How do alcohol control policies influence Australian adolescent drinking trends?

VicHealth

Cancer Council Victoria

fare
Foundation for Alcohol Research & Education

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ACKNOWLEDGEMENTS

The work presented in this report was funded by a National Health & Medical Research Council (NHMRC) Partnership Project Grant #1037104 with VicHealth and the Foundation for Alcohol Research and Education (FARE).

Michael Livingston was supported by a National Health and Medical Research Council (NHMRC) Early Career Fellowship and by FARE, an independent, not-for-profit organisation working to stop the harm caused by alcohol in Australia. Robin Room was supported by the Victorian Department of Health and FARE. Tanya Chikritzhs is supported by a NHMRC Career Development Fellowship. Melanie Wakefield is supported by a NHMRC Principal Research Fellowship.

Funding for data collection for the student surveys used in this report was made available from Cancer Councils and state health departments in states and territories across Australia as well as the Australian Government Department of Health.

Advertising expenditure data and TRPs data was supplied by Nielsen. TRPs data used in this study are from OzTAM Pty Ltd.

Five papers published by the authors have been drawn on for the report:

- White V, Azar D, Faulkner A, Coomber K, Durkin S, Livingston M, Chikritzhs T, Room R, Wakefield M. Adolescents' alcohol use and strength of policy relating to youth access, trading hours and driving under the influence: findings from Australia Addiction. 2018 Jan 22. [Epub ahead of print]
- White V, Azar D, Faulkner A, Coomber K, Durkin S, Livingston M, Chikritzhs T, Room R, Wakefield M. Adolescents' exposure to paid alcohol advertising on television and their alcohol use: exploring associations over a 13-year period. Addiction 2017 Oct;112(10):1742-1751.
- Azar D, White V, Coomber K, Faulkner A, Livingston M, Chikritzhs T, Room R, Wakefield M. The association between alcohol outlet density and alcohol use among urban and regional Australian adolescents. Addiction. 2016; 111(1):65-7.
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- Azar D, White V, Bland S, Livingston M, Room R, Chikritzhs T, Durkin S, Gilmore W, Wakefield M. 'Something's Brewing': The changing trends in alcohol coverage in Australian newspapers 2000-2011. Alcohol and Alcoholism. 2014; 49(3):336-42.

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KEY FINDINGS AND IMPLICATIONS

This is the first Australian study to examine how changes in several factors contributing to a community's social environment may influence adolescents' consumption of alcohol. This report details trends in the 'push factors' – retail outlet density, advertising, negatively-framed newspaper articles and control policies – on the 'past-month/week drinking' and 'risky drinking' of adolescents. The report then examines the relationship between trends in these different factors and Australian adolescents' alcohol use to identify factors that may have played a role in the changing prevalence of alcohol use among Australian adolescents.

Taken together, our results suggest that population-based policies that attempt to restrict the availability of alcohol, reduce youth access to alcohol, and reduce alcohol advertising on television may contribute to reductions in youth drinking.

Alcohol outlet density: Taking into account adult population increases, the density of alcohol outlets per 10,000 adults generally decreased during the eleven year period 1999-2011.

We found that greater density of alcohol outlets in an adolescent's local area was positively related to both past-month drinking and risky drinking. Our study suggests higher alcohol outlet density increases the likelihood of Australian adolescents engaging in past-month drinking and risky drinking.

Alcohol advertising expenditure: The media channels used to advertise alcohol, and the specific alcohol products advertised changed between 1997 and 2011, with a decrease in expenditure on television advertising coinciding with an increase in newspaper advertising expenditure, and a shift from beer advertising to retailer marketing. The decrease in free-to-air television advertising expenditure may reflect a move to other methods of promotion such as social media, sports sponsorship, point-of-sale advertising and paid advertising at sports events.

Alcohol advertising on television: Reflecting the decrease in alcohol advertising expenditure directed at television, adolescents' potential exposure to alcohol TV advertising decreased over the study period. The decrease may reflect a change in the marketing strategy of alcohol beverage companies, from TV to greater use of other advertising channels including the internet and sponsorships.

The study shows that adolescents were exposed to a significant number of alcohol advertisements each month. We found that alcohol product advertising on television (TV) was positively related to risky youth drinking. Our findings suggest that self-regulation of alcohol advertising on TV is not sufficient to stop adolescents from being exposed to these advertisements.

Alcohol in Australian newspapers: The number of alcohol-related articles in major daily Australian newspapers more than doubled between 2000 and 2011. However, the content of these articles broadened from mainly promoting alcohol by industry spokespeople to include messages from health advocates about policy/restrictions and responsible beverage service.

Alcohol control policies: Across four states, policy in the areas of trading hours, youth access and drink driving strengthened over the 11-year period. Adoption of policies occurred at different rates, with the greatest increase seen the drink driving domain and the smallest increase seen in the trading hours domain.

We found that after adjusting for the influence of alcohol advertising and alcohol outlet density, stronger policy in the areas of trading hours and youth access reduced the likelihood of past-month drinking and past-week risky drinking respectively.

DID THE DIFFERENT COMPONENTS OF THE SOCIAL ENVIRONMENT FOR ALCOHOL INFLUENCE ADOLESCENT DRINKING?

The different alcohol policy and social environment variables influenced students' drinking behaviours differently. Greater potential exposure to alcohol advertising on television, to alcohol outlets, and greater prevalence of adult drinking, increased the likelihood of adolescents drinking in the past month. Students were less likely to drink if they were exposed to environments with a greater level of negative alcohol newspaper stories. Stronger policies restricting alcohol outlet trading hours reduced the likelihood of an adolescent drinking in the past month, while stronger policies restricting youth access to alcohol reduced the likelihood of risky drinking.

INTRODUCTION

Multiple surveys of adolescents and young people in Australia[1-3] and internationally[4-6] have shown a decreasing prevalence of alcohol use during the 2000s. The reasons for these decreases are not clear and there has been a call for greater efforts to understand the factors that may have influenced the decreasing use of alcohol use by adolescents[7]. In this report we detail results from a study funded through a National Health and Medical Research Council (NHMRC) partnership grant involving the NHRMC, the Foundation for Alcohol Research and Education and VicHealth that aimed to commence this investigation.

Room et al's framework for understanding change and stability in alcohol use in a population[8] provided the organising basis for this project. Room et al's framework classifies variables according to whether they push usage levels: i) up; ii) down; iii) work to stabilise use; or iv) work in either direction[8]. Factors suggested as pushing usage levels up and down tend to be the opposite of each other, and include availability of alcohol (increases push alcohol use up, decreases push usage down) and alcohol promotion (greater promotion pushes usage up, less promotion pushes usage down). Factors that can work to stabilise usage levels include cultural customs around alcohol use, while those that may work in either direction include social norms for drinking. This framework suggests that changes in alcohol usage levels depend on the relative change in these variables[8]. That is, if the factors pushing usage levels up increase while those working to push levels down remain the same, and social norms for increased consumption are favourable, alcohol usage is likely to increase.

Despite the potential importance of these factors in understanding change or stasis in alcohol use in a community, there is little data on the long-term trends in these different alcohol push factors in Australia. Without this information, it is difficult to understand the factors that may be contributing to the decreasing prevalence of alcohol use among Australian youth. To address this issue, the current project aimed to:

- Examine changes in alcohol outlet density, alcohol control policies, reports of alcohol-related stories in newspapers, and alcohol advertising in Australia between 1999 and 2011.

As indicated above, it is suggested that change in the prevalence of alcohol use in a community is likely to be related to change in the push factors for alcohol use. While several studies in the United States of America (USA) and Australia have started to investigate the association between adolescents' alcohol use and the implementation of different alcohol control policies[9-11], outlet density[12-14], and alcohol advertising[15, 16], few studies have examined the relative influence of these factors on adolescents' drinking behaviours in the one analysis. Utilising alcohol use data from the triennial Australian School Students Alcohol and Drug (ASSAD) use study, the current study aimed to:

- Examine the relative influence of alcohol outlet density, alcohol control policies, newspaper reports of alcohol-related stories, and alcohol advertising on adolescents' alcohol use (prevalence of drinking and risky drinking) over the period 1999-201.

This report presents the findings from this study. The report is structured to first describe trends in the different push factors investigated: alcohol outlet density, alcohol advertising, the framing of alcohol-related stories in newspapers and alcohol control policies, to document how these factors have changed across Australia between 1997 and 2011. The report then examines the relationship between trends in these different factors and Australian adolescents' alcohol use to identify factors that may have played a role in the changing prevalence of alcohol use among Australian adolescents.

During the course of this project, it became apparent that it was not possible to collect historical data for all push factors for all populations or for all years of interest. For instance, neither Tasmania nor South Australia could provide any historical data on the number of alcohol outlets in postcodes in these states, while adolescent-specific television target audience rating points data for alcohol advertising was only available for the capital cities of Australia's mainland states – Sydney, Melbourne, Perth, Adelaide and Brisbane. As a consequence of the differences in data availability, the sample size for analyses that examine how different factors are related to adolescents' alcohol use differs, due to both differences in the years that could be examined and in the students that could be included in analyses.

CHAPTER 1:
Trends in alcohol licence numbers and density 2000-2011

This chapter was originally published:

Trends in the number and density of four main types of alcohol licences in Victoria, New South Wales, Queensland, Northern Territory and Western Australia: 2000 to 2011.

