

Article

Alcohol brand use of youth-appealing advertising and consumption by youth and adults

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Significance for public health

Youth are overexposed to alcohol advertising. This contributes to youth having positive expectations of drinking, initiating drinking, and drinking more in quantity and frequency. The alcohol industry's self-regulatory guidelines stipulate that marketing content cannot be primarily attractive to youth versus adults. But we do not yet have a sound scientific tool to assess what would be primarily attractive to youth. This manuscript uses a new tool, the CAY index, and two large, nationally representative datasets of youth and adult drinking patterns and shows that alcohol brands' use of such content in their advertisements is not associated with adult brand consumption but is positively associated with youth brand consumption over and above the influence of adult brand preferences. This is critical evidence for supporting revised industry guidelines in order to protect youth from the effect of advertising on underage drinking.

Abstract

Background: Youth exposure to alcohol marketing has been shown to be an important contributor to the problem of underage drinking in the U.S. More work is needed on identifying and minimizing content with particular appeal to youth.

Design and Methods: We tested the association between the youth-appeal of marketing content of televised alcohol advertisements and the brand-specific alcohol consumption of both underage youth and adults. We used existing data from three sources: a brand-specific alcohol consumption survey among underage youth ($N=1032$), a brand-specific alcohol consumption survey among adults ($N\sim 13,000$), and an analysis of content appealing to youth (CAY) in a sample of televised alcohol advertisements ($n=96$) aired during the youth survey. The association between CAY scores for the 96 alcohol ads and youth (age 13-20) versus adult (age 21+) consumption of those ads' brands was tested through bivariate and multivariate models.

Results: Brand CAY scores were (a) positively associated with brand-specific youth consumption after controlling for adult brand consumption; (b) positively associated with a ratio of youth-to-adult brand-specific consumption; and (c) not associated with adult brand consumption.

Conclusions: Alcohol brands with youth-appealing advertising are consumed more often by youth than adults, indicating that these ads may be more persuasive to relatively younger audiences, and that youth are not simply mirroring adult consumption patterns in their choice of brands. Future research should consider the content of alcohol advertising when testing marketing effects on youth drinking, and surveillance efforts might focus on brands popular among youth.

Introduction

Youth use of alcohol in the U.S. is a serious public health problem. Though the rates have shown moderate declines nationally,¹ alcohol is still the most popular substance of abuse among U.S. youth. By age 15 more than 30% of youth have had at least 1 drink,² increasing the likelihood of their experiencing alcohol-related harms in their lifetime compared to those who initiate drinking at an older age.³ Heavy drinking during adolescence has negative effects on neuropsychological functioning and can result in abnormal brain development.⁴ Additionally, over 4,300 teens die annually from alcohol-related vehicle crashes, homicides, suicides, and injuries.⁵ Youth exposure to alcohol marketing may be an important contributor to this problem. Several longitudinal studies have found positive associations between youth exposure to alcohol advertisements and drinking initiation, frequency of drinking, and amount of alcohol consumed.⁶⁻⁸ Yet, the alcohol industry asserts that this mounting evidence is insufficient to demonstrate a direct link between advertising and underage drinking.⁹ Further, the effect of advertising on youth could result indirectly through its effects on adults whom youth then imitate. That is, adults are most responsible for underage drinking. Youth behaviors may be differentially influenced by the drinking patterns of young adults (age 21-34) versus older adults (age 35+). Teens are likely to have greater exposure to the drinking habits of older adults, including parents, but may instead strive to emulate the behavior of younger adults whom they see as more similar.

The interaction between alcohol advertisement exposure and advertisement content could be one of the missing factors in the equation. Media content is an influential force in shaping youths' perceptions and expectations. Youth exposure to alcohol advertising has been associated with expectancies that drinking will lead to happiness and social acceptance,^{10,11} promises that are often depicted in alcohol ads.¹² Youth who hold such positive expectations may be more likely to drink.^{8,13}

The industry's voluntary guidelines nominally prohibit content that *primarily* appeals to youth, yet the guidelines only weakly define such content.¹⁴ This leaves marketers unsure how to comply, as evidenced by the fact that alcohol ads have been found to use content features that appeal to youth.^{12,15} However, to our knowledge, work has not yet established whether such advertisements are primarily appealing to youth or equally appealing to adults.

