



## Original article

# Early Adolescent Exposure to Alcohol Advertising and its Relationship to Underage Drinking

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Manuscript received July 28, 2006; manuscript accepted January 18, 2007

**Abstract**

**Purpose:** To determine whether early adolescents who are exposed to alcohol marketing are subsequently more likely to drink. Recent studies suggest that exposure to alcohol ads has a limited influence on drinking in mid-adolescence. Early adolescents may be more vulnerable to alcohol advertising effects.

**Methods:** Two in-school surveys of 1786 South Dakota youth measured exposure to television beer advertisements, alcohol ads in magazines, in-store beer displays and beer concessions, radio-listening time, and ownership of beer promotional items during 6th grade, and drinking intentions and behavior at 7th grade. Multivariate regression equations predicted the two drinking outcomes using the advertising exposure variables and controlling for psychosocial factors and prior drinking.

**Results:** After adjusting for covariates, the joint effect of exposure to advertising from all six sources at grade 6 was strongly predictive of grade 7 drinking and grade 7 intentions to drink. Youth in the 75th percentile of alcohol marketing exposure had a predicted probability of drinking that was 50% greater than that of youth in the 25th percentile.

**Conclusions:** Although causal effects are uncertain, policy makers should consider limiting a variety of marketing practices that could contribute to drinking in early adolescence. © 2007 Society for Adolescent Medicine. All rights reserved.

**Keywords:** Advertising; Alcohol marketing; Children; Drinking; Television

Underage drinking is associated with increased probability of motor vehicle crashes [1], sexually transmitted diseases [2], suicide, and disability [3]. Emerging evidence suggests that alcohol advertising may contribute to adolescent drinking [4]. Adolescents, on average, see at least 245 television ads for alcohol each year [5,6]. Exposure also occurs through magazines [7], radio [8], and ownership of promotional items like T-shirts [9]. Youth who are exposed to alcohol ads report liking them as much or more than ads for other products [6,10], are conversant in the ads' messages [11,12] and, in some studies, see drinking in a more positive light [13–19]. Cross-sectional surveys find relation-

ships between advertising exposure, drinking intentions, and drinking behavior among youth [13,15,19].

However, causally linking ad exposure and drinking requires longitudinal research with appropriate statistical controls. The few studies that have used such methods are more qualified in their findings. In one study [20], New Zealand youth described the alcohol advertising they had seen or heard at ages 13 and 15. Their reports were used to predict their alcohol consumption at age 18. Some negative relationships between drinking and advertising-exposure were observed among women. Among men, there was no association between ad exposure at age 13 and later drinking, but associations with exposure at age 15 were positive. In a study of South Dakota youth [21], recalled exposure to in-store beer displays at grade 8 predicted drinking onset by grade 9. Among 7th-grade drinkers, grade 8 exposure to magazines with alcohol ads, and recalled exposure to beer

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concession stands at sports or music events predicted more frequent grade 9 drinking. Exposure to television beer ads was not a significant predictor of grade 9 drinking. In contrast, a study of Los Angeles youth [22], using a very similar measure, found a strong association between exposure to television beer ads in grade 7 and grade 8 drinking. Finally, a study of New England middle school students [9] showed that ownership of an alcohol promotional item (e.g., a T-shirt) increased the likelihood of drinking initiation one to two years later.

These studies suggest that youth might be more likely to drink as a result of exposure to alcohol advertising. However, some findings are unreplicated, and others are inconsistent; possibly, the effects of ads are specific to particular groups of viewers. The present study tested for alcohol advertising effects on youth exposed during grade 6. This is the youngest sample that has been studied longitudinally. By grade 8, slightly more than half of all youth have experimented with alcohol, and many of those who have not, have observed alcohol effects among their peers. These experiences may overwhelm any effect of ads [24]. Moreover, as adolescents mature, they acquire more of the cognitive skills necessary to counter advertising. Clearer alcohol-advertising effects may be observed among younger adolescents than have been shown previously.