INTRODUCTION

In Australia the sale of alcohol is regulated at the state or territory level. Each state regulates who can sell alcohol, the hours when alcohol can be sold, whether alcohol can be consumed on-premises or taken away, conditions regarding the sale of alcohol, the penalties for breaching regulations, who alcohol can be sold to, and who can drink on the premises. In all states and territories the sale of alcohol requires a licence, although each state and territory determines the type of alcohol licences they issue. While there are some differences between jurisdictions, the major types of alcohol licence are common to all jurisdictions (See Box 1).

Box 1: Definition of licence types

On-premise:	Alcohol can be sold for the purpose of consumption at that venue.
Off-premise:	Packaged alcohol can be sold for the purpose of consumption elsewhere; alcohol cannot be consumed on-premise.
General:	Alcohol can be sold for consumption on the premises and packaged alcohol can be sold for consumption off the premise.
Club:	Alcohol can be sold for the consumption on the premises by members and guests.
Restricted club:	Alcohol can be sold for the consumption on the premises by members and guests during limited hours only (e.g. only on weekends).
Limited licence:	One-off or short-term licences for consumption of alcohol on the premises.

The raw number of outlets selling alcohol has generally increased over the past 20-30 years[17]. While the size of this increase in different states and territories is not clear, there is some research showing that at least in one state (Victoria), the number of licensed premises increased 120 per cent between 1996 and 2010[18]. Depending on the type of licence, some research[19, 20], but not all[21], has suggested a positive association between the number or density of alcohol outlets in an area and the incidence of alcohol-related harm, intoxication and number of alcoholic drinks consumed. This research has led advocates to propose greater regulation of the physical availability of alcohol in the community to reduce both alcohol consumption and alcohol-related harm.

While several reports and documents present a snapshot of the number of licensed premises in each Australian state[22-25], few provide details of how these numbers have changed over time and fewer still have considered changes in the number of licensed premises as a function of the change in the adult population for that area. Additionally, reports that provide some information on trends in licensed premises numbers often fail to disaggregate the data by licence type, with many reports including the number of temporary or limited licences in the overall licence numbers.

In this chapter we present the number of licensed premises in four licence types (on-premise, off-premise, general and club) in each year in five Australian jurisdictions (Victoria, New South Wales, Queensland, Western Australia and Northern Territory) over the period 2000-2011, and examine the change in the number and density of each licence type (number of licence premises per 10,000 head of adult population) in that jurisdiction.

DATA

DATA SOURCES

Data were obtained from a number of sources. Data for Victoria had been collected previously by co-investigators Livingston and Room and this data was supplied to the current project. These data were available at the postcode level for all years between 2000 and 2011 and were originally supplied by Responsible Alcohol Victoria. Data for Western Australia (WA) were obtained from co-investigator Chikritzhs, who had previously collated postcode level data for this state for years 1993-2011, except the year 2000 when postcode level data was not available. Data for Northern Territory (NT), Queensland and New South Wales (NSW) was obtained specifically for this project. Data from 2000-2011 were obtained for NT from the Department of Justice, Northern Territory Government; for NSW from NSW Office of Liquor, Gaming and Racing; and for Queensland from the Queensland Department of Justice and Attorney General. Data were obtained at the postcode level for each year. For Queensland and Victoria, data represent the number of licences in each postcode current at 30 June each year, whereas for NSW, NT and WA, data represent the total number of licences in each postcode for each full financial year.

There are a number of different alcohol licence types in Australia, and licence types may differ between states. A detailed description of all licences types in each state is provided by Trifonoff, Andrew, Steenson, Nicholas and Roche (2011)[24]. In brief, the main licence types in each state are: general licence, on-premises licence, off-premises or take-away licence, club licence and limited or restricted licence (see Box 1). In the current study, the following licence types were excluded from all states: wholesaler, producer, restricted club (where possible), and limited licences. In addition, the following licence types were excluded from NSW data: caterer's licence, certificate of registration, governor's licence, and poker machine (no liquor) licence. Data for NT also excludes vessel licences. Excluding these different licences ensured comparability of licence types between states.

Licence types in each state were categorised according to four licence groups: Club, General, Off-premises and On-premises. On-premises licences include restaurants, where alcoholic beverages are an adjunct to a meal, as well as pubs and hotels. The total number of licences in each licence type group were calculated for each year from 2000-2011 and postcode level numbers are aggregated up to produce the number for each state.

OUTLET DENSITY

Population statistics for people aged 18 years or more for each state were obtained from the Australian Bureau of Statistics[26] for 2000-2011. Two types of outlet density were calculated. First, the number of outlets per 10,000 adults in the state/territory was calculated. Second the population per licence outlet was calculated.

RESULTS

Tables 1-4 show the number of licences, the outlet density per 10,000 adults and the population per licence for each licence type by state and year.

Using year as a linear predictor, we found that the number of club licences in Victoria, WA, the NT and Queensland decreased significantly over the study period (see Table 1). The decrease in the number of clubs in NSW was not statistically significant. In all states and territories, density of club licences per 10,000 adult population decreased between 2000-11. In all years, the density of club licenses was highest in the NT.

While the number of general licence premises in each state and the NT increased between 2000 and 2011, the density of these premises per 10,000 adults generally decreased in all states and the NT (see Table 2). In all years, the highest density of general licence premises per 10,000 adults was in the NT with 7.80 premises per 10,000 adults in 2000 and 6.44 premises per 10,000 adults in 2011.

The number of off-premises licences increased between 2000 and 2011 in all states, while in the NT the number decreased (Table 3). Density of off-premises licences per 10,000 adults increased significantly in Victoria and NSW over the study period, but did not change significantly in Queensland. In WA and the NT, the density of off-premises licences decreased. As for general licences, in all years, the highest density of off-premises licences per 10,000 adults was found in the NT followed by Victoria and then NSW.

In all states and the NT, the number of on-premises licences increased between 2000 and 2011, with the greatest increase found in Victoria (by 87 per cent in figures for the year 2000) and NSW (67 per cent in 2000) (Table 4). Increases in the number of on-premises licences in the other states and the NT were more modest (by 14 per cent in NT; 12 per cent in WA; and 4 per cent in Queensland). The density of on-premises licences in VIC and NSW increased significantly between 2000 and 2011, by 5 outlets per 10,000 adults in Victoria and by 4 outlets per 10,000 adults in NSW. The change in the density of on-premises licences in Queensland did not change significantly over the study period. There was a decrease in on-premises outlet density in WA and the NT over the 11-year period. In Victoria, NSW and Queensland, the density of on-premises licences per 10,000 adults was substantially greater than the density of other licence types.

Table 1: Number of club licences, outlet density (outlets per 10,000 adult population) and population per licensed outlet, by state and year

YEAR	VIC			WA			NSW			NT			QLD		
	COUNT	OUTLET DENSITYA	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET
2000	809	2.25	4441	—	—	—	1510	3.09	3236	71	5.23	1914	1114	4.21	2373
2001	811	2.22	4500	372	2.63	3804	1512	3.05	3282	72	5.23	1913	1122	4.16	2406
2002	807	2.18	4588	358	2.49	4021	1514	3.02	3315	75	5.38	1859	1008	3.64	2750
2003	806	2.14	4664	362	2.47	4050	1517	2.99	3340	75	5.35	1869	1000	3.51	2853
2004	802	2.10	4755	361	2.42	4140	1520	2.98	3360	73	5.14	1946	983	3.35	2982
2005	798	2.06	4856	346	2.27	4410	1521	2.95	3389	72	4.94	2024	984	3.27	3056
2006	793	2.01	4975	338	2.16	4619	1524	2.93	3416	72	4.82	2076	988	3.20	3121
2007	790	1.97	5084	349	2.17	4606	1526	2.89	3458	72	4.69	2131	989	3.13	3190
2008	789	1.93	5193	336	2.02	4947	1529	2.85	3509	71	4.47	2238	993	3.07	3254
2009	784	1.87	5345	338	1.97	5087	1532	2.81	3560	69	4.20	2383	984	2.97	3362
2010	768	1.80	5544	329	1.87	5355	1479	2.68	3732	67	3.99	2504	960	2.86	3501
2011	766	1.77	5635	336	1.86	5385	1467	2.63	3802	67	3.96	2525	949	2.79	3588

* denotes a significant difference from the Australian average.

[a]Outlet density = number of licences / (population/10000).

—Postcode level data not available.

^Pop= Adult population.

Table 2: Number of general licences, outlet density (outlets per 10,000 adult population) and population per licensed outlet, by state and year[a]

YEAR	VIC			WA			NSW			NT			QLD		
	COUNT	OUTLET DENSITYA	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET
2000	1961	5.46	2775	—	—	—	2045	4.19	3346	106	7.80	1415	1276	4.83	4878
2001	1983	5.43	2697	567	4.01	3104	2052	4.14	3337	107	7.77	1420	1299	4.81	4591
2002	1985	5.36	2665	554	3.85	3171	2055	4.10	3328	107	7.67	1423	1235	4.46	4271
2003	1978	5.26	2549	556	3.79	3201	2062	4.07	3306	107	7.63	1430	1259	4.41	4013
2004	1986	5.21	2398	555	3.71	3278	2067	4.05	3249	106	7.46	1480	1305	4.45	3919
2005	1988	5.13	2285	562	3.68	3310	2069	4.01	3190	107	7.34	1487	1323	4.40	3885
2006	1981	5.02	2238	543	3.48	3454	2074	3.98	3194	108	7.23	1510	1340	4.35	3929
2007	1985	4.94	2196	554	3.45	3510	2077	3.94	3210	107	6.97	1615	1353	4.29	4019
2008	1984	4.84	2172	566	3.41	3606	2083	3.88	3226	108	6.80	1746	1370	4.24	4054
2009	2215	5.29	2167	592	3.44	3538	2099	3.85	3132	112	6.81	1807	1319	3.99	3991
2010	2202	5.17	2198	620	3.52	3531	2120	3.84	2981	111	6.62	1864	1338	3.98	4129
2011	2200	5.10	2209	640	3.54	3590	2147	3.85	2766	109	6.44	1901	1339	3.93	4204

Outlet density = number of licences / (population/10000).