To answer this question, we tested the differential association between youth and adult alcohol brand consumption and those brands' use of content appealing to youth. We used a dataset of alcohol advertisements ($n=96$) that were previously coded using

the Content Appealing to Youth (CAY) index.¹² The CAY index includes 38 unique features such as sound effects, animation, and associations with success that were compiled from a systematic review of the research literature on features appealing to youth, and then categorized into six major content areas: production value, character appeals, youth-oriented genre, product appeals, reward appeals, and risk-related content. Youth have been found to be particularly susceptible to advertising with these features due to their unique developmental stage, which comprises underdeveloped self-regulation, propensity for high-risk behaviors, and relative inexperience with drinking.¹⁶⁻¹⁸ Inter-coder reliability on the index was high (Cohen's kappa=0.76, agreement=89%), and substantial reliability (Cohen's kappa>0.60) was reached for all categories.¹⁹ The full index of features and how they are operationalized can be found in Padon *et al.*,¹² but the basic mechanisms have been summarized below.

Production value consists of stylistic features, such as illustration and sound effects, that may stimulate an orienting response to the advertisement, particularly among youth and young adults,²⁰⁻²² and may lead to more extensive message processing, higher recall, and more positive attitudes.^{20,23,24} Character appeal captures the use of attractive, famous or youthful-looking actors, who may trigger modeling,²⁵ as well as animals and anthropomorphized creatures which may promote positive emotional responses and greater ad liking among youth.²⁶⁻²⁸

Youth-oriented genre captures the use of magic or fantasy, which are associated by younger teens with kid-focused entertainment,²⁹ and humor, which is rated highly by all teens.^{26-28,30}

The use of product appeals, such as a focus on taste, cost and quality, have been found to lead to less purchase intent and less ad liking by youth.^{26,28} One study found youth simply did not believe taste and quality arguments for alcohol.³⁰

Reward appeals promise positive life outcomes from product use, and youth, who have less experience with alcohol in real life, and who experience greater negative affect, self-doubt and anxiety than children and adults,¹⁷ rate these appeals favorably.^{26,27,29}

Finally, risk-related content includes depictions of activities which can be risky when combined with alcohol (*i.e.* swimming or skiing), as well as consuming alcohol inappropriately, such as binge drinking (*i.e.* one person with a bottle of liquor). Watching such risky behaviours can decrease cognitive control and response inhibition among youth.³¹

The question remains, however, whether these features appeal primarily to underage youth or if they appeal more broadly. Thus, we addressed the following research questions:

- RQ1: *Are brand CAY score and youth brand consumption associated?*
- RQ2: *Are brand CAY score and adult brand consumption associated?*
- RQ3: *Are brand CAY score and the ratio of youth-to-adult brand consumption rates associated?*

Materials and Methods

Data for this study come from three primary sources: i) a national survey of brand-specific alcohol consumption among youth, ii) a national survey of brand-specific alcohol consumption among adults, and iii) a dataset of alcohol advertisements coded using the CAY index that were televised during programs highly popular with youth. All data used in this study was received de-identified; its use in this research project was approved by the Institutional Review Board of the Johns Hopkins School of Public Health. The study was carried out in 2013.

Sample and study design

ABRAND survey

Data on youth brand consumption came from the Alcohol Brand Research Among Underage Drinkers (ABRAND) survey administered December 2011 to May 2012 to 1,032 underage youth, ages 13-20, who had consumed at least one drink of alcohol in the past 30 days. The survey was administered online using a pre-recruited Internet panel maintained by GfK (Palo Alto, CA). GfK applied post-stratification statistical weights to account for the different selection probabilities associated with the random digit dialling and addressed-based sampling, the oversampling of minority communities, non-response to panel recruitment, and panel attrition. The overall response rate was 44%. Respondents were asked to report past 30-day consumption of 898 different brands of alcohol, allowing brands to be ranked according to the prevalence of consumption among youth. The 25 brands with highest prevalence of underage consumption, approximately 2.8% of the alcohol brands surveyed, made up almost 50% of youth market share. More details of the survey methods can be found elsewhere.³²

