Adolescents' exposure to paid alcohol advertising on television and their alcohol use: exploring associations over a 13-year period

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Abstract

Aims: To determine i) whether Australian adolescents' exposure to television alcohol advertisements changed between1999 and 2011 and ii) examine the association between television alcohol advertising and adolescent drinking behaviours.

Design: Cross-sectional surveys conducted every three years between 1999 and 2011. Analyses examined associations between advertising exposures and reported drinking.

Setting: Five Australian major cities.

Participants:Students aged 12-17 years participating in a triennial nationally representative school-based survey residing in the television advertising marketsassociated with the major cities (sample size range per survey: 12644 to 16004).

Measurements: Outcome measures were:drinking in the pastmonth, pastweek, and past-week risky drinking(5+ drinks on a day). The key predictor variable was past-month adolescent-directed alcohol advertising Targeted Rating Points (TRPs, a measure of television advertising exposure). Control measures included student level characteristics, government alcohol-control advertising TRPs, road-safety (drink-driving) TRPs and time of survey.

Findings: Average monthly adolescent alcohol TRPs increased between 1999 (mean=2371) to 2005 (mean=2679) ($p<.01$) then decreased between 2005 and 2011: (mean=880) ($p<.01$). Multilevel logistic regression analyses that adjusted for

survey timing, student level factors and alcohol-control advertising variables,showed a significant association between past-month alcohol TRPs and past-month drinking (odds ratio [OR]=1.10, 95% confidence interval [CI]: 1.04-1.16), past-week drinking (OR=1.08, 95% CI: 1.03-1.14) and past-week risky drinking (OR=1.16, 95% CI: 1.08-1.25). Past-week risky drinking was inversely associated with road-safety TRPs (OR=0.69 (95% CI: 0.49-0.98).

Conclusions: While Australian adolescents' exposure to alcohol advertising on television reduced between 1999 and 2011, higher levels of past-month television alcohol advertising were associated with an increased likelihood of adolescents drinking. The reduction in television alcohol advertising in Australia in the late 2000s may have played a part in reducing adolescent's drinking prevalence.

Key words: alcohol use, adolescents, alcohol advertising, trends, population based, school-based surveys, targeted rating points.

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Introduction

While alcohol marketing is increasingly turning tonew digital technologies and the one-on-one channels of ‘below the line’ advertising (e.g., point-of-sale tastings, targeted promotions),advertising throughtraditional mass media such as televisionis still common. Indeed in 2011 television advertising commanded the largest share of alcohol producers’direct advertising expenditures in the UK (48%)[1], with comparable data from the US suggesting that around 50% of alcohol producers’ direct advertising budgets went to television (with sponsorship and spending on helping others sell alcohol excluded)[2].

The influence of television alcohol advertising on adolescents’ alcohol use has been examined in several longitudinal studies. Greater exposure to televised beer advertisements[3] and general alcohol advertisements[4] among Grade 7 students is associated with an increased likelihood of drinking in Grade 8. Exposure to alcohol advertising and liking alcohol advertisements in Grade 7 has also been shown to be positively associated with alcohol consumption in Grade 10[5]. However, another study foundnoassociation betweenexposure to television alcohol advertisements in Grade 7 non-drinkers and their drinking in Grade 9[6]. A study of older adolescents and young adults also found a positive association between alcohol advertising expenditure and drinking 21 months later[7]. Other research has shown positive associations between the level of television advertising for specific alcohol brands and the brand of alcohol adolescents consume[8, 9].

In Australia, alcohol advertisements are permitted on television at all times except children's viewing times (weekdays: 5am-12 noon, 3pm-8.30pm; weekends and school holidays: 7am -8.30pm). However, regardless of the time of day, the live broadcast of sports is exempt from these restrictions[10]. Despite these restrictions, most Australian adolescents are exposed to television alcohol advertising [11].

Between 2000 and 2011,alcohol beverage television advertising expenditures reduced substantially in Australia [12]. During this same period, the prevalence of drinking in Australian adolescents began to decrease[13, 14]. Reasons for this decrease are not clear and there has been little work investigating the possible impact of changes in Australia's alcohol-control policies or other secular trends on adolescent drinking behaviours[15]. As alcohol advertising has been identified as a factor increasing the likelihood of adolescents' drinking, decreases in the level of advertising may contribute to decreases in adolescent drinking prevalence[16].