We also look at a wider variety of advertising than any previous study. Guided by the general framework of the Elaboration Likelihood Model of persuasion (ELM) [24] we allowed for advertising influences through both high-attention information processing and more automatic, minimally-attentive processes. High attention processing can result in greater persuasion when advertising presents strong arguments, but produce less persuasion when mere associations between a product and image (being “cool”) or good times are made. The latter is the case with most alcohol ads. Because ads processed with greater attention may be better remembered but less effective, this can bias estimates of advertising effects based on recall alone. Our measures of television, radio, and magazine exposure tap both kinds of processing by measuring likely exposures, regardless of attention level or recall. We measure television-advertising exposure by weighting self-reported viewing-frequency for specific programs by the number of ads they aired. We measure magazine-advertising exposure with self-reports of reading select publications, and radio exposure with daily listening-hours. More attentive processing is captured by our other measures: recalled exposure to beer concession stands and in-store beer displays, and self-reported ownership of an alcohol promotional item. Together, our measures cover all advertising types previously examined in longitudinal studies, using measures validated in those studies.

To provide evidence regarding the possibility of a causal relationship, we test effects longitudinally and include a vari-

ety of controls for known predictors of underage drinking [26–30].

We test effects on both underage drinking and intentions to drink in the near future. Ads might produce intentions that study participants do not have an opportunity to act on prior to our follow-up survey.

## Methods

### Sample

Respondents were recruited through South Dakota elementary schools. Middle schools in districts where these schools were located participated in the evaluation of a school-based drug prevention intervention. That study involved 55 schools, 9 in cities with more than 50,000 residents, 11 in cities of 25,000 to 50,000, and the rest in rural areas across the state [25]. We capitalized on alliances with these districts to recruit elementary schools into the present study. Ninety percent of schools approached took part; 1959 grade 5 students from 39 schools were enrolled at baseline (Spring 2000). Of these, 91% completed additional surveys at both grade 6 and grade 7 and were therefore eligible for the present study ( $n = 1786$ ). Native Americans and boys were somewhat more likely to be lost to follow-up. Small amounts of missing data on the outcomes resulted in analysis samples of 1699 and 1740 youth for predicting drinking and drinking intentions, respectively. Table 1 shows the characteristics of the sample as the cross-section of these two groups (i.e., those with data for both outcomes).

This sample was an average of 11.8-years old at grade 6 ( $SD = 0.6$ ), 85% white, 12% Native American, and 3% other race; 51% were females. Fifteen percent and 17% reported at grades 5 and 6, respectively, that they had ever drunk a can or bottle of beer; by grade 7, 27% had done so.

### Procedure

The RAND Human Subjects Protection Committee approved procedures and materials. Parents were mailed a letter describing the study and could refuse consent by returning a form. Youth gave assent prior to survey administration; surveys were administered in class.

### Measures

Descriptive statistics for all measures are displayed in Table 1.

#### Outcome variables

*Past-year beer drinking* was measured at grade 7 and coded to reflect any versus none. We focused on beer because most alcohol advertising is for this beverage. *Drinking intentions* for the coming six months was measured at grade 7. This three-level ordinal variable indicates responses of definitely no, probably no, or definitely or probably yes.

Table 1  
Sample characteristics for all outcome and predictor variables  
(N = 1664)