GfK MRI survey

Data on adult alcohol brand consumption came from another GfK survey, the MRI Survey of the American Consumer (New York, NY). This is a self-administered survey conducted in seven-month waves and administered to approximately 13,000 randomly selected U.S. adults, ages 18+, to assess their use of consumer products. The 2010-2012 data on prevalence of consumption of specific alcohol brands among the adult (age 21+) panel members who reported drinking alcohol in the past 6 months was used in this project. That the sampling frame of the overall MRI survey was not limited to adult drinkers could theoretically result in a different drinker profile from ABRAND. Because youth drinkers are a smaller, and hard to reach population, restricting recruitment efforts to these youth was necessary to achieve sufficient power. However, considerable effort was made in the recruitment and consent process to reduce the perceived stigma of reporting drinking behaviours to limit selection bias among respondents. Further, the MRI survey is of multiple consumer products, thus limiting selection bias and reducing the disparity between the samples.

Advertisement content

Data on the presence of CAY features in televised alcohol ads came from a previous content analysis by Padon *et al.*¹² in which the CAY index was used to code a sample of televised alcohol ads ($n=96$). The researchers collected the 191 alcohol ads that were aired nationally on the 20 most popular 2011 TV shows for youth (ages 12-20) to account for the likelihood of youth exposure. The ads were then stratified by their brand into high and low popularity according to the ABRAND survey: *high popularity* ads were from the 25 brands with highest prevalence of underage consumption, and the remaining brand ads were categorized as *low popularity*. A randomly selected 50% sample within the high popularity brand ads and low popularity brand ads resulted in the final sample of 96 ads, which represented 41 brands. Three brands (Pinnacle Vodka, Avion Tequila, and Daily's cocktails) were not included in the GfK MRI survey and thus were removed, making the final sample 90 advertisements and 38 brands. These ads were then coded using the CAY index, where each was given a score of 1 for each youth appealing feature from the CAY index that they contained. The scores for each

ad were then summed, and total ad scores were averaged by brand for a total sample size of 38 brands.¹²

Measures

Brand consumption prevalence

Outcome measures were the prevalence of youth (age 13-20) and adults (age 21+) who reported consuming each of the 38 alcohol brands scored for use of CAY. *Youth brand consumption*, the main dependent measure, was a continuous variable defined as the weighted proportion of all ABRAND respondents ($N=1032$) who reported drinking any of the 38 alcohol brands in the past 30 days, regardless of quantity.

The GfK MRI adult population ($N \sim 13,000$) was divided into *young adults* (ages 21-34) and *older adults* (ages 35+). These measures were continuous, defined as the weighted proportion of each subgroup who reported drinking any of the 38 brands coded for CAY, in the past 30 days (for flavoured alcoholic beverages and liquors) or 7 days (for beer and wine).

Ratios for *youth-to-young adult brand consumption* and *youth-to-older adult brand consumption* were calculated by dividing the youth brand consumption prevalence rates by the young adult and older adult brand consumption prevalence rates, respectively, for each brand. Scores greater than 1 indicate a higher brand consumption prevalence among youth relative to adults.

Predictors and covariates

Our primary predictor was *brand CAY score*, which is the average CAY score across the advertisements aired by each brand. As each instance of a youth appealing feature in an ad was summed and averaged by brand, a higher brand CAY score indicates the presence of more youth appealing features in the brands' ads.

The analyses controlled for alcohol type to minimize the effect of the differing measurement timeframes in the GfK MRI survey. *Type of alcohol* was recorded as a dichotomous variable of beer and wine brands versus liquor and flavoured alcoholic beverage brands (e.g., Mike's Hard Lemonade). As an alcohol industry defence against stricter marketing regulation is that the modelling of drinking behaviour by adults matters most,⁹ to test for an association between marketing content and youth brand consumption over and above the modelling influence that adults may have, we adjusted for *young (age 21-34)* and *older adult (age 35+)* brand consumption prevalence from GfK MRI in the models predicting youth brand consumption.