The current study aims to:, i) determine whether Australian adolescents' exposure to alcohol advertisements on television changed between1999 and 2011 and ii) to describe the association between adolescent's potential exposure to alcohol advertising in the past month, and their drinking in the past month and week, and past-week risky drinking. The advertising industry's measure of a target populations' potential exposure to advertisements, Target audience Rating Points (TRPs) is used as it allows an objective measure of potential advertising exposure.

Method

Design

Repeated cross-sectional surveys of Australian secondary students (aged 12-17 years) conducted every three years between 1999 and 2011 collected information on students drinking behaviours. Alcohol television advertising data were merged to student data by survey date, to provide an indicator of each student's potential exposure to alcohol advertising in the previous month. Regression analyses examined the association between potential past month advertising exposure and student drinking.

Alcohol-related advertising Target Rating Points (TRPs)

We used target audience rating points (TRPs) to measure adolescents' potential exposure to all direct beverage (beer, wine, spirits, premixed/cider) and alcohol retailoutlet advertising on television. TRPs data was obtained from the mediamonitoring company responsible for determining television ratings in Australia. TRPs are an extension of the Gross Rating Points (GRPs) measure[17]. GRPsare based on the reach of an advertisement among the entire population of households with televisions, along with how often the advertisementis screened to that audience (frequency). TRPs are calculated by multiplying GRPs by the proportion of the target audience among the larger population. TRPs specific to 13- to 17-year-olds (adolescents) are available and are derived from the range of television programs watched by this age group, which includes both youth-specific and more general

programs. TRPs data for the target audience groups of i) adults over 18 years and ii) adolescents were obtained. GRPs and TRPs are cumulative measures and therefore a range of different potential exposure levels could underpin a specific value. For example,80 TRPs per month could represent: 80% of adolescents within a media market exposed to the advertisement once during that month; 40% of adolescents exposed twice during the month; or 20% exposedfour times. TRPs are an indicator of potential advertising exposure as they do not indicate whether an individual actually saw specific advertising.

Australia's media market is divided into five metropolitan areas covering the five major mainland cities (Adelaide, Brisbane, Melbourne, Perth, Sydney) and six regional areas. Advertising exposure data for 13- to 17-year-olds is only available for the metropolitan advertising areas (referred to as major city). Around two-thirds of Australia's population reside in the metropolitan areas associated with these five major cities.

Student Survey Procedures

Adolescent data are from national, triennial, cross-sectional surveys of secondary students conducted since 1984. The survey was designed to assess the self-reported use of tobacco, alcohol, over-the-counter and illicit drugs in representative samples of students aged 12 to 17 years. The current study uses data from the 1999, 2002, 2005, 2008 and 2011 surveys. The same sampling and administration

procedures were used in all study years and are described elsewhere[18, 19]. In brief, a stratified two-stage probability sample was used, with a proportionally representative sample of schools selected from the three education sectors within a state at the first stage and students selected at the second. On an agreed day, external research staff attended each participating school to administer the survey to groups of students. Students completed the paper-pencil surveys anonymously. Surveys were conducted between May and December in each survey year. All surveys had Human Research Ethics Committee approval.

Analyses used data from students residing in the five major cities.

Survey data

Questionnaire items were identical in all surveys. Survey date, education sector (government, Catholic, Independent) and students' state was recorded for each studentby survey administrators after survey completion.

Alcohol consumption outcome variables

Three alcohol consumption outcome variables were used. Past month alcohol use was assessed by asking "have you had an alcoholic drink in the last four weeks?" (yes vs. no). Students indicated how many alcoholic drinks they had consumed on each of the previous seven days indicating zero if no alcoholic drinks were consumed. This data was used to identify students who had used alcohol in the past week (yes vs. no) as well as students who had consumed five or more alcoholic drinks on at least one of the previous seven days (defined as risky drinking based on

recommendations for drinking in adults[20]). The proportion of past-week risky drinkers among all students was determined.

Student level control variables

As part of the survey, students reported their sex, current age,residential postcode, language spoken at home (English, English and another language, another language only), self-rated academic ability (above average, average or below), and whether they had smoked a cigarette in the past month (yes or no).

Other Control variables

Socioeconomic Status

A postcode level socioeconomic status (SES) indicator derived from income, employment, education, occupation and housing characteristics of an area was assigned to each student based on their residential postcode[21]. The SES indicator was categorised into three groups with a low score indicating greater disadvantage.

Exposure to alcohol-control advertising

Adolescent TRPs data for alcohol-control advertising was obtained from the media monitoring company. Alcohol-control advertising included government or non-

government advertising and alcohol-directed road safety advertising campaigns. TRPs data on advertising sponsored by DrinkWise, a not-for-profit organisation largelyfunded by the alcohol industry that aims to promote a ‘safer drinking culture’, was also obtained.