—Postcode level data not available.

^Pop= Adult population.

Table 3: Number of off-premises licences, outlet density (outlets per 10,000 adult population) and population per licensed outlet, by state and year

YEAR	VIC			WA			NSW			NT			QLD		
	COUNT	OUTLET DENSITYA	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET
2000	1295	3.60	2775	—	—	—	1460	2.99	3346	96	7.06	1415	542	2.05	4878
2001	1353	3.71	2697	456	3.22	3104	1487	3.00	3337	97	7.04	1420	588	2.18	4591
2002	1389	3.75	2665	454	3.15	3171	1508	3.01	3328	98	7.03	1423	649	2.34	4271
2003	1475	3.92	2549	458	3.12	3201	1533	3.03	3306	98	6.99	1430	711	2.49	4013
2004	1590	4.17	2398	456	3.05	3278	1572	3.08	3249	96	6.76	1480	748	2.55	3919
2005	1696	4.38	2285	461	3.02	3310	1616	3.13	3190	98	6.72	1487	774	2.57	3885
2006	1763	4.47	2238	452	2.89	3454	1630	3.13	3194	99	6.62	1510	785	2.55	3929
2007	1829	4.55	2196	458	2.85	3510	1644	3.12	3210	95	6.19	1615	785	2.49	4019
2008	1886	4.60	2172	461	2.77	3606	1663	3.10	3226	91	5.73	1746	797	2.47	4054
2009	1934	4.62	2167	486	2.83	3538	1741	3.19	3132	91	5.54	1807	829	2.51	3991
2010	1937	4.55	2198	499	2.83	3531	1852	3.35	2981	90	5.37	1864	814	2.42	4129
2011	1954	4.53	2209	504	2.79	3590	2016	3.61	2766	89	5.26	1901	810	2.38	4204

* denotes a significant difference from the Australian average.

Outlet density = number of licences / (population/10000).

—Postcode level data not available.

^Pop= Adult population.

Table 4: Number of on-premises licences, outlet density (outlets per 10,000 adult population) and population per licensed outlet, by state and year

YEAR	VIC			WA			NSW			NT			QLD		
	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET	COUNT	OUTLET DENSITY	POP^ PER OUTLET
2000	3415	9.50	1052	—	—	—	4622	9.46	1057	184	13.54	738	3388	12.82	780
2001	3759	10.30	971	593	4.19	2387	4891	9.86	1015	193	14.01	714	3593	13.31	751
2002	4102	11.08	903	555	3.86	2594	5146	10.25	975	194	13.91	719	2938	10.60	944
2003	4418	11.75	851	598	4.08	2452	5374	10.61	943	195	13.91	719	3045	10.67	937
2004	4725	12.39	807	618	4.13	2419	5606	10.98	911	194	13.65	732	3283	11.20	893
2005	5044	13.02	768	630	4.13	2422	5821	11.29	886	196	13.45	744	3478	11.57	865
2006	5338	13.53	739	558	3.57	2798	6065	11.65	858	199	13.31	751	3677	11.92	839
2007	5611	13.97	716	599	3.73	2683	6300	11.94	838	206	13.43	745	3842	12.18	821
2008	5826	14.22	703	604	3.63	2752	6520	12.15	823	210	13.22	757	4039	12.50	800
2009	6062	14.47	691	646	3.76	2661	6844	12.55	797	208	12.65	790	3363	10.16	984
2010	6247	14.67	682	649	3.68	2715	7238	13.11	763	208	12.40	806	3529	10.50	952
2011	6392	14.81	675	667	3.69	2713	7717	13.84	723	209	12.35	810	3526	10.35	966

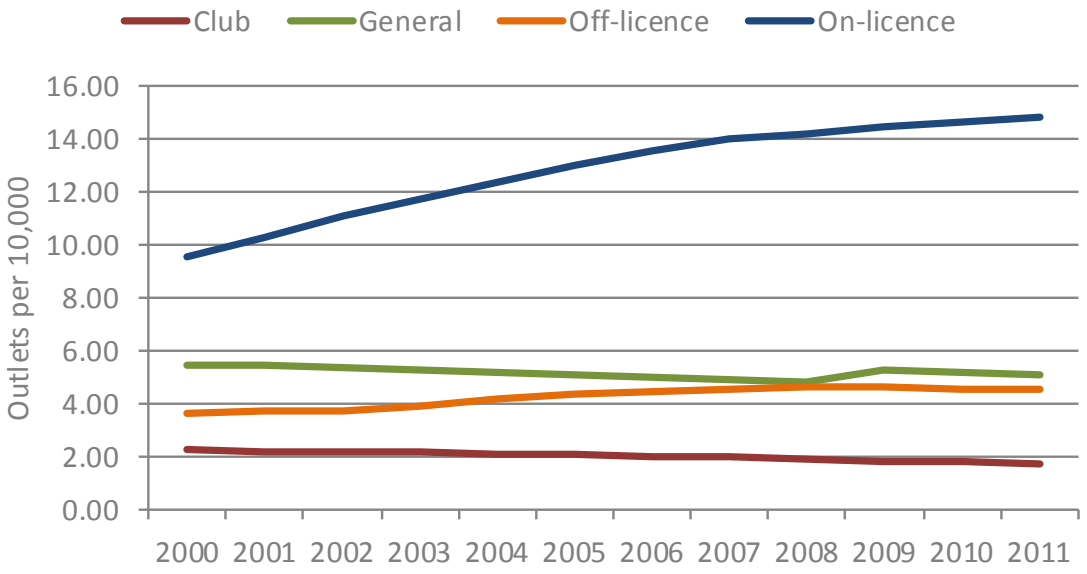
[a]Outlet density = number of licences / (population/10000).

—Postcode level data not available.

^Pop= Adult population.

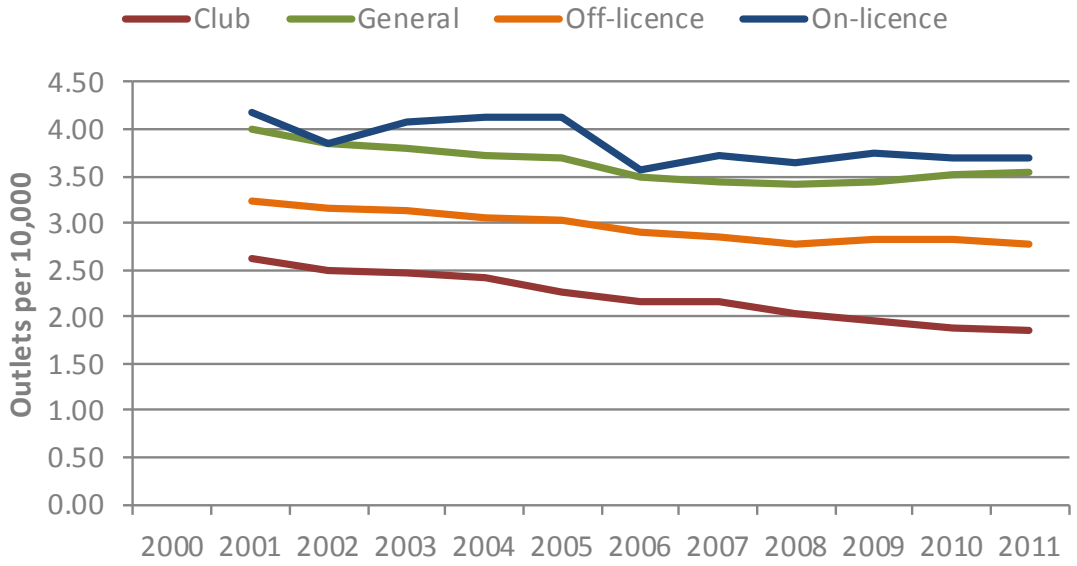
Figures 1-5 present graphically the change in the density per 10,000 adults within each state for each licence type. For Victoria (Figure 1), the outlet density for on-premises licences increased from fewer than 10 on-premises licences per 10,000 adults to around 15 per 10,000 adults by 2011. In contrast the increase in density for general and off-licence types has been relatively small. The density of club licences per 10,000 adults has declined over the study period.