Analysis

Descriptive statistics and multivariate linear regressions were conducted using Stata version 13. The brand consumption prevalence variables were positively skewed. Standardized normal probability and quantile plots for the distribution of residuals confirmed that a square-root transformation of the variables would best approximate a normal distribution of residuals. The analyses used these square-root transformed variables as the outcomes.

Results

Descriptive Statistics

Table 1 reports descriptive statistics of predictors and outcomes.

Multivariate linear regression models

Linear regression modelling, in which predictors were added in successive steps, was used to assess the association between brand CAY score and brand consumption prevalence (Table 2). All analyses are at the brand level, and all beta coefficients are standardized.

Bivariate linear regression showed a positive association between brand CAY score and youth brand consumption ($\beta=0.31$; $SE=0.04$; $P<0.01$). Youth and young adult brand consumption were strongly correlated ($r=0.94$; $P<0.001$), as were youth and older adult brand consumption ($r=0.92$; $P<0.001$). Therefore, we examined the relationship between brand CAY score and both young adult and older adult brand consumption. However, the association between brand CAY score and young adult brand consumption was not significant in the baseline model, nor was the association between brand CAY score and older adult brand consumption. Brand CAY score was still not associated with young adult brand consumption ($\beta=0.19$; $SE=0.03$; $P=0.08$) after adjusting for alcohol type ($\beta=-0.19$; $SE=0.19$; $P=0.08$), and was still not associated with older adult brand consumption ($\beta=0.19$; $SE=0.02$; $P=0.08$) after adjusting for alcohol type ($\beta=-0.32$; $SE=0.14$; $P<0.01$) (Table 2).

In contrast, brand CAY score was positively associated with youth brand consumption ($\beta=0.19$; $SE=0.02$; $P<0.001$), after adjusting for both young adult brand consumption ($\beta=0.86$; $SE=0.01$; $P<0.001$) and alcohol type ($\beta=-0.07$; $SE=0.12$; $P=0.09$). In addition, brand CAY score was positively associated with youth brand consumption ($\beta=0.20$; $SE=0.02$; $P<0.001$) after adjusting for older adult brand consumption ($\beta=0.86$; $SE=0.03$; $P<0.001$) and alcohol type ($\beta=0.03$; $SE=0.13$; $P=0.54$). Note that, in both of these models, the variance inflation factor scores for the variables were all below 2, suggesting the absence of multi-collinearity. A likelihood-ratio test showed that adding the adult brand consumption variables to the second and third models significantly improved the fit compared to the first model with brand CAY score alone ($P<0.001$), but that adding alcohol type did not (Table 2).

In the final set of models, youth-to-young adult and youth-to-older adult brand consumption ratios were the outcomes, and brand CAY score and alcohol type were main effects. In the baseline models, brand CAY score was positively associated with both youth-to-young adult brand consumption ($\beta=0.45$; $SE=0.01$; $P<0.001$) and youth-to-older adult brand consumption ($\beta=0.42$; $SE=0.01$; $P<0.001$), indicating that brands with higher youth-appealing content were consumed more by youth than by young adults or older adults. Brand CAY score remained positively associated with youth-to-young adult brand consumption ($\beta=0.50$; $SE=0.01$; $P<0.001$), after adjusting for alcohol type ($\beta=-0.22$; $SE=0.07$; $P=0.02$), and remained positively associated with youth-to-older adult brand consumption ($\beta=0.45$; $SE=0.01$; $P<0.001$), after adjusting for alcohol type ($\beta=-0.12$; $SE=0.09$; $P=0.22$) (Table 2).

Discussion

This study is the first that we know of to examine the differential association between use of youth-appealing content in brand-specific advertising and the corresponding brand-specific consumption among youth and adults. We found that brand-specific CAY scores were i) positively associated with youth brand consumption, ii) not associated with adult brand consumption, and iii) positively associated with relative youth-to-adult brand consumption. These results support previous findings suggesting that specific alcohol marketing content features may influence youth

drinking.^{10,13,15} They also support findings that youth are not simply mirroring adults in their brand choices,³³ as even after taking into account brand consumption by adults, advertising content appears to explain a significant proportion of the variance in youth brand preferences.