Variable	Mean	SD	Min	Max
Grade 7 beer drinking <sup>a</sup>	.17	.39	.00	1.00
Grade 7 drinking intentions <sup>b</sup>	2.45	.79	1.00	3.00
Alcohol ad exposure				
Television ads				
ESPN beer ads	2.30	3.92	.00	14.56
Other sports beer ads	4.74	3.94	.00	11.29
Other TV beer ads	.15	.18	.00	1.00
Magazine reading	1.65	1.97	.00	6.00
Radio listening	1.85	1.13	.00	4.00
Beer concessions	3.40	1.84	1.00	7.00
In-store beer displays	4.48	1.88	1.00	7.00
Beer promotional items <sup>a</sup>	.19	.41	.00	1.00
Low parental monitoring	1.15	.72	.00	4.00
Adult drinking	.94	.94	.00	3.00
Peer drinking <sup>a</sup>	.20	.42	.00	1.00
Parent approval	1.34	.79	1.00	4.00
Friend approval	1.93	.87	1.00	4.00
Low school grades	1.85	.90	1.00	5.00
Depressed mood	1.16	1.14	.00	5.00
Deviance	.35	.75	.00	5.00
Impulsivity	1.24	.84	.00	4.00
Low religiosity	2.20	1.01	1.00	4.50
Sports activity <sup>a</sup>	.72	.47	.00	1.00
Weekly TV viewing	1.95	.70	.00	3.79
Parental education	3.33	1.04	1.00	5.00
Female <sup>a</sup>	.51	.52	.00	1.00
Race				
Native American <sup>a</sup>	.12	.34	.00	1.00
Not Native American/White <sup>a</sup>	.03	.18	.00	1.00
Grade 6 beer drinking	.17	.62	.00	4.00

<sup>a</sup> Dichotomous or dummy-coded variable.

<sup>b</sup> Higher scores indicate less intent to drink.

### Advertising exposure variables

Exposure to television beer-advertising was measured at grade 6. Slightly more than half of television beer ads appear on sports programming [31,32]. Of these, a substantial portion appears on ESPN (Nielsen Media Research), a cable network. Because not all households subscribe to cable, estimating exposure to television beer ads using all ads appearing on sports programming would overestimate the exposure of youth who do not have access to ESPN. Similarly, examining only sports viewing would underestimate exposure for youth who see alcohol ads during other programs, but do not watch sports. We used three indicators of television exposure to account for these different patterns of viewing.

Based on Nielsen data and survey responses, we determined that beer ads were seen most frequently during five sports. Students indicated on a five-point scale how often they watched televised professional football, professional basketball, college football, college basketball, and NASCAR races, "since school started this fall." To create *exposure to beer ads on ESPN* we asked "How many days a week do you watch ESPN or ESPN2?" and weighted the

response by the number of beer ads on these two stations during these five sports according to Nielsen data covering the September through March period before the survey. ESPN televises a sports-news program, "Sports Center," that airs a large number of beer ads. We asked students how often in the past month they had watched it, weighted responses by the relevant number of beer ads, and added this to the weighted ESPN item. The sum was divided by 1000 to produce parameter estimates within accustomed ranges. To tap *exposure to beer ads on other sports programs*, we weighted responses to the five sports items using Nielsen data, but excluding ads that aired on ESPN or ESPN2. We then summed the items and divided by 1000. *Exposure to beer ads on other TV programs* was measured with questions about non-sports programs popular with youth (at the time of the survey) that aired beer ads: *Comic-view*, *The X-Files*, *Behind the Music*, *Millennium*, *The Tonight Show*, *Conan O'Brien*, *Howard Stern*, and *World Championship Wrestling*. Frequency of watching each was weighted by the relevant number of ads, items were summed, and the total divided by 1000.

Respondents reported how often in the past year they had looked at *Rolling Stone*, *Sports Illustrated*, *People*, *Field and Stream*, and *Newsweek*, on five-point scales. *Exposure to alcohol advertising in magazines* was measured with their sum. The first three magazines were among the top 10 in alcohol advertising dollars according to a recent analysis [5]; and had among the largest youth audiences of these 10 advertisers. *Newsweek* was fifth in distilled spirits advertising in 1997 [31]. Focus group data from South Dakota 6th graders indicated that, among other magazines with alcohol advertisements, *Field and Stream* was most frequently read in our population. Our measure is identical to one predicting drinking in a prior study [21] except that we excluded *Playboy* for our younger sample.

*Radio listening* was measured as self-reported hours of listening "on a typical day," (none to five or more). Focus groups indicated that our population could not reliably report on specific radio programming or stations, making weighting by number of ads impossible.