Figure 1: Outlet density by licence group, Victoria 2000-2011



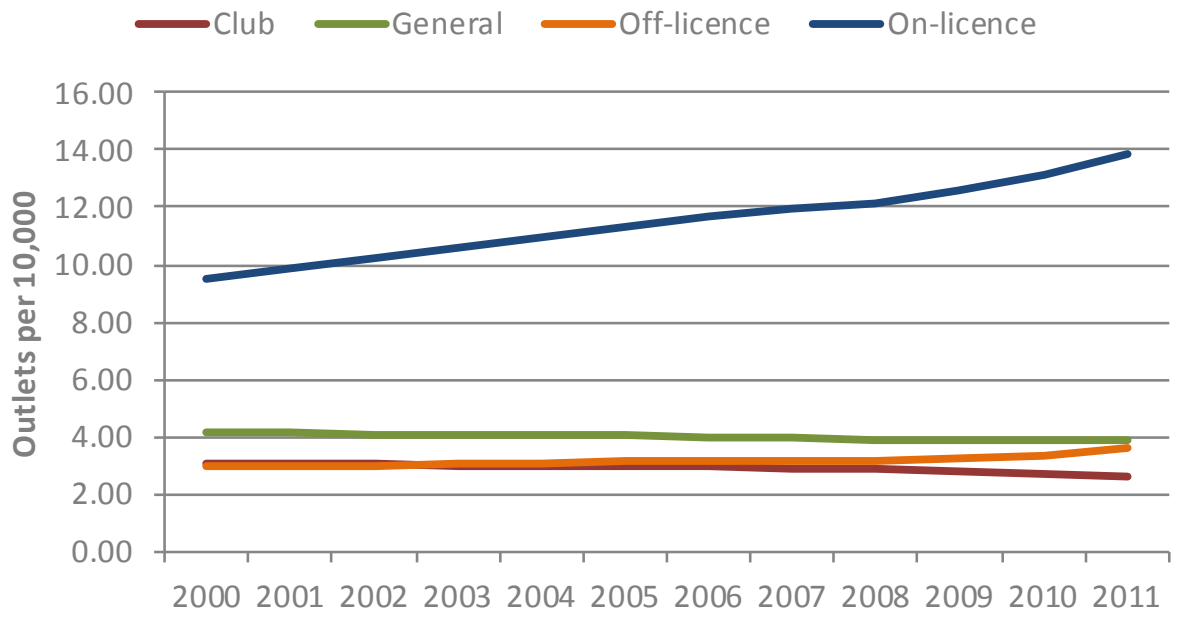
In WA (Figure 2) outlet density per 10,000 adults decreased between 2001 and 2011 for all four licence types, with on-premises licences consistently having the highest density. However, during 2002 and 2006 outlet density in WA shows a curvilinear pattern ($p = 0.052$), with a peak in 2004-2005 with a density of 4.13 outlets per 10,000 population in both years.

Figure 2: Outlet density by licence group, Western Australia 2001-2011



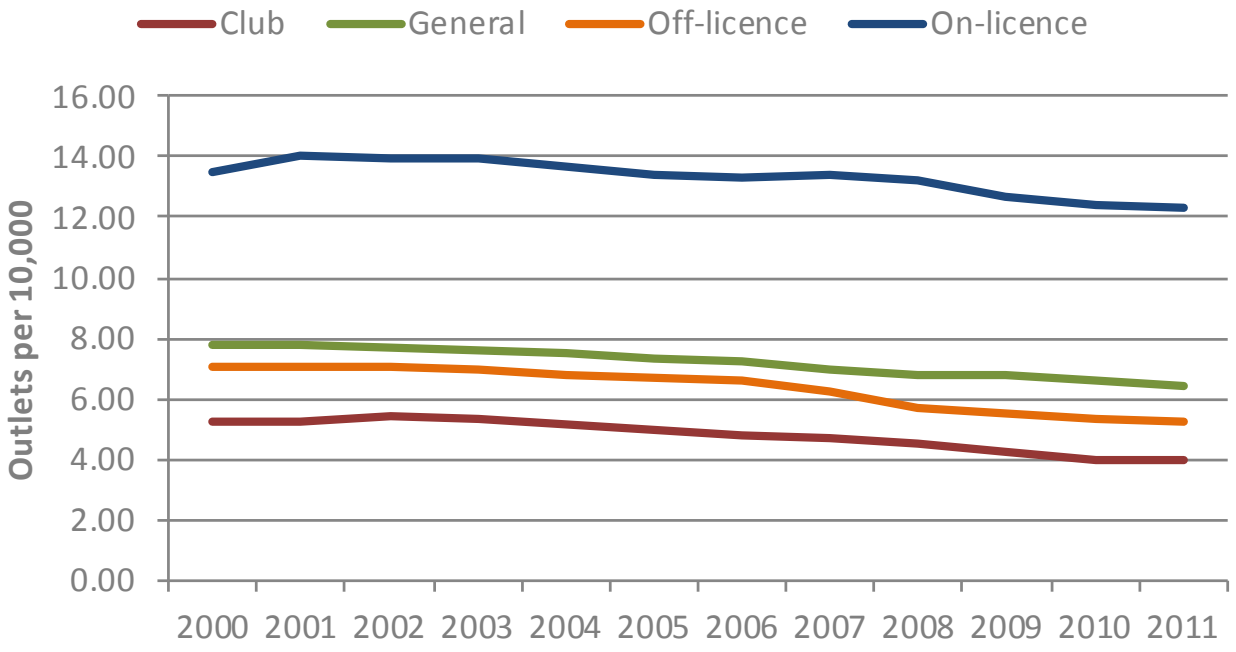
Within NSW, the density per 10,000 adults of on-premises licences has been consistently higher than the density of other licence types (see Figure 3). In addition, the density of on-premises and off-premises licences has been increasing from 2000-2011, whereas the outlet density of clubs and general licences showed small declines.

FIGURE 3: OUTLET DENSITY FOR EACH LICENCE GROUP, NEW SOUTH WALES 2000-2011



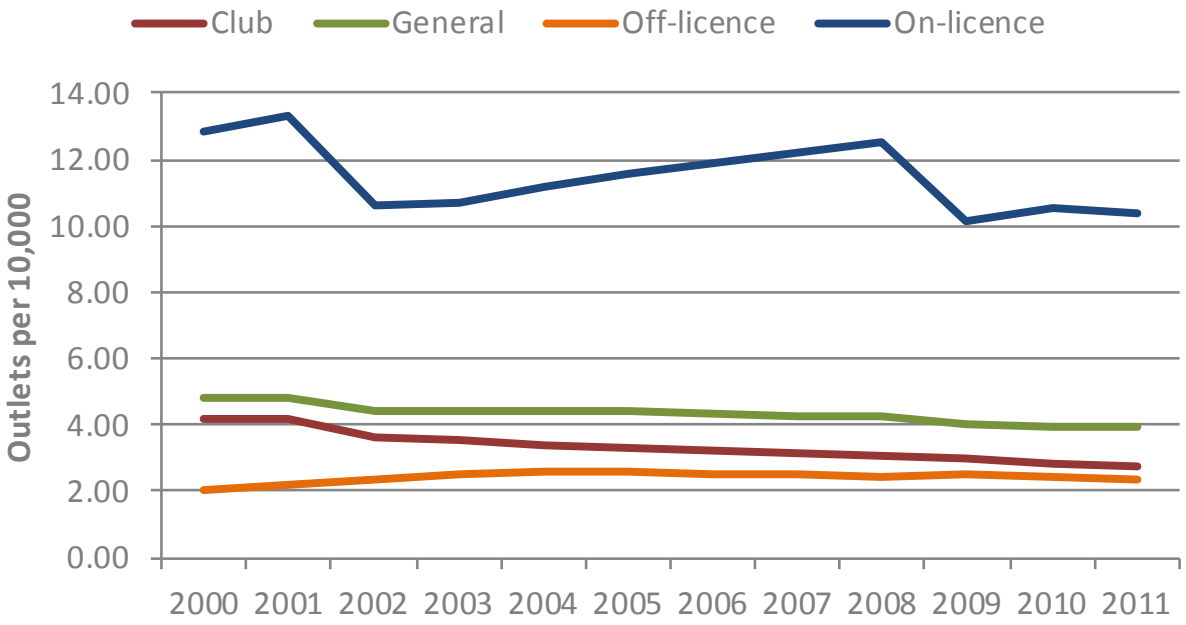
The density of on-premises licences in the NT was higher than the density of the other licence types throughout the study period (Figure 4). Among all four licence types, there were small declines in density per 10,000 adult population over the 11 year period.

Figure 4: Outlet density for each licence group, Northern Territory 2000-2011



Lastly, in Queensland (Figure 5) outlet density per 10,000 adult population for on-premises, general and club licences showed a decrease over time from 2000-2011, whereas there was a small increase in the density of off-premises licences. On-premises outlet density was consistently higher than the other three licence types.

Figure 5: Outlet density for each licence group, Queensland 2000-2011



DISCUSSION

On-premises licence types had the highest density per 10,000 adults within each state, followed by general licences, then by off-premises licences, and then by club licences. While the raw numbers of alcohol licences have increased in all states, once increases in the adult population in that state are accounted for, the density of alcohol outlets per 10,000 adults generally decreased. The exceptions to this were on-premises licences in Victoria and NSW, where the density increased between 2000 and 2011.

There were differences in the density of licence types across states. WA stands out as having the lowest density of all licence types in all years. For example, density of on-premises licences in WA in 2011 was 25 per cent of the density in Victoria. In contrast, the NT and Victoria had the highest density estimates for general and off-premises licences. However, Victoria had the lowest density of club licences, while the NT, Queensland and NSW consecutively had the highest densities. The higher density of club licences in Queensland and NSW may reflect the prevalence of league clubs in these two states compared to Victoria and WA.