Number of newspaper articles negative to alcohol use

As part of a separate study, a content analysis was conducted on a sample of alcohol-related newspaper articles published in major daily and Sunday newspapers from 1999 to 2011for the two largestmajor cities and from 2000 to 2011 for the remaining three cities[22]. Eligible articleswere coded for: article type (news, commentary (e.g. editorials, opinion pieces) and topic slant (disapproval, approval, mixed or neutral) about alcohol use. For each major city and survey year, the percentage of news and opinion articles with a disapproving alcohol slant was determined from the total number of news and commentary articles appearing each month. In cities where data for 1999 was missing, the average for the appropriate month in 2000 and 2001 was used as data from cities with 1999 data indicated that the percentage of disapproving news and opinion articles were similar between 1999 and 2000.

Statistical analysis

Requirements for accessing students’ and TRPs’ data necessitated de-identification of state when reporting results. Adolescent and adult monthly TRPs data for each alcohol product (beer, wine, spirits, premixed drinks, and alcohol retail outlets) were

merged with student data by survey date and major city. Following procedures used elsewhere[23], students surveyed after the 16th of the month were assigned the current month's TRPs, while those surveyed before the 16th of the month were assigned the previous month's TRPs. This variable is termed past-month TRPs. Past-month TRPs for the four alcohol beverage products and alcohol retail outlets were combined to produce an indicator of total past-month alcohol advertising TRPs with 126 different scores.

The per cent of disapproving news and percentage of disapproving commentary articles appearing in newspapers in the past month were assigned to each student using the same procedure as for TRPs.

A variable indicating survey time (in months) was calculated using each students' survey month and year information.

Past-month alcohol advertising to which students were potentially exposed was examined using means. Logistic regression analyses examined bivariate associations between survey timeand student level variables and the three drinking outcome variables (past-month drinking, past-week drinking, and past-week risky drinking among all students). Weighted data were used in these analyses. While standard methods for time series data is now based on ARIMA-type models, due to the low number of time points, and the clustering of students, this analytic method was not appropriate in this instance. Instead we used multilevel logistic regression analysis to examine multivariate associations between alcohol advertising TRPs and the three alcohol use outcomes which allowed for the clustering of students by

school and major city after adjustment for the covariates described above. In multilevel analyses, survey time was entered as a linear fixed effect variable. To examine whether advertising for the different alcohol products influenced adolescent drinking behaviours separately, analyses were repeated using advertising TRPs for each product rather than total alcohol TRPs. All multilevel analyses specified a three-level model: individuals within schools within major cities. For these analyses, advertising TRPs variables were scaled to per 1,000 TRPs, while the negative news and commentary newspaper article variables were scaled to per 10%.

To assess the specificity of association between alcohol advertising TRPs and adolescent alcohol use, the multilevel modelling analyses were repeated using past-month smoking as the outcome variable.

When reporting per cent of students drinking in each survey year, data were weighted to ensure the distribution of age, gender and education sector wasrepresentative of the population of 12- to 17-year-olds in secondary schools in each participating major city. Multilevel analyses were conducted with unweighted data. All analyses were conducted using Stata 14.0.

Results

Description of Student Sample

A total of 70,922 students from a total of 1151 schools across the five surveys were included in analyses. The average age of students surveyed was 14.3 years. SES distribution of students was similar over the study period. Past-month smoking prevalence declined over time ($p<0.01$) (Table 1).

While the proportion of students consuming alcohol in the past month or past weekdid not change between 1999 and 2002, from 2005 drinking prevalence declined (Table 2).The prevalence of past-week risky drinking declined from 2008.

Alcohol advertising,alcohol-control advertising over time

Adolescents werepotentially exposed to a decreasing amount of alcohol advertising on television after 2005 (Table 3). The highest advertising levels were found between 1999 and 2005, with adolescents potentially exposed to an average of 24 alcohol advertisements a month in 1999, an average of 26 advertisements a month in 2002 and 27 advertisements a month in 2005. Past-month adolescent alcohol advertising TRPs declined after 2005 with adolescents exposed to an average of 9 alcohol advertisements a month in 2011. Average past-month adult TRPs also declined between 2005 and 2011 (Table 3).Trends in past-month adolescent alcohol advertising TRPs and past-month drinking in each major city are shown in Figure 1. While the average level of past-month adolescent alcohol advertising TRPs varied between cities, in all cities TRPs declined between 2005 and 2008.