Perhaps the finding with the broadest implications for industry marketing practice and regulatory policy was that brands with high CAY scores were more likely to be consumed by youth than by

adults. The content features that populated each ad's CAY score are ones that the alcohol industry's voluntary code does not currently prohibit on the grounds that they are equally appealing to adults. The fact that adult brand consumption is not associated with these features, whereas youth brand consumption is, suggests that the industry codes are deficient.

The possibility remains that some of the individual youth-appealing content features are equally or more persuasive to young

Table 1. Descriptive statistics of sample brands (n=41).

Number of ads by brand	CAY score, mean (SD)*	Adult consumption**	Youth consumption***	Youth:adult consumption****
Heineken Beer (2)	18.32 (3.81)	4.50	9.71	2.16
Jack Daniels Whiskey (2)	18.11 (0.71)	3.96	11.45	2.89
Smirnoff Vodkas (3)	16.44 (2.77)	3.00	12.72	4.24
Absolut Vodkas (2)	16.27 (7.37)	5.82	10.10	1.74
Dos Equis Beer (3)	15.26 (0.67)	1.60	3.84	2.40
Grand Marnier Cognac (5)	15.18 (3.04)	0.58	0.18	0.31
Svedka Vodka (1)	14.63	1.19	0.88	0.74
Hennessy Cognac (1)	14.54	2.25	5.65	2.51
Captain Morgan Rum (1)	14.34	4.64	10.39	2.24
Mike's Hard Lemonade (4)	14.21 (1.78)	5.16	10.77	2.09
Corona Extra Beer (1)	13.25	5.22	11.26	2.16
Bud Light Beer (6)	13.23 (2.68)	13.24	27.86	2.10
Russian Standard Vodka (2)	13.16 (1.53)	0.26	0.18	0.69
Miller Lite Beer (4)	13.04 (2.84)	4.67	7.45	1.60
Yellow Tail Wines (1)	13.01	2.97	2.30	0.77
Stella Artois Beer (4)	12.83 (3.55)	1.85	1.24	0.67
Newcastle Beer (1)	12.68	1.07	0.51	0.48
Bacardi Rums (1)	12.52	6.40	9.27	1.45
Maker's Mark Bourbon (3)	12.45 (0.78)	1.31	0.75	0.57
Avion Tequila (2)	12.05 (2.26)	NA	0.0	-
Ketel One Vodka (1)	11.99	1.38	0.26	0.19
Budweiser Beer (1)	11.95	10.34	14.64	1.42
Michelob Ultra Beer (4)	11.71 (4.15)	2.05	0.80	0.39
Johnnie Walker Whisky (2)	11.57 (0.88)	2.06	1.44	0.70
Coors Light Beer (3)	11.37 (2.11)	5.52	12.71	2.30
Pinnacle Vodkas (3)	11.05 (1.20)	NA	2.74	-
Disaronno Liqueur (1)	10.90	0.44	0.14	0.32
Baileys Irish Cream (2)	10.85 (0.93)	2.56	5.18	2.02
Blue Moon Beers (4)	10.00 (1.81)	4.33	8.16	1.88
Grey Goose Vodkas (4)	10.00 (1.63)	4.70	6.72	1.43
Coors Beer (1)	8.80	3.50	3.83	1.09
Patron Tequilas (4)	7.73 (1.78)	3.58	5.52	1.54
Kahlua Liqueurs (1)	7.37	2.10	2.46	1.17
Southern Comfort Liqueur (1)	7.24	0.41	0.36	0.88
Samuel Adams Beers (7)	7.09 (1.84)	4.59	3.14	0.68
Sauza Tequila (1)	6.84	0.72	0.33	0.46
Daily's Cocktails (1)	6.74	NA	1.29	-
Guinness Beer (2)	6.17 (1.89)	2.47	1.78	0.72
Korbel Champagne (2)	4.84 (0.72)	1.26	0.48	0.38
Budweiser Select Beer (1)	4.55	1.95	2.89	1.48
Cavit Wines (1)	3.01	0.34	0.0%	0.00