LIMITATIONS OF DATA

Due to liquor licencing laws being controlled at the state and territory level, there will be small differences in the types of licences ultimately included in the four licence groups. For example, while we have excluded restricted club licences from each state, as the NT does not have a separate restricted club licence, we assume that these types of venues are included in the 'club' licence counts in NT. If this is the case, the greater number of club licences in the NT may be an artefact of our inability to exclude the restricted club licence from this group of licences in NT data. In addition, in WA the number of on-premises licensed venues is based on outlets that purchase alcohol from wholesalers, and therefore excludes venues that purchase alcohol from retail outlets. In other states and the NT, all on-premises licences are counted regardless of where their alcohol is purchased. The impact of these differences on the number of on-premises licences in WA and the other states/the NT is not clear. However, all steps were taken to ensure comparability and consistency of licensing data across states and time.

A second limitation is the exclusion of other licence types including BYO licences, limited licences and wholesaler/producer licences in our data. These exclusions mean that the data presented does not provide a picture of the total number of licences in a state/territory. Data from Victoria suggest that the number of BYO licences decreased from just under 2000 in the year 2000 to just over 1000 in 2011[25]. While the decrease in BYO licences is less than the increase in the number of on-premises licences in Victoria, it is likely that at least some of the increase in the number of on-premises licences is due to BYO licences converting to on-premises licences. As indicated, because this research project examines the relationship between permanent licence venues and adolescent alcohol use, we excluded limited licences from the data set.

In addition, we examined the density of alcohol licences at a state/territory level rather than at the postcode or community level. The density estimates reported here reflect an average estimate for the entire state/territory. It is likely that there will be some postcodes that have a much greater density of alcohol outlets per 10,000 adults than reported here, but there will also be some postcodes where alcohol outlets are less dense. The density estimates reported here need to be seen as a general, state-wide average.

Finally, we examined the number of licenced premises and did not examine the size of or the volume of alcohol sold at the different premises. A recent study from Victoria found that behind the relatively stable number of off-premises licenses lay a substantial increase in big-box 'liquor barn' stores, and a decrease in the number of conventionally-sized bottle shops[27]. The volume of alcohol sold may be an important indicator of potential alcohol-related harm in a community. It may be the case that the volume of alcohol sold per 10,000 adults has increased even if the number of licenced premises per 10,000 adults has not changed or decreased. This could be due to changes in opening hours, reductions in prices for alcohol, or increases in the demand for alcohol in a community. To obtain a more complete picture of alcohol consumption in a community, sales of alcohol or a volumetric measure of alcohol needs to be considered.

CHAPTER 2:
Trends in alcohol-related advertising expenditure in Australia 1997-2011

This chapter is based on the following publication:

White V, Faulkner A, Coomber K, Azar D, Room R, Livingston M, Chikritzhs T, Wakefield M. How has alcohol advertising in traditional and online media in Australia changed? Trends in advertising expenditure 1997-2011. Drug and Alcohol Review. 2015 34(5):521-530.

This chapter was originally published:

Trends in alcohol related advertising expenditure in Australia between 1997 to 2011.

INTRODUCTION

Between 1997 and 2011 there was an increasing trend towards deregulation of the sale of alcohol in all Australian states and territories[28]. This time period also saw an increase in the number of brands and/or variants of brands on the Australian market, exemplified by increases in the number of premixed spirit drinks in the Australian market[29].

Two previous reports have described the level of alcohol advertising expenditure in Australian mainstream media, with the first covering the years 2003-2005[30] and the second covering 2005 and 2007[31]. Taken together, the reports showed that total alcohol advertising expenditure increased between 2003-2007 with beer advertising contributing to around half the total alcohol advertising expenditure in each year. Findings from these two reports also suggested that the key media channels for advertising alcohol changed between 2003 and 2007 with spending on advertising on metropolitan free-to-air television decreasing while spending on outdoor advertising increased[30, 31]. By 2007 the proportion of total alcohol advertising expenditure spent in outdoor advertising (32 per cent) was similar to the proportion spent on free-to-air television (34 per cent)[31].

Both reports discussed above focused on the advertising spends of alcohol producers with neither report including information on the advertising spend of alcohol retail outlets. In Australia the number of alcohol retail outlets increased substantially during the late 1990s[28] with Australia's two largest 'supermarket' chains entering the alcohol retail market. These new entrants applied the techniques developed for selling groceries to the sale of alcohol, including advertisements in daily newspapers[32]. Excluding retailers from investigations of alcohol advertising expenditure may underestimate the level of alcohol advertising in traditional media.

In this chapter, advertising expenditure for the period 1997-2011 for four types of alcoholic beverages (beer, spirits, wine and premixed spirits/cider) and for retailers in eight media channels(television, newspapers, magazines, radio, outdoors, cinema, direct mail, and online) are examined.

METHODS

ADVERTISING EXPENDITURE DATA

Advertising expenditure data was obtained from Nielsen Advertising Information Services (AIS) in July 2013. Media monitored are shown in Box 1. Advertisements in all monitored media were coded for advertiser, product name, date of advertisement, and cost. Advertising costs were estimated using a mix of market rate cards, client volume spend, possible discounts achieved by the advertising buying agency and seasonal market demand.

Box 1: Definitions of the media channels monitored

PRODUCTS MONITORED	DEFINITION
Free-to-air television advertising: Metropolitan and regional free-to-air television advertising expenditure.	Advertising estimates were obtained from a combination of visual monitoring of all metropolitan television output and television stations program logs. Data from metropolitan and regional television were combined to produce an overall television expenditure estimate.
Newspapers: Major daily metropolitan newspapers in each Australian state and territory, the two national newspapers, and major regional newspapers.	All advertisements visually verified. Loose advertising inserts not included in the monitoring.
Magazines: High circulation magazines including magazine lift outs in newspapers (number of magazines: 160+).	All advertisements monitored.
Outdoors (excludes advertisements in sporting arenas).	All outdoor advertising in all major formats and sizes.
Radio: Main commercial radio stations in Melbourne, Sydney, Brisbane, Adelaide and Perth.	Daily station logs monitored. Estimates only include advertisements and do not include live discussions of products whether paid or not.
Cinema: Metropolitan and regional.	Derived directly from airtime logs of the company that manages advertising in virtually all cinemas across Australia. Stills advertising were not monitored.
Direct mail: A sample of households is used to monitor direct mail advertising.	Direct mail includes addressed items (either named household member or to householder) delivered by Australia's national postal service. Data available from January 2005.
Online (display banners).99	Over 600 websites' display image advertising monitored. Online data available from January 2008.

ANALYSIS

For each product type within each media channel, weekly spend data were summed to produce annual expenditure estimates for each beverage type and for retailers. All yearly expenditure data were adjusted to 2012 Australian dollar ($AUD) values using the consumer price index [33].

Regression analyses examined the significance of change in expenditure using year as a linear predictor. The possibility of non-linear trends was examined by testing the significance of including a quadratic year term in each model. Regression analyses also examined whether expenditure for different product types varied. Analyses were conducted in Stata 14.1.

RESULTS

The total annual (beverage and retailers) alcohol advertising expenditure is shown in Table 1 for each study year. There was a curvilinear trend over the study period ($p<0.01$) with expenditure peaking in 2007 ($AUD284,715,000) (Table 1).

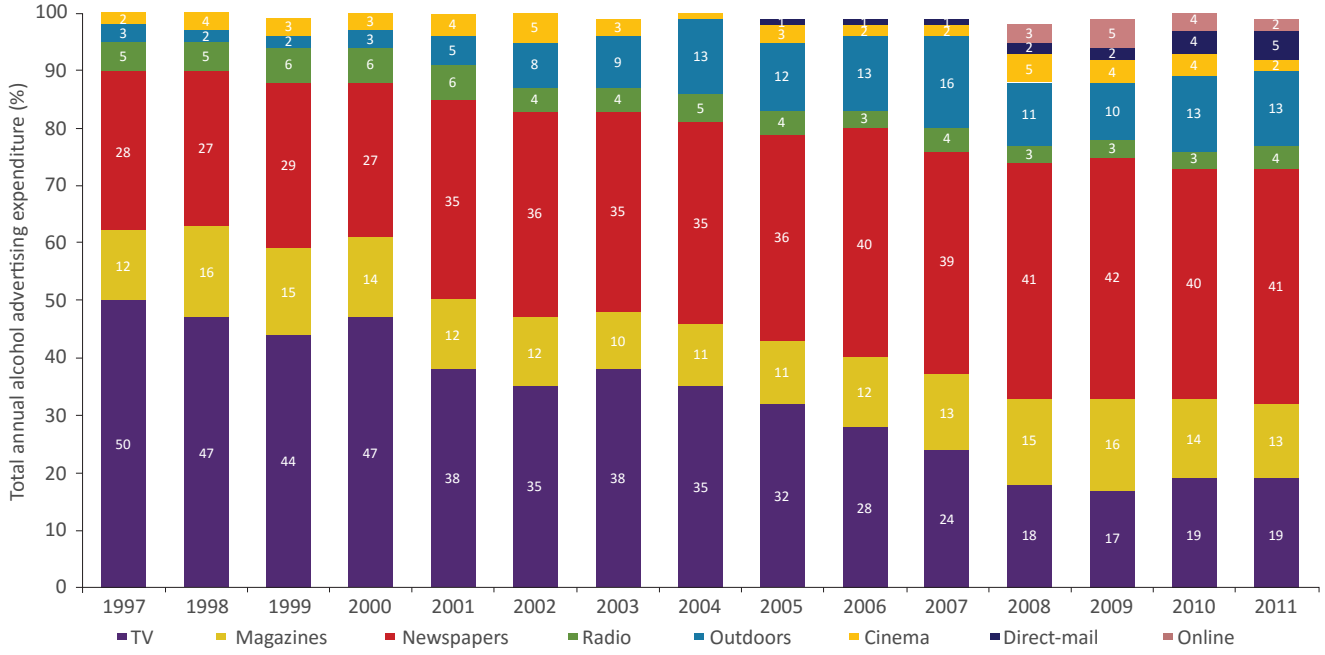
Table 1: Total alcohol advertising expenditure 1997-2011