Table 4 shows that average past month TRPs for alcohol-control campaigns and drink-driving campaigns were substantially less than those for alcohol products. Exposure to DrinkWise advertising was evident only from 2008.

Multilevel modelling analysis

As there was no advertising TRPs for DrinkWise in three of the five survey years, this variable was excluded from the multilevel analyses. After adjusting for control variables, multilevel logistic analyses found significant positive associations between alcohol advertising TRPs and the three drinking outcome behaviours (Table 5).. Greater potential exposure to past-month total alcohol advertising increased the likelihood of adolescents drinking in the past month (OR=1.11, 95% CI, 1.07-1.15), past week (OR=1.10 95% CI: 1.06-1.14) and past-week risky drinking (OR=1.15, 95% CI: 1.09-1.22). Of the alcohol control advertising TRPs, only the association between past-month drink-driving advertising TRPs and past-week risky drinking was statistically significant (p=0.04) with greater potential exposure to drink-driving advertising in the past month reducing the likelihood of an adolescent engaging in past-week risky drinking (OR=0.69, 95% CI: 0.49-0.98). Table 5 also shows that percentage of negatively slanted news or opinion newspapers articles in the past month were not related to drinking outcomes.

The multilevel modelling was repeated to examine the association between alcohol consumption and advertising TRPs for the different beverage types and alcohol retail outlets. Advertising TRPs for all beverage types except premixed spirits and for

alcohol retail outlets showed significant positive associations with the three drinking outcomes (all p-values < 0.01).

Sensitivity analyses that adjusted for the covariates listed in Table 5, found no association between past-month smoking and past-month adolescent total alcohol advertising TRPs (p=0.98).

Discussion

Using the advertising industry's indicator of potential advertising exposure,we examined the relationship between adolescents' alcohol use and their exposure to alcohol advertising on television over a 13-year period. Australian adolescents' potential exposure to all alcohol advertising on free-to-air television also decreased duringthis period: from an average of between 24 and 27 advertisements a month between1999 and 2005, to around 9 advertisements a month in 2011. Our analyses showed a positive association between alcohol advertising TRPs and adolescents drinking with results suggesting that for every increase of 1000 TRPs the odds of an adolescent drinking in the past month increased by approximately 10%, while the odds of an adolescent engaging in past-week risky drinking increased by 16%. While the findings are in line with previous work showing a positive association between alcohol advertising and adolescent drinking behaviours[3, 5, 24], they may also suggest that the decreasing level of alcohol advertising on television may have contributed to the reduction in adolescents' alcohol consumption. However, we note

that as declines in adolescent drinking are not unique to Australia[25], other factors are also likely to be contributing to declines in youth drinking reported here.

The decrease in adolescent past-month alcohol TRPs was contributed to by all alcohol beverages and was matched by a decrease in adult alcohol past-month TRPs. These results suggest that the overall volume of direct alcohol advertising on television decreased over the study period. The decrease in television advertising may reflect greater use of other advertising channels including the internet and sponsorships as seen in other countries[1, 2] which is concerning [26, 27].Currently it is not possible to quantify the level of advertising expenditure alcohol-related industries spend in these channels in Australia[12],although marketing via the internet has clearly expanded over our study period[1, 28].

Throughout the study period, beer made the largest contribution to total alcohol TRPs, followed by spirits. Beer and spirits were in the top three most commonly consumed alcoholic beverage types by adolescents throughout the study period[13, 29]. We found no television advertising for pre-mixed beverages in 2008 and possibly as a result, we did not find an association between advertising TRPs for premixed beverages and adolescent drinking behaviours. There was much debate about these drinks and their appeal to young people in Australia in the mid-2000s and the excise levied on these drinks increased in 2008[30, 31]. Whether the lack of advertising for these drinks in 2008 was a strategy to reduce their profile, a response to the tax increase or a response to changing media environment, needs further investigation.

Throughout the study period adolescents' potential exposure to alcohol-control advertising was very low. Most alcohol-control advertising TRPs were associated with alcohol-related road safety advertisements and our analyses showed that greater potential exposure to these advertisements reduced the likelihood of an adolescent engaging in past-week risky drinking. Since the 1990s, road safety advertisements in many Australian cities have portrayed realistic images of road accidents and their aftermath, with many advertisements evoking a strong negative emotional response[32]. While our results need to be confirmed in other studies, our findings suggest that the anti drink-driving messages in these advertisements may positively influence the risky drinking behaviours of adolescents. However, our study also shows that the levels of alcohol-control television advertising Australian adolescents have been exposed to, is substantially less than levels shown to be effective in reducing adolescent smoking[23]. As research shows that ongoing adequate exposure is a critical element of effective campaign advertising[33, 34], the low exposure levels may have reduced the effectiveness of this advertising in reducing past-month and past-week drinking.