Recalled *exposure to beer concessions* was assessed with a single item accompanied by a photograph of a beer concession that prominently displayed brand names. Respondents reported the number of times they had seen such a place in the past year, on a seven-point scale. Recalled *exposure to in-store beer displays* was an identical item accompanied by a photograph from the refrigerator section of a store that showed stacks of beer and signs advertising brands.

Ownership of an alcohol *promotional item* was measured with the question "Do you own any hats, posters, or T-shirts that advertise alcohol (beer, wine, liquor, or wine coolers), yes or no?"

### Covariates

We measured variables highlighted in several different theories of adolescent substance use [26–28] and variables that are demonstrated predictors of such use [29,30]. *Low parental monitoring* was the average of three items (e.g., “How often do parents or guardians know where you are when you are away from home?”  $\alpha = .54$ ). *Adult drinking* was measured for “the most important adult” to the respondent, and *peer drinking* with: “Do you think your best friend drinks alcohol sometimes?” We also assessed perceived *parent approval*, and perceived *friend approval*, if these individuals found out the respondent drank alcohol.

*School grades* were self-reported, from mostly A’s to mostly F’s. *Low religiosity* was the average of two items (e.g., “Religion is very important in my life,”  $r = .64$ ). *Depressed mood* was the average of three items referencing the prior month (e.g., depressed, downhearted and blue;  $\alpha = .84$ ).

*Deviance* averaged the past year frequency of: skipping school, stealing from a store, etc. ( $\alpha = .88$ ). *Impulsivity* averaged five items (e.g., “I do what feels good without thinking about the future;”  $\alpha = .79$ ).

We also included an indicator of any *sports participation*. *Weekly TV viewing* was the average of eight items about the number of hours spent watching at various times and days.

Demographic variables were *parent education*, *female gender*, and self-reported *race/ethnicity*. *Frequency of grade 6 beer drinking* was measured with a five-point ordinal variable.

Covariates were measured at grade 6, with the exceptions of gender and race (measured at enrollment), and deviance, religiosity, impulsivity, and parent education (for which we had only grade 7 measures).

### Analyses

We imputed missing data on predictor variables using the Sequential Regression Imputation Method implemented in the IVEware application for the SAS software package [33]. The average missing was 5.8% across items. Test statistics accounted for possible dependence among outcomes for students from the same school (intra-school correlation) and for the imputation of missing values [34,35].

Bivariate associations were estimated using logistic regression (for beer drinking) and ordered logit (for alcohol intentions). We estimated partial associations with a second set of equations controlling for beer drinking at grade 6. Given our reference periods for advertising exposure, drinking during grade 6 might have occurred prior or subsequent to alcohol advertising exposure. Analyses that control for grade 6 drinking are therefore conservative, estimating only lagged effects.

Full multivariate analyses also employed ordered logit and logistic regression, separately regressing each outcome variable simultaneously on all candidate predictors. Mea-

asures of advertising exposure were highly correlated, thus parameter estimates for individual variables may be unstable when all are included in a model. We dealt with this in two ways. First, we conducted a series of tests in which we included only one advertising predictor with the full set of covariates. These provide an indication of whether an advertising variable is truly unrelated to drinking or whether it drops out of more complete models because of collinearity. Second, we tested complete models that included all of the ad variables and supplemented them with joint tests of significance for: (1) exposure to all sources of alcohol advertising; (2) exposure to television ads for beer only. Joint tests examine associations for the totality of advertising exposure or the landscape of television ads without attempting to identify the specific measures in the two sets that account for them (because we cannot reliably do so). Finally, we repeated the two complete models controlling for grade 6 drinking.