YEAR	TOTAL EXPENDITURE ('000,000)	TOTAL EXPENDITURE BEVERAGES ('000,000)	TOTAL EXPENDITURE RETAIL ('000,000)
1997	163	117	46
1998	189	136	53
1999	188	132	56
2000	226	166	60
2001	199	133	66
2002	203	128	75
2003	232	144	88
2004	259	161	98
2005	258	154	104
2006	258	140	118
2007	285	159	126
2008	264	137	127
2009	250	131	119
2010	253	134	119
2011	222	114	108

[a] Adjusted to 2012 Australian dollars.

The proportion of advertising expenditure directed at the different media channels in each year between 1997-2011 is shown in Figure 1. Television captured the largest proportion of total annual expenditure between 1997-2000 after which there was a decline, and by 2011 advertising expenditure on television was approximately half that found in the late 1990s. Outdoor advertising expenditure increased over the study period from 2 per cent in 1998 to 13 per cent in 2011. The proportion of total advertising expenditure spent in newspapers increased over the study period from 28 per cent in 1997 to 41 per cent in 2011. Magazine ($p=0.01$) and direct mail ($p=0.02$) advertising also increased over the study period. There was no change in advertising spend on radio, in cinemas or online.

Figure 1: Proportion of annual total alcohol advertising expenditure directed at different media channels

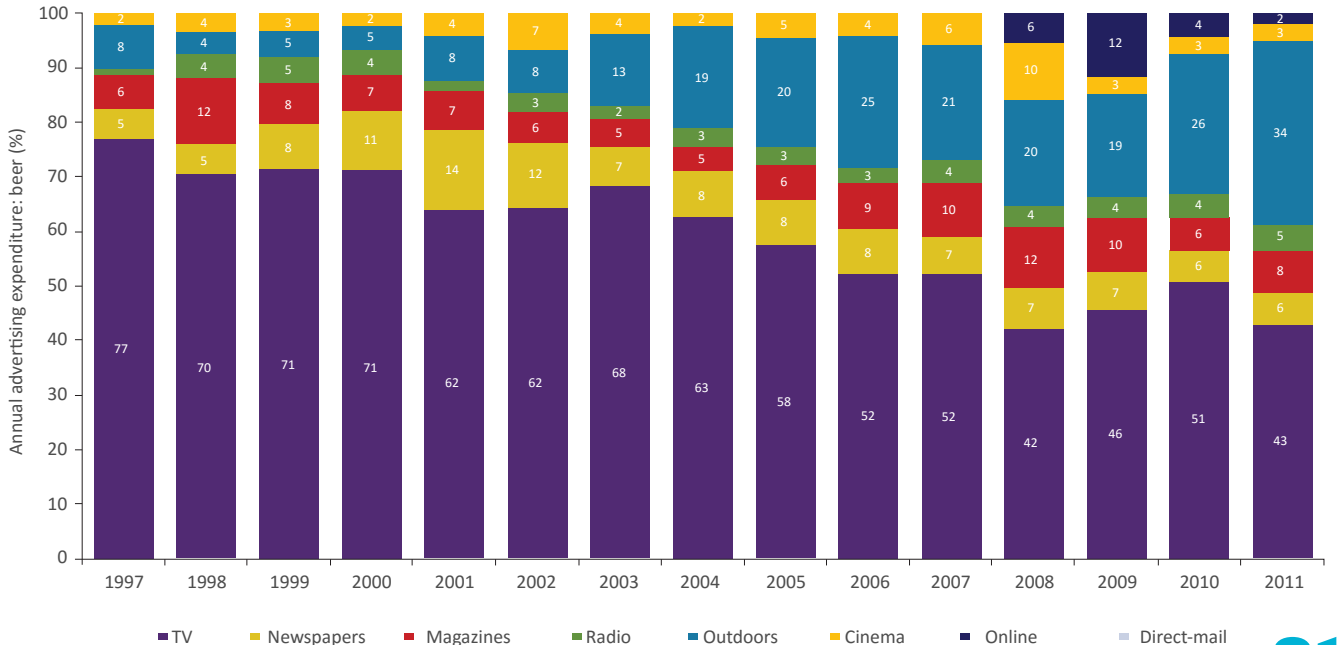


Use of different media channels by alcohol beverage categories

Beer: In all years, most of the advertising dollars for beer were directed at television (Figure 2), although the proportion of expenditure spent on television advertising declined over the study period ($p<0.001$) (Figure 2). In contrast, the proportion of beer advertising expenditure spent on outdoor advertising increased ($p<0.001$).

Figure 2: Proportion of annual advertising expenditure for beer beverages spent in different media channels

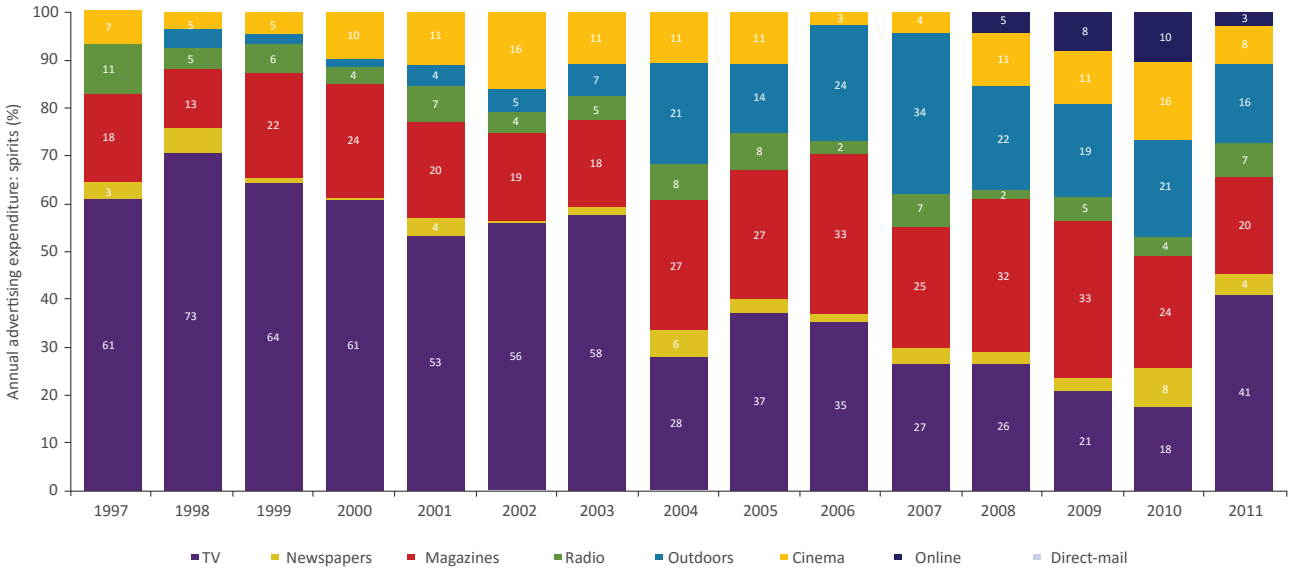
YEAR	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
$'000	60306	67248	74632	90043	59675	54114	66519	69758	70540	75153	69447	62276	50793	55952	52759
% total product spend	37%	36%	40%	40%	30%	27%	29%	27%	27%	29%	24%	24%	20%	22%	24%



Spirits: The proportion of spirits advertising expenditure spent on television advertising decreased over the study period while there was an increase in the proportion spent on outdoor advertising (Figure 3). The proportion of spirits advertising expenditure spent in magazines fluctuated between 13 per cent in 1998 to 33 per cent in 2006 and 2009.