Although our study covered many years, our analyses were cross-sectional. We used differences in alcohol consumption and alcohol advertising levels between major cities and study years to increase the variation in our predictor and outcome variables. Whileschools and students in different survey years were not the same, older students in a survey year would be drawn from the cohort of younger students (12- to 14-year-olds)eligible for survey participation three years earlier. The decrease

in drinking among older adolescents first seen in 2008 may result from the maturing of the 2005 cohort of 12- to 15-year-olds, who had significantly lower levels of drinking than previous cohorts. A longitudinal study from the US examining the impact of alcohol advertising expenditure levels onalcohol use found that youth living in low alcohol advertising markets were less likely to consume alcohol and increased their consumption of alcohol more modestly than youth living in high advertising markets[7].The lower level of advertising in 2008 and 2011 may have helped younger students maintain low levels of alcohol consumption as they reached their senior school years.

Several limitations to our study need to be noted. While the use of an objective measure of advertising exposure is a potential strength, this measure does not reflect the actual 'dose' of advertising an individual received. Our advertising exposure measure did not include cable or subscription television advertising; thus we may have under-estimated potential advertising exposures. However,as subscription television had a penetration of around 29% of Australian households in 2011[35],free-to-air television dominated the Australian market during the study period.

We did not control for the potential impact of different alcohol-control policiesin our analysis. In their international comparison study, Paschel et al[36] showed an inverse association between adolescent drinking and policies controlling alcohol availability, suggesting the potential importance of controlling for this policy. Price can also influence adolescents' alcohol consumption[37]. The excise levied on

premixed alcoholic beverages increased in 2008 and this increase may have contributed to the reduction in youth drinking [38]. The full impact of changes in alcohol-control policy on adolescents' alcohol consumption needs to be considered in future studies.

As noted above, adolescent drinking declined in other countries, including the United Kingdom (UK) and the United States of America (USA), during the 2000s[25, 39, 40]. Research into the drivers of this change is limited and we are not aware of other studies relating trends in the level of television alcohol advertising to trends in adolescents' alcohol use. Information on television alcohol advertising expenditure for the UK suggests that television alcohol advertising expenditures decreased between 2005 and 2009 by 54%[1, 41], with past-month drinking prevalence in English youth decreasing from 36% in 2005 to 31% in 2009 and 25% in 2010[39]. While this is consistent with the proposition that reduced television alcohol advertising contributes to declining adolescent drinking, television alcohol advertising expenditures in the UK increased by 56% between 2009 and 2011[1, 40], while alcohol prevalence continued to decline[39]. A variety of other factors may be contributing to the declines in adolescent drinking. During the 2000s many countries in Europe strengthened their alcohol control policies, including increasing prices of some alcohol, strengthening drink-driving policies and increasing prevention efforts[42]. In addition, the use of alcohol by adults has decreased slightly in many European countries[42]. These changes, along with a decrease in adults' use of alcohol, may be contributing to a less accepting social norm for adolescent drinking

which may be contributing to the decreasing trends. It is likely that secular changes including the way adolescents socialise (e.g. greater use of social media and the internet) and changing attitudes towards alcohol have contributed todeclines inyouth drinking. Social movements promoting alcohol-free months or lifestyles such as ‘FebFast’, ‘Dry July’ and ‘Hello Sunday Morning’ became prominent in Australia in the late 2000s reflecting and perhaps influencing changing alcohol attitudes[15]. Further work is needed to determine the influence of secular trends and policy change on youth drinking.

Despite these limitations, our study provides novel evidence regarding the extent of alcohol advertising Australian adolescents have been potentially exposed to through mainstream television over a 13-year period, and the association between this advertising and adolescent drinking. While alcohol advertisers have reduced direct advertising on free-to-air television, there is a need to ensure that advertising through other channels does notreach the levels seen in 2002/5, the time when adolescent alcohol use was at its peak. As there are few restrictions on alcohol advertising in Australia[43], there is an ongoing need to monitor advertising in different media and through sponsorship and to examine the relative influence of advertising and alcohol-control policies on adolescent drinking behaviours.