### Results

Seventeen percent of youth reported past year beer drinking at grade 7. Sixteen percent “definitely” or “probably”

Table 2  
Partial associations between candidate predictor variables, beer drinking, and drinking intentions, controlling for grade 6 beer drinking

Variable	Grade 7 beer drinking		Grade 7 drinking intentions	
	OR	CI	OR	CI
Alcohol ad exposure				
Television ads				
ESPN beer ads	1.43	(1.22–1.68)	1.29	(1.16–1.43)
Other sports beer ads	1.48	(1.24–1.77)	1.23	(1.11–1.36)
Other TV beer ads	1.46	(1.26–1.69)	1.54	(1.38–1.71)
Magazine reading	1.15	(1.06–1.26)	1.16	(1.11–1.21)
Radio listening	1.39	(1.19–1.63)	1.22	(1.11–1.34)
Beer concessions	1.27	(1.14–1.41)	1.20	(1.13–1.27)
In-store beer displays	1.25	(1.12–1.39)	1.17	(1.11–1.24)
Beer promotional items	3.54	(2.55–4.90)	2.99	(2.44–3.66)
Low parental monitoring	1.64	(1.38–1.95)	1.44	(1.27–1.64)
Adult drinking	1.32	(1.11–1.56)	1.26	(1.12–1.43)
Peer drinking	3.20	(2.15–4.75)	2.75	(2.10–3.60)
Parent approval	1.69	(1.43–1.99)	1.79	(1.55–2.06)
Friend approval	1.98	(1.64–2.40)	1.65	(1.43–1.90)
Low school grades	1.28	(1.08–1.51)	1.38	(1.21–1.58)
Depressed mood	1.23	(1.10–1.37)	1.13	(1.03–1.24)
Deviance	2.00	(1.33–3.02)	2.46	(1.64–3.71)
Impulsivity	1.66	(1.36–2.04)	1.63	(1.44–1.85)
Low religiosity	1.42	(1.21–1.68)	1.37	(1.21–1.55)
Sports activity	1.60	(1.06–2.42)	1.45	(1.14–1.85)
Weekly TV viewing	1.25	(1.05–1.48)	1.22	(1.10–1.36)
Parental education	.78	(.65–.94)	.88	(.78–.99)
Female	.62	(.44–.88)	.64	(.52–.79)
Race				
Native American	1.36	(.81–2.27)	1.38	(1.00–1.90)
Other	.53	(.19–1.50)	1.15	(.69–1.92)

OR = odds ratio; CI = confidence interval.

Table 3  
Multivariate associations between candidate predictor variables, beer drinking, and drinking intentions, controlling for grade 6 beer drinking

Variable	Grade 7 beer drinking		Grade 7 drinking intentions	
	OR	CI	OR	CI
Alcohol ad exposure	a		a	
Television ads	b		b	
ESPN beer ads	1.08	(.83–1.42)	1.01	(.85–1.21)
Other sports beer ads	1.19	(1.01–1.40)	.91	(.78–1.06)
Other TV beer ads	1.13	(.95–1.34)	1.25	(1.09–1.44)
Magazine reading	.96	(.87–1.06)	1.03	(.97–1.10)
Radio listening	1.17	(1.00–1.37)	1.02	(.92–1.14)
Beer concessions	1.01	(.91–1.13)	1.03	(.95–1.12)
In-store beer displays	1.03	(.92–1.14)	1.00	(.94–1.07)
Beer promotional items	1.76	(1.23–2.52)	1.65	(1.33–2.04)
Low parental monitoring	1.22	(1.03–1.46)	1.10	(.97–1.25)
Adult drinking	1.06	(.89–1.26)	1.07	(.95–1.22)
Peer drinking	1.40	(.91–2.18)	1.40	(1.00–1.94)
Parent approval	1.16	(.92–1.46)	1.39	(1.16–1.67)
Friend approval	1.53	(1.23–1.90)	1.20	(1.06–1.36)
Low school grades	1.06	(.87–1.28)	1.15	(.99–1.34)
Depressed mood	1.05	(.92–1.20)	.95	(.86–1.06)
Deviance	1.54	(1.21–1.97)	1.75	(1.32–2.32)
Impulsivity	1.22	(1.00–1.48)	1.28	(1.16–1.42)
Low religiosity	1.29	(1.07–1.55)	1.21	(1.07–1.37)
Sports activity	1.52	(.96–2.42)	1.62	(1.27–2.06)
Weekly TV viewing	.86	(.73–1.03)	.93	(.85–1.03)
Parental education	.88	(.73–1.06)	.96	(.86–1.07)
Female	1.04	(.70–1.55)	.96	(.71–1.28)
Race				
Native American	1.16	(.52–2.58)	.95	(.61–1.47)
Other	.48	(.16–1.42)	.99	(.58–1.70)
Grade 6 beer drinking	2.32	(1.16–4.63)	1.54	(1.06–2.25)