Figure 3: Proportion of annual advertising expenditure for spirit beverages spent in different media channels

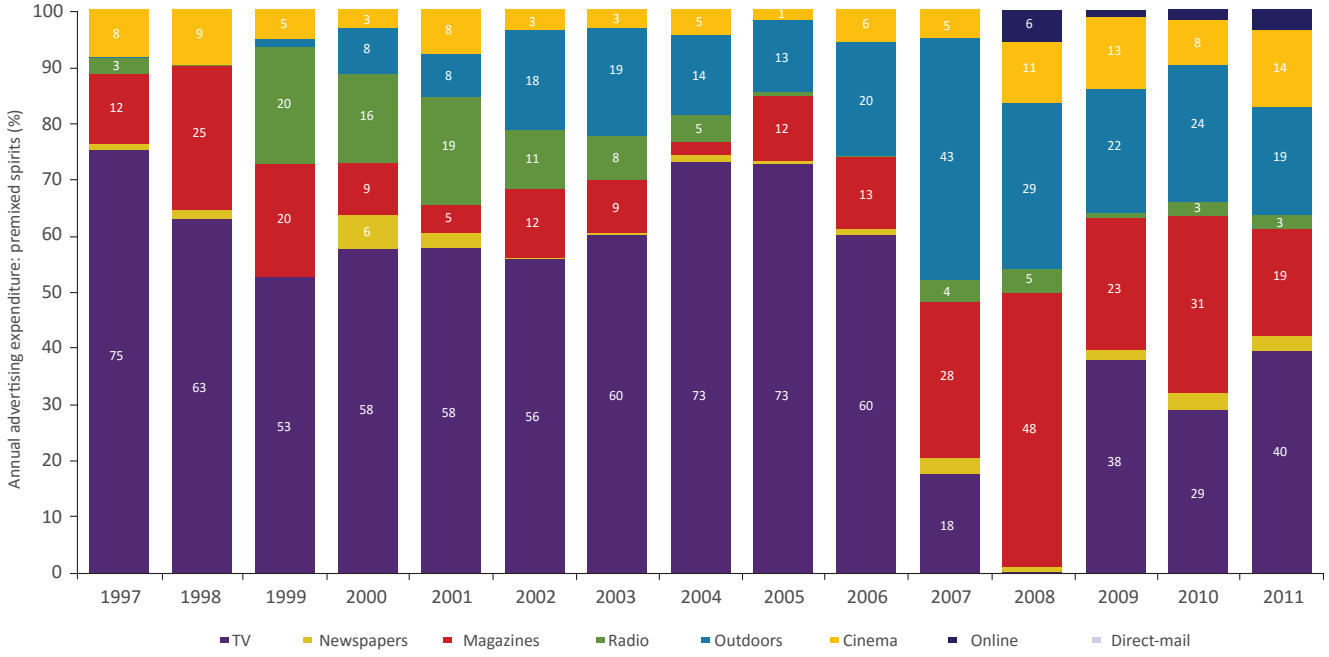
YEAR	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
$'000	29278	30177	21847	29653	30230	29434	34358	34284	27979	25340	42713	27786	23584	29726	16973
% total product spend	18%	16%	12%	13%	15%	14%	15%	13%	11%	10%	15%	11%	9%	12%	8%



Pre-mixed drinks/cider: Between 1997-2006, the proportion of annual advertising expenditure for premixed drinks directed towards television fluctuated between 53 per cent and 75 per cent (Figure 4). In 2008 there was no advertising on television or in newspapers. By 2011, 40 per cent of the annual advertising expenditure for premixed drinks was spent on television advertising. The proportion of expenditure directed towards outdoor advertising increased over the period of the study from 8 per cent in 2000 to 24 per cent in 2010, with a peak of 43 per cent in 2007 (Figure 4).

Figure 4: Proportion of annual advertising expenditure for premixed spirit beverages and ciders spent in different media channels

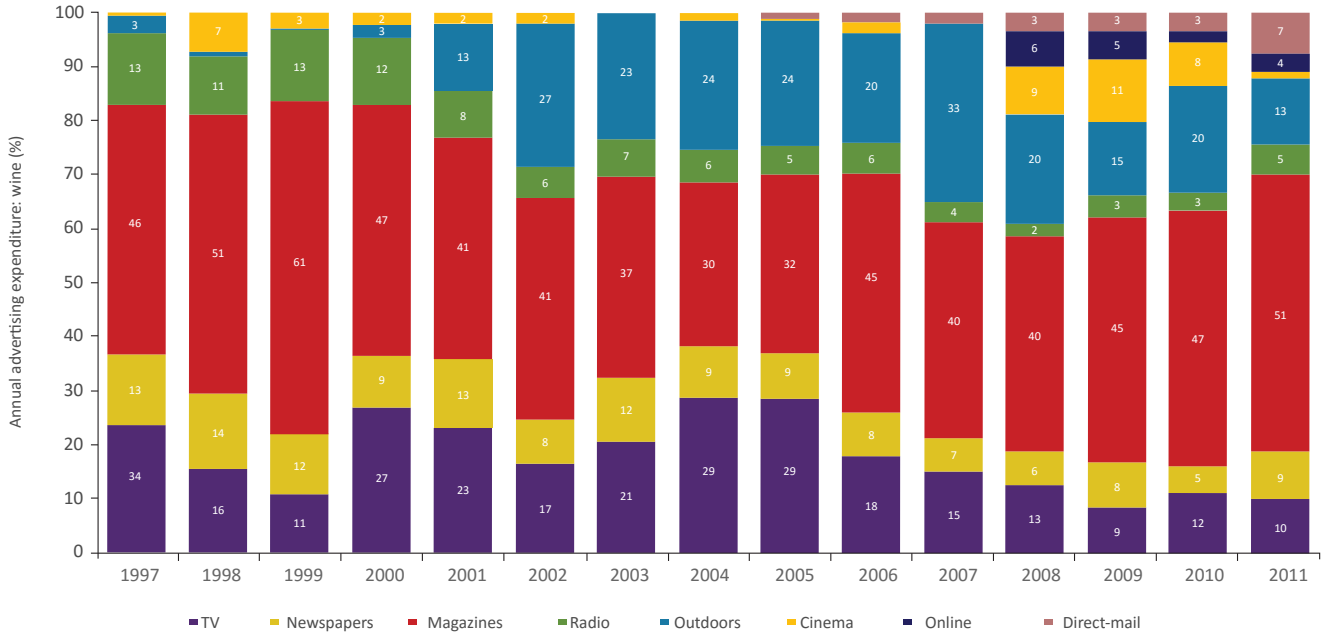
YEAR	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
$'000	9134	13322	11129	16568	16894	13830	16632	18306	14148	10902	10468	3032	10850	9307	13129
% total product spend	6%	7%	6%	7%	8%	7%	7%	7%	5%	4%	4%	1%	4%	4%	6%



Wine: At the start of the study period, magazines and television captured more than 60 per cent of the annual advertising expenditure for wine with magazines capturing the larger share of expenditure (Figure 5). Over the study period, the percentage of advertising expenditure for wine directed at television advertising decreased over the study period from 24 per cent in 1997 to 10 per cent in 2011. In contrast, the percentage of expenditure spent on outdoor advertising increased over the study period from 3 per cent in 1997 to 33 per cent in 2007 and 20 per cent in 2010.

Figure 5: Proportion of annual advertising expenditure for wine spent in different media channels

YEAR	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
$'000	17897	24598	24449	28905	25986	31063	26518	39515	41028	28004	35916	44115	45916	39313	30210
% total product spend	11%	13%	13%	13%	13%	15%	11%	15%	16%	11%	13%	17%	18%	16%	14%



Retailers: Throughout the study period advertising expenditure for retail outlets more than doubled. However as Figure 6 shows, throughout the study period the vast majority of annual advertising expenditure was spent in newspapers. There was an increase in the proportion of annual expenditure spent on direct mail at the end of the study period.

Figure 6: Proportion of annual advertising expenditure for retail outlets spent in different media channels

YEAR	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
$'000	46647	53386	55519	60364	65914	74898	87944	97627	100349	115119	123463	122492	116125	118839	108415
% total product spend	29%	28%	30%	27%	33%	37%	38%	38%	40%	46%	44%	48%	48%	47%	49%

DISCUSSION

Between 1997-2011 the alcohol industry spent an estimated $AUD3.4 billion on advertising in traditional and online media channels in Australia. However, both the main media channels used for advertising and the product advertised changed over the study period. At the beginning of our study period, television captured the largest proportion of advertising revenue (50 per cent). However by study end, only 19 per cent of the total alcohol advertising expenditure was spent on television advertising. In contrast, the proportion of total alcohol advertising expenditure spent in newspapers increased, with newspapers capturing 41 per cent of total annual alcohol advertising expenditure in 2011. Additionally, while at the beginning of the study beer captured the largest proportion of annual advertising expenditure, by study end retailers, rather than a specific alcohol beverage category, became the main alcohol advertiser in Australian mainstream media.

Our study's finding that alcohol advertising expenditure decreased on television while increasing in newspapers contrasts trends occurring for total advertising expenditure during the 2000s where the proportion of advertising expenditure captured by television was stable, while the proportion directed at the print media decreased[34]. The decrease in Australian free-to-air television advertising expenditure may reflect a move to other methods of promotion such as social media, sports sponsorship, point-of-sale advertising and paid advertising at sports events. There is limited reliable data on the alcohol industry's expenditure on sport sponsorship or point-of-sale advertising in Australia.

During the study period retailers became the major alcohol advertiser in Australia. Competition policy introduced in Australia in the late 1990s resulted in increases in the number of licensed outlets[35], and the development of alcohol outlet retail chains which were owned by one of the two leading supermarket chains in Australia. While others[35] have noted how retailers engaged in a 'price war' with heavy discounting of alcohol products with retailers capturing an increasing amount of the alcohol advertising expenditure, our data suggests that they may also have engaged in an 'advertising blitz'.