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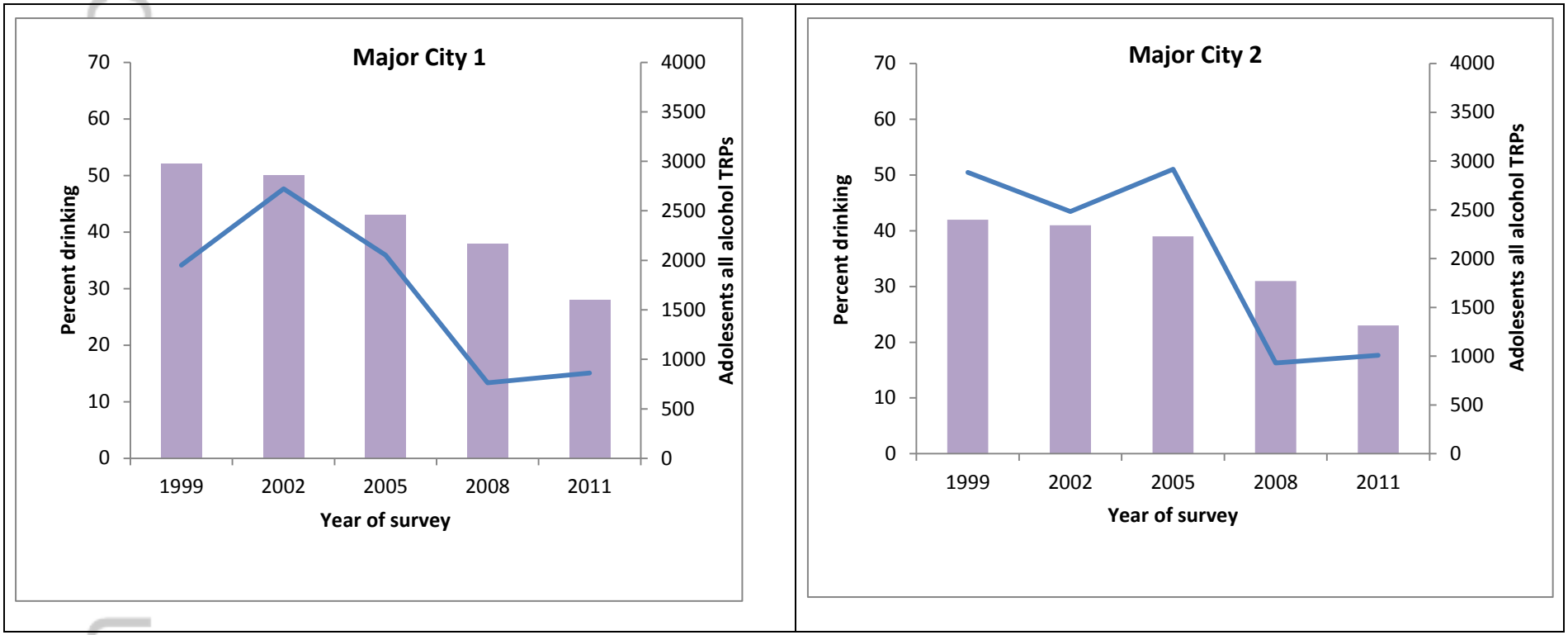
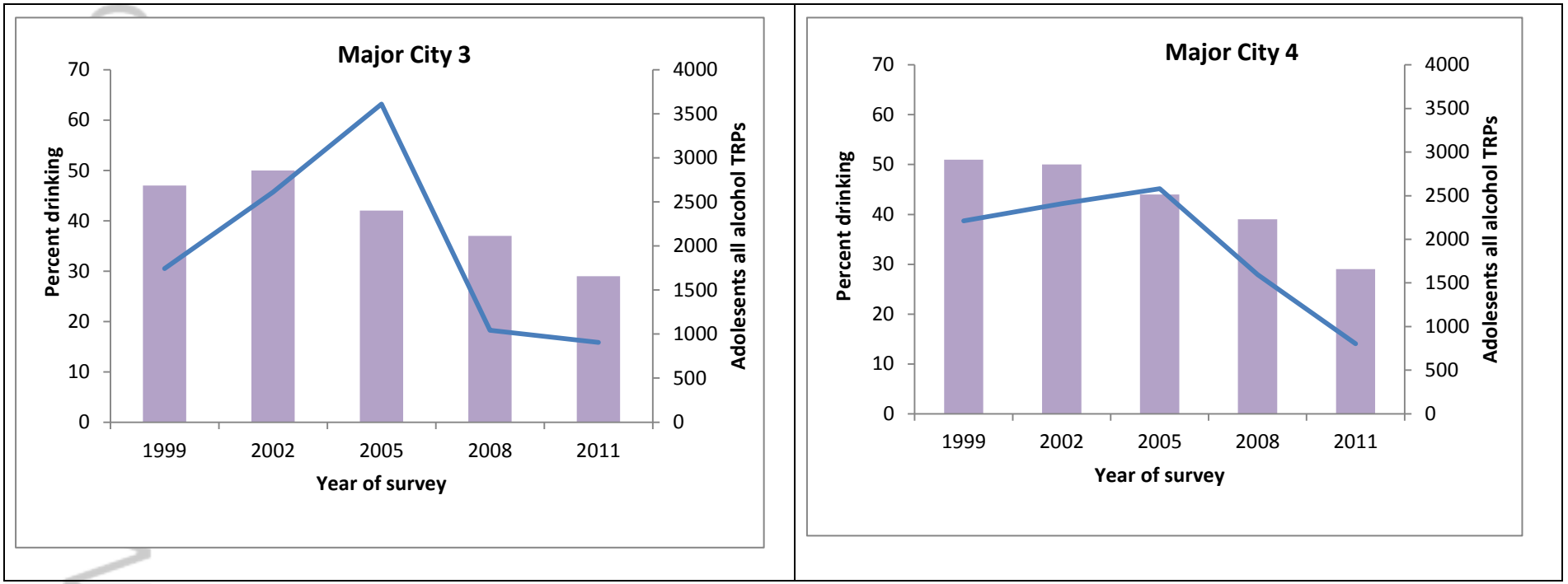
TRPs data used in this study are from OzTAM Pty Ltd.