OR = odds ratio; CI = confidence interval.

<sup>a</sup>  $p < .001$  for joint test.

<sup>b</sup>  $p < .05$  for joint test.

would drink in the next six months; 23% “probably would not”; 61% “definitely would not.” Partial associations for these outcomes (controlling grade 6 drinking) are displayed in Table 2. Results without this control were nearly identi-

cal, and are not displayed. The advertising exposure variables were all significant, positive predictors of grade 7 beer drinking and drinking intentions. Most of the covariates were also significant, underscoring the need to include them in tests of advertising effects.

In the series of 16 multivariate models (not shown) that separately tested associations of each of the 8 advertising variables with (a) beer drinking and (b) drinking intentions, 4 of the advertising variables were significant predictors of drinking: TV sports beer ads ( $\beta = .28$ ), other TV beer ads ( $\beta = .22$ ), radio listening ( $\beta = .21$ ), and ownership of promotional items ( $\beta = .67$ ; all  $p$ -values  $< .05$ ). Exposure to ESPN beer ads just missed significance ( $\beta = .22$ ,  $p = .05$ ). There were significant associations between drinking intentions and: exposure to ads on programs other than sports ( $\beta = .26$ ), exposure to magazines ( $\beta = .07$ ), and ownership of promotional items ( $\beta = .56$ ), all  $p$ -values  $< .05$ .

Complete multivariate models predicting grade 7 beer drinking are displayed in Table 3. We present only the analyses controlling for grade 6 drinking because the unadjusted results were nearly identical. The joint effect of exposure to ads from all measured sources was significant:  $F(8, 28) = 8.36$ ,  $p < .0001$ , as was the joint test of the three television ad variables alone [ $F(3, 33) = 3.35$ ,  $p < .05$ ]. Friends’ approval of drinking was also a predictor, as were low parental monitoring, impulsivity, deviance, and low religiosity.

To illustrate the pattern and magnitude of these advertising effects, we used the technique of “recycling” [36]. This involves using results of the multivariate tests to calculate the covariate-adjusted probability of the outcome for each participant if he or she had been exposed to “low” levels of the predictor, and then calculating the probability obtained if he or she had been exposed to “high” levels. One set of predictions was generated based on exposure to all alcohol advertising sources; a second was based on exposure to television advertising for beer. We present results obtained at the 75th percentile of exposure to advertising

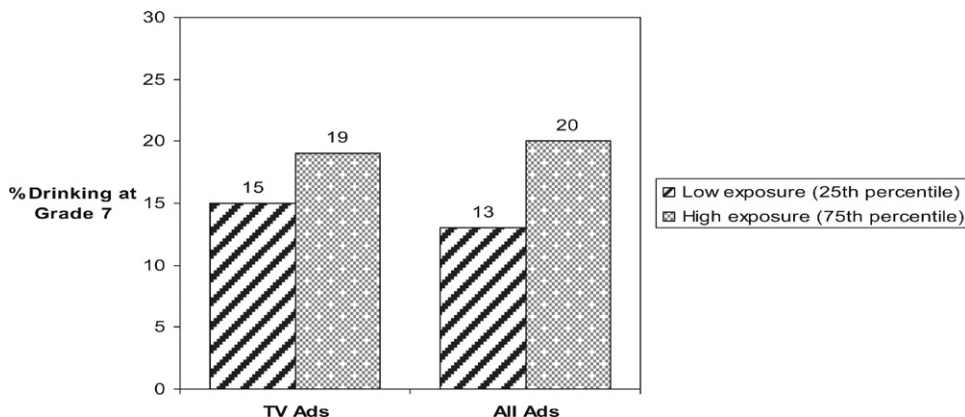


Figure 1. Covariate-adjusted predicted probabilities of grade 7 drinking by level of advertising exposure at grade 6.