*Mean CAY index score for the televised advertisements for each brand (Padon *et al.*, 2016). **Weighted prevalence rates for past 7-day (beer, wine) or 30-day (flavored alcoholic beverages, spirits) alcohol consumption among all adults, ages 21+, from the GfK MRI Survey of the American Consumer, 2010-2012 (New York, NY). NA indicates the brands not included in the survey. ***Weighted prevalence rates for past 30-day alcohol consumption among youth, ages 13-20, from the ABRAND survey, 2011-2012 (Siegel *et al.*, 2013). ****Youth:Adult Consumption ratio is calculated as the youth (ages 13-20) prevalence rate divided by the adult (ages 21+) prevalence rate.

adults or older adults than to youth. The CAY index sums across multiple features, and in effect treats all features as equally appealing. Work that identifies the relative youth and adult appeal of individual features could generate specific industry-practice recommendations on key features that should be prohibited to minimize the appeal to youth. Despite the very high correlations between youth and adult consumption, the model does not suffer from problems from multi-collinearity. In both models containing youth brand consumption and one of the adult brand consumption variables, the variance inflation factor scores for the variables were all below 2, there was not a significant relationship between brand CAY scores and young or older adult brand consumption, and, finally, what multi-collinearity problem there might be, if any, is resolved in the model with the ratio of youth to adult consumption as the outcome variable. There are two possible explanations for the lack of an association between young adult brand consumption and youth-appealing advertising content. First, many of the vulner-

abilities that teenagers may have with regard to media effects – such as involuntary cognitive engagement, self-identity development, and so forth – may have been resolved by the time people are in their early to mid-20s.^{34,35} Major changes in frontal cortical control systems, as well as the relative maturity of reward processing systems, may make young adults less vulnerable to substance-related impulses as compared to youth.^{36,37} Among adolescents, the risk of alcohol use disorders is twice as high as young adults aged 22-26.³⁸ Second, many young adults' relationship with alcohol may change after they can legally purchase the product and establish their own brand preferences and drinking norms, thus making them less susceptible to advertisements attempting to create brand loyalty or define expectancies of alcohol use.^{18,39}

The underlying mechanisms we are proposing here are tentative, but the basic finding – the need to make distinctions between the relationships that adolescents have with alcohol and alcohol marketing compared to young adults – is crucial.

Table 2. Bivariate and multivariate analyses: predictors of consumption (n=38).

Predictors	r ^b	Beta ^c	Total R ²
	Youth Consumption ^a		
Young Adult Consumption^e			
Baseline Model			
Brand CAY Score ^d	0.32**	0.31**	9.5**
Block 2			
Brand CAY Score ^d	0.32**	0.19***	
Young Adult Consumption ^e	0.94***	0.86***	
Alcohol Type ^f	-0.21*	-0.07	85.3***
Block 3			
Brand CAY Score ^d	0.32**	0.20***	
Older Adult Consumption ^g	0.92***	0.86***	
Alcohol Type ^f	-0.21*	0.03	81.7***
Older Adult Consumption^g			
Baseline Model			
Brand CAY Score ^d	0.16	0.14	2.8
Block 2			
Brand CAY Score ^d	0.16	0.19	
Alcohol Type ^f	-0.15	-0.19	5.5
Youth:Young Adult Consumption Ratio^h			
Baseline Model			
Brand CAY Score ^d	0.12	0.11	1.2
Block 2			
Brand CAY Score ^d	0.12	0.19	
Alcohol Type ^f	-0.27**	-0.32**	10.6**
Older Adult Consumption^g			
Baseline Model			
Brand CAY Score ^d	0.44***	0.45***	20.1***
Block 2			
Brand CAY Score ^d	0.44***	0.50***	
Alcohol Type ^f	-0.08	-0.22*	24.7***
Youth:Young Adult Consumption Ratio^h			
Baseline Model			
Brand CAY Score ^d	0.45***	0.42***	17.5***
Block 2			
Brand CAY Score ^d	0.45***	0.45***	
Alcohol Type ^f	0.004	-0.12	19.0***

