (Total advertising expenditures)	−2.40(−3.52 - −1.27)	P <0.001
Issues per year	0.00(0.00 – 0.01)	0.052
δ * (Issues per year)	0.01(0.00 – 0.01)	0.060
δ	−0.23(−1.32 - 0.86)	0.677
2007	0.09(0.02 – 0.16)	0.010
2008	0.13(0.04 – 0.22)	0.005
2009	0.02(−0.09 – 0.12)	0.764
2010	−0.03(−0.15 – 0.10)	0.689
2011	0.03(−0.09 – 0.14)	0.631
Constant	−3.97(−4.40 - −3.54)	P <0.001

[a]δ is 1 for underage brands and 0 for all other brands.