Figure 1: For each major city, trends in prevalence of past-month alcohol use and trends in average past-month adolescent alcohol advertising TRPs to which students were potentially exposed.





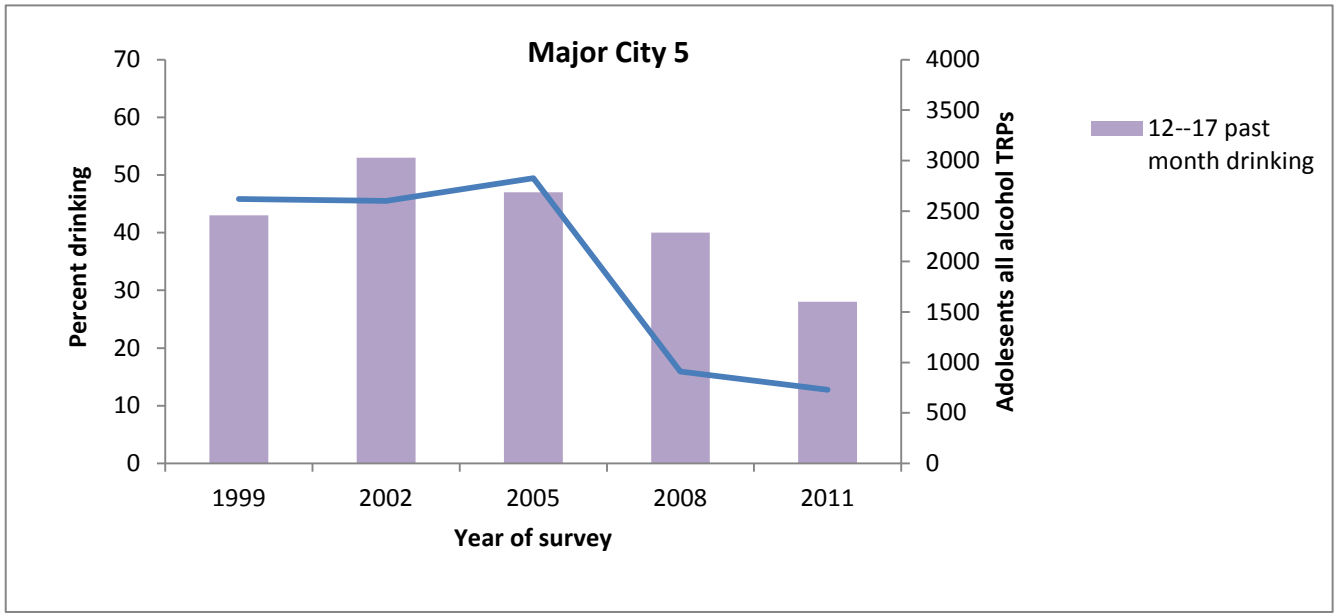


Table 1: Description of 12 to 17 year olds in the 5 major cities participating in each survey