^aWeighted prevalence rates for past 30-day alcohol brand consumption among youth, ages 13-20, from the ABRAND survey, 2011-2012 (see Table 1). This dependent variable was square-root transformed. ^bZero-order Pearson or Spearman correlation between predictors and consumption measure. ^cStandardised betas from linear regression equations. ^dMean brand CAY index score for the televised advertisements for each brand (see Table 1). ^eWeighted prevalence rates for past 7-day (beer, wine) or 30-day (flavoured alcoholic beverages, spirits) alcohol consumption among young adults, ages 21-34, from the GfK MRI Survey of the American Consumer, 2010-2012. This dependent variable was square-root transformed. ^fCoded as 1 = beer or wine, and 2 = liquor or flavoured alcoholic beverages. ^gWeighted prevalence rates for past 7-day (beer, wine) or 30-day (flavored alcoholic beverages, spirits) alcohol consumption among older adults, ages 35+, from the GfK MRI Survey of the American Consumer, 2010-2012. This dependent variable was square-root transformed. ^hCalculated as the youth (ages 13-20) prevalence rate divided by the young adult (ages 21-24) prevalence rate. This dependent variable was square-root transformed. ⁱCalculated as the youth (ages 13-20) prevalence rate divided by the older adult (ages 35+) prevalence rate. This dependent variable was square root transformed. *P<0.05 **P<0.01 ***P<0.001.

Limitations

Despite its strengths, our study has a number of limitations. The GfK MRI survey population is a nationally representative, randomly selected sample, and although the ABRAND survey drew from a nationally representative online panel and applied post-stratification statistical weights, underage drinkers are a hard-to-reach population, and ABRAND had a low initial screening rate. The youth and adult samples may not be fully comparable.

It should be noted, however, that we tested the association between the brand consumption of youth aged 18-20 from both ABRAND and GfK MRI and found that they were highly correlated ($r=.94$; $P<0.001$). Also, GfK MRI youth (age 18-20) brand consumption was positively associated with brand CAY scores ($\beta=0.08$; $SE=0.01$; $P=0.02$), even when adjusting for young adult (age 21-34) brand consumption prevalence.

An additional limitation concerns the assumption that the survey respondents were likely to have been exposed to the ads, a critical first step in establishing a link between alcohol marketing and drinking. For the ABRAND youth, this limitation was minimized by using ads that aired on the 20 television shows most popular among youth while the ABRAND survey was in the field. In contrast, these ads were aired before and after some of the GfK MRI adults had completed that survey. It should be kept in mind, however, that ads are typically aired repeatedly across multiple channels and times in order to maximally expose various audiences,⁴⁰ and that the selected television shows in fact have larger adult than youth audiences. Of course, if adults were the actual target audience, and were less likely to have seen the ads in question, then this would suggest that they were aired during the wrong shows. The alcohol industry volunteers to avoid advertising on programming with a high proportion of youth audience members, and yet, there is evidence of content attractive to youth on the most popular programming among teens.¹² Future research should score advertisements appearing on popular adult TV shows for content appealing to youth, as differences in presence could be suggestive of the alcohol industry's awareness of the effects of such content. Future studies should also include market-level or self-reported data on youth exposure to specific ads to examine the interaction between brand advertising content, youth exposure, and alcohol brand consumption. It is also likely that other, unmeasured variables such as gender, race/ethnicity, price, availability, and current parental use of alcohol contribute to the variance in youth brand consumption. Further research accounting for such variables would be needed for a full analysis of the association between brand-specific advertisement content and youth brand preferences.

Conclusions

To the best of our knowledge, this is the first study to examine the relationship between youth-appealing content in advertising and brand-specific alcohol consumption by youth and adults. We found that alcohol brands using more youth appealing content were more likely to be consumed by youth than adults. This study takes significant strides toward quantifying youth-focused marketing efforts and parcelling out the effects of adult modelling and marketing on youth drinking. This study has further demonstrated the utility of the CAY index in assessing alcohol advertising content. Using the CAY index across populations, time periods, and types of media, could strengthen the body of research on the relationship between alcohol marketing content and the alcohol-related attitudes, beliefs, and behaviours of youth.

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