(high exposure) versus those at the 25th percentile (low exposure) in Figure 1. As compared to low-exposure youth, the probability of subsequent drinking was 27% higher among youth exposed to the most television ads; the probability of drinking was more than 50% greater among those with the highest advertising exposure from all sources.

Results of the multivariate models predicting drinking intentions are also displayed in Table 3. The joint test of all advertising variables was significant [ $F(8, 35) = 7.41, p < .0001$ ], as was the joint test of just the television advertising variables [ $F(3, 35) = 3.91, p < .05$ ]. Covariates predicting drinking intentions were: peer drinking, parent and friend approval of drinking, deviance, impulsivity, low religiosity, and sports activity.

Predicted probabilities for intentions are displayed in Figure 2. After statistically equating youth on the covariates in our model, the number who intended to drink was 13% greater in the high television ad exposure group, as compared to the low television ad exposure group (top of figure). The percentage intending to drink among those exposed to high levels of alcohol advertising from all

sources was 36% greater than that of those with low exposure (bottom of figure). Conversely, both forms of exposure decreased the probability of respondents reporting they would definitely not drink in the coming months by 7% to 16%.

## Discussion

Exposure to alcohol advertising during very early adolescence predicts both beer drinking and drinking intentions one year later. The joint effect of advertising exposure from all sources was significant after controlling for potentially confounding variables, including prior drinking. Their combined association with drinking was substantial. Children at extremely high levels of overall advertising exposure were subsequently 50% more likely to drink and 36% more likely to intend to drink as those at low levels. These results are consistent with the hypothesis that exposure to alcohol advertising leads to underage drinking.

The joint effect of exposure to television advertising was significant in all models, consistent with one similar study [22], but not another [21]. Our measure was similar to those