	1999	2002	2005	2008	2011	P-value
Total number of 12-17 year olds surveyed in the national study (unweighted)	25,538	23,517	21,905	24,616	24,912	
Number of schools in study sample^	235	208	227	246	235	
Number of students in study sample^ (unweighted)	14,196	12,644	13,384	14,694	16,004	
	%	%	%	%	%	
Males	50	50	49	50	50	0.823
Age **(mean in years)**	14.3	14.4	14.3	14.3	14.3	0.995
Language spoken at home						
Only English	79	79	80	79	75	0.04
Only other language	3	4	3	4	4	
English and other language	18	17	17	17	21	
Socioeconomic Status (postcode) tertiles						
Low SES	27	31	29	36	27	0.38
Mid	41	40	39	39	40	
High SES	32	29	32	25	33	
Self-rated academic ability						
Above Average	41	41	43	42	46	0.001
Average or below	59	59	57	58	54	

% Smoked in past month	22	18	13	11	8	<0.001
Average percent of newspaper news articles with negative alcohol slant in previous month	43.6%	38.4%	69.9%	62.9%	69.2%	<0.001
Average percent of newspaper commentary articles with negative alcohol slant in previous month	18.2%	8.7%	6.8%	29.2%	5.9%	<0.001

^ study sample includes only those students and schools that were located in the metropolitan advertising areas associated with five major cities (Adelaide, Brisbane, Melbourne, Perth, Sydney).

Table 2: The proportion of students residing in the five major cities engaging in different drinking behaviours by survey year

Student Drinking involvement	1999	2002	2005	2008	2011	P-value
Past-month drinking	49%	48%	42%	36%	27%	<0.001
Past-week drinking	32%	33%	28%	22%	15%	<0.001
Past-week risky drinking	10%	10%	10%	8%	5%	<0.001

Table 3: Average past-month adolescent alcohol advertising Target audience Rating Points (TRPs) (total and for product types) and average past-month adult total alcohol advertising TRPsfor students in each survey year.

	Adolescent (13-17 year olds) average past-month TRPs						Adult (18+ years) TRPs
	Total alcohol	Beer	Premixed	Spirits	Wine	Alcohol Retail outlets	Total Alcohol
1999	2371	1305	379	390	116	182	3146
2002	2587	1105	310	736	195	241	3601
2005	2679	1215	330	455	375	304	3895
2008	965	547	0	143	105	170	1606
2011	880	457	85	221	81	35	1525

Table 4: Average past-month adolescent TRPs for government alcohol-control advertising, alcohol-related road safety advertisingand DrinkWise advertising for students in each eachsurvey year

	Adolescent (13-17 year olds) average past-month TRPs		
	Government	Alcohol-related Road Safety	DrinkWise
1999	41	184	0
2002	39	159	0
2005	0	97	0
2008	39	60	56
2011	2	45	8

Table 5: Associations (Odds Ratios (OR) and 95% Confidence Intervals (95%CIs)) between past-month total alcohol advertising adolescent TRPs and the three drinking outcomes after adjusting for control variables from multi-level models

Variable	Past-month drinking OR (95%CI)	Past-week drinking OR (95%CI)	Risky drinking among all students OR (95%CI)
All Alcohol advertising in past month (Per 1000 TRPs	1.11 (1.07-1.15)**	1.10 (1.06-1.14)**	1.15 (1.09-1.22)**
% Negatively slanted alcohol related news stories in newspapers previous month	1.00 (0.99-1.00)	1.00 (0.99-1.00)	1.00 (0.99-1.02)
% Negatively slanted alcohol related opinion pieces in newspapers previous month	1.01 (1.00-1.02)	1.00 (0.99-1.01)	1.01 (0.99-1.03)
Government Alcohol control advertising TRPS per 1000	0.92 (0.65-1.28)	0.81 (0.57-1.14)	0.63 (0.37-1.07)
Road safety per 1000 Advertising TRPS	0.95 (0.75-1.21)	0.97 (0.76-1.23)	0.69 (0.49-0.98)*
Time (in months)	0.99 (0.99-1.00)**	0.99 (0.99-0.99)**	1.00 (0.99-1.00)

Multilevel modelling adjusted for covariates of age, sex, socioeconomic status, self-rated academic ability, language spoken at home and past month smoking. Models also adjusted for clustering of students at the school and city level.

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