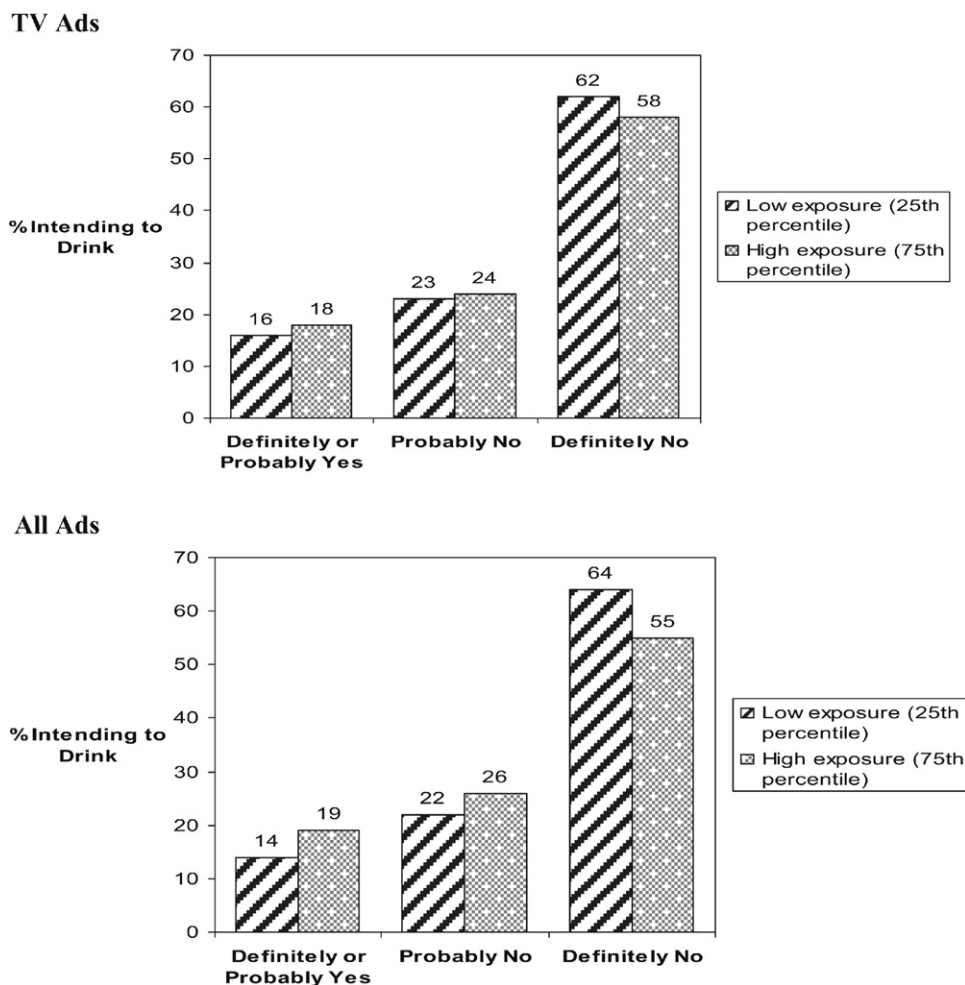


Figure 2. Covariate-adjusted predicted probabilities of intention to drink at grade 7 by advertising exposure at grade 6.

used in these studies, but small differences in the specific programs tapped could explain varying results. Alternatively, the younger samples studied by ourselves and the study producing the same result [22] could be responsible.

In multivariate models, individual effect sizes for most forms of advertising were small, and some types of advertising appear to have no effect. This may be partly attributable to collinearity among the measures. When tested individually, four of the eight variables were significant predictors of drinking and one was marginal. Ownership of a hat, poster, or t-shirt that advertises alcohol predicted both drinking and drinking intentions in all our models. Nineteen percent of sixth graders in our study reported that they owned a promotional item, and the odds of drinking were nearly double for this group, after controlling for other variables. This finding corroborates other results [9] and is also consistent with research on cigarettes [37].

We cannot draw definitive conclusions about the effects of other specific forms of advertising. In full multivariate models, none was independently associated with the outcomes. However, a few were significant when tested in the absence of other forms of marketing, and collinearity among these factors was high. Thus, we cannot rule out the possibility that these forms of marketing are related to drinking.

Some limitations to this study must be noted. Participants were from South Dakota, which ranks among the top ten states in binge drinking among adolescents [38]. Results may not generalize to other locations, particularly those with low rates of alcohol misuse. An additional limitation is our reliance on self-report measures [39]. Finally, we did not test for advertising effects on the perceived consequences of drinking (i.e., alcohol expectancies), awareness of advertising, or liking alcohol ads. While these are potentially important pathways through which advertising might have an effect, our focus was on the outcome of most concern to public health, underage drinking. We leave it to future research to test these processes. Strengths include our longitudinal design, assessment of multiple outcomes and multiple control variables, and multiple advertising measures.

The goal of this article was to test whether children at a particular stage of youth, the entry to adolescence and immediately before the modal age for experimenting with alcohol, are more likely to engage in underage drinking if they are exposed to more alcohol advertising. Our results indicate this may be the case. Because we did not conduct a comparative test of advertising effects on older adolescents, we cannot know if early adolescence is an especially vulnerable period, but this is possible. Given other data indicating high levels of exposure to and awareness of beer ads among school children [6,12], and high rates of underage drinking [40], it is important that parents and policy makers address this issue. While concern has been directed at television advertising [32], our findings suggest that other kinds of alcohol marketing may also pose risks.

## Acknowledgments

This study was supported by a grant from the National Institute for Alcohol Abuse and Alcoholism (R01AA12127). We thank Nielsen Media Research for providing data concerning television alcohol advertising.

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