Several limitations of the data need to be acknowledged. Expenditure values are estimates and based on 'best guesses' of what may be paid for an advertisement on television, in newspapers or on billboards. An examination of advertising expenditure does not describe the audience reach of the advertising. Additionally, this study did not look at expenditure spent on advertising through catalogues and unaddressed mail, in-store advertising, sponsorships, product discounts or give-aways, as these data were not available. However as a study of the 2011 advertising expenditure data from major alcohol suppliers in the USA found that around 33 per cent was directed towards point-of-sale promotions and 18 per cent at sponsorships[36], expenditure directed towards these advertising avenues in Australia may also be significant. Advertising on pay or cable television was not included in this study as this information was not available. However, as only around 30 per cent of Australian homes had a paid television subscription by the late 2000s[37], Australian television viewing practices were still dominated by free-to-air television during the study period. Finally, advertising on YouTube® or on social media avenues such as Facebook® was not included as this information was not available.

Despite these limitations, this study provides important information regarding the level of advertising expenditure for different alcohol-related products in each traditional media channel and online. This study has highlighted a decrease in the reliance on television advertising for many alcohol products, particularly beer. It also highlighted the rise of retailers as a key alcohol advertiser utilising newspapers as their main advertising avenue. The large amount of money retailers are spending on advertising shows the importance of including this group in Australian studies of alcohol advertising.

CHAPTER 3:
Trends in alcohol advertising on television in Australia 1997-2011

This chapter was originally published:

Trends in alcohol advertising on television in Australia between 1997 and 2011.

INTRODUCTION

While most countries attempt to restrict the amount of alcohol advertising adolescents are exposed to when watching television, research consistently shows that most adolescents have been exposed to television alcohol advertisements[38-40], and that many find the advertisements appealing[41, 42]. Research has also suggested that the greater the exposure to alcohol advertising, the more likely adolescents are to have positive beliefs about the benefits of drinking alcohol and stronger intentions to drink in the future[43, 44]. Longitudinal studies have also shown a positive association between greater exposure to alcohol advertising on television and future drinking behaviours, particularly among younger adolescents[45].

To help reduce children's and adolescents' exposure to alcohol advertising, many countries including Australia have developed regulatory frameworks to control the content and placement of alcohol advertisements in different media. Australia has a national co-regulation system with government and industry, each having a part in the regulation of alcohol advertisements on free-to-air television. Through the *Competition and Consumer Act 2010*, the Australian Government is provided with a mechanism for legislative controls on advertising content while the *Broadcasting Services Act 1992*, enables the government to provide legislative controls on the content of television programs and advertising in these programs.[46] Government regulation on advertising is administered through the Australian Communication and Media Authority (ACMA) which has responsibility for the Children's Television Standard (CTS) (2009). The CTS restricts the content and number of advertisements screened during periods classified as preschool and children's viewing times[46, 47]. At the time of this study, alcohol advertisements were prohibited from being shown between 5am-12 noon and 3-8.30pm weekdays, and between 7am-8.30pm weekends and school holidays. Live broadcasts of sporting events were exempted from these restrictions, with alcohol advertisements allowed during these broadcasts regardless of the time of day[47]. Exemptions for alcohol advertisements during live sporting events changed in 2016 with alcohol advertisements only allowed after 6pm on weekends and public holidays.

Despite the restrictions on the broadcast of alcohol advertisements on Australian television, the majority of Australian adolescents report seeing alcohol advertising when watching television, with one study finding that 94 per cent of adolescents aged 12-17 years had seen alcohol advertising on television[39], while another found that 58 per cent reported weekly exposure to alcohol advertisements on television or the radio[38]. As recall bias may influence the level of advertising students report seeing, a more objective measure of adolescents' exposure to advertising on television is needed. One such measure is the advertising industry's metric of Target Audience Rating Points (TARPs or TRPs). TRPs are a per capita measure and provide an indication of the proportion of a specific population (e.g. adolescents) likely to be exposed to television advertising, with higher TRPs indicating a greater potential exposure to the advertisement. Several studies have shown that during the middle of the 2000s, Australian adolescents were potentially exposed to similar levels of alcohol advertising on television as young adults (18-24 year olds). These studies suggested that in 2005 and 2006, adolescents living in the five largest capital cities in Australia were potentially exposed to an average of between 4 and 5 alcohol advertisements a week[47, 48].

To date no Australian study has examined long-term trends in Australian adolescents' potential exposure to alcohol advertising on free-to-air television. As a consequence, we do not know whether the level of advertising found in these earlier studies has continued. In a previous study we showed that the level of alcohol advertising expenditure directed towards television decreased substantially

during the second half of the 2000s[49]. Whether this resulted in a reduction of adolescents' potential exposure to alcohol advertising is not yet understood. In this study we use TRPs data to examine trends in the potential exposure of adolescents aged13-17 years old and adults aged over 18 years of age to alcohol advertising on Australian television over the 15-year period 1997-2011. In this study, two research questions are examined: i) Has adolescents' exposure to alcohol advertising changed over this time period? and ii) Has the ratio of adolescent-to-adult advertising changed over this time period?

METHODS

ADVERTISING TARGET AUDIENCE RATING POINTS (TRPS) DATA

TRPs data was obtained from the media monitoring company responsible for determining television ratings in Australia (OzTAM). TRPs are derived from Gross Rating Points (GRPs) data which is a per capita measure of advertising exposure calculated by multiplying the total number of times an advertisement may be seen over a particular time period (i.e. the frequency of exposure), by the reach of the advertisement within the population of households with televisions.[50]

TRPs refer to particular segments of the audience (e.g. adolescents) potentially exposed to the advertisement and are calculated by multiplying GRPs by the proportion of the target audience among the larger population. GRPs and TRPs are cumulative measures and therefore a specific value could represent a range of different exposure levels. For example, 80 TRPs per month is equivalent to 80 per cent of a target audience within a media market exposed to the advertisement once during that month, or 40 per cent exposed twice during the month, or 20 per cent exposed four times during the month.

The TRPs examined in this paper are for adults (18 years and over) and adolescents (13-17 year olds). TRPs for both target audiences are derived from the range of television programs watched by these age groups. The television programs used to derive TRPs for the 13-17 year olds include both youth-specific and more general programs.

Australia's media market is divided into five metropolitan areas covering the five major mainland cities (Adelaide, Brisbane, Melbourne, Perth, and Sydney) and six regional areas. Advertising exposure data for 13-17 year olds is only available for metropolitan advertising areas. Around two-thirds of Australia's population resides in the metropolitan areas associated with these five mainland capital cities. This report focuses on TRPs for free-to-air television in these five capital cities.

ANALYSIS

Monthly TRPs data for each alcohol product category (beer, wine, spirits, premixed drinks (including cider) and retail outlets) for each target audience (adolescents and adults) were obtained for each of the five media markets. Mean monthly adolescent and adult alcohol advertising TRPs were calculated for each year within each media market for each alcohol category. To examine the relative exposure of alcohol advertising to adolescents compared to adults' exposure, the ratio of adolescent TRPs to adult TRPs within each market was calculated for each year and trends examined. Ratios greater than 1 suggest adolescents were exposed to more television alcohol advertising than adults. Relative change between 1997 and 2011 in average past-month adolescent and adult alcohol TRPs was determined. Regression analyses was used to examine the significance of change in TRPs and adolescent/adult advertising exposures, using year as a linear predictor.

RESULTS

Tables 1-6 show for each jurisdiction in each study year, the average monthly adolescent and adult alcohol advertising TRPs for all alcohol (Table 1), for beer (Table 2), spirits (Table 3), premixed spirits (Table 4), wine (Table 5) and retail outlets (Table 6). In each jurisdiction average monthly TRPs decreased for all alcohol advertising and for each beverage type.

Assuming 100 TRPs per month indicates that 100 per cent of the target audience were potentially exposed to one advertisement a month; Table 1 shows that in 1997, adolescents in five Australian mainland capital cities were potentially exposed to between 21-33 alcohol advertisements a month, while adults were potentially exposed to between 27-39 alcohol advertisements a month. Over the study period there was a decrease in adolescent and adult alcohol-related monthly TRPs in each capital city, for each beverage-type and for retail outlets. For all alcohol advertising and for all beverage types except wine, the decrease in adolescent and adult monthly TRPs was statistically significant (all $p<0.01$). For retail outlet advertising, the decrease in monthly adolescent TRPs was statistically significant for Adelaide and Perth ($p<0.05$), while for adult retail outlet advertising TRPs, the decreases were statistically significant for Sydney ($p<0.01$), Melbourne ($p<0.01$) and Perth ($p<0.01$).

For all alcohol advertising, average adolescent monthly TRPs decreased between 1997 and 2011 by around 70 per cent in four of the five markets (Sydney, Adelaide, Perth, Brisbane) (Table 1). In 2011, adolescents in these capital cities were potentially exposed to between 6-9 alcohol advertisements a month. In Melbourne, adolescent monthly alcohol advertising TRPs peaked in 2000. The 2011 adolescent monthly TRPs in Melbourne were 67 per cent less than monthly adolescent advertising TRPs in 2000. In Melbourne, adolescents were potentially exposed to an average of nearly 28 alcohol advertisements a month in 2000, while in 2011 they were potentially exposed to an average of nine alcohol advertisements a month.

A similar pattern of results was found for adult TRPs. For Sydney, Adelaide, Perth and Brisbane, monthly total alcohol advertising TRPs peaked in 1997-98, and the percentage change between 1997 and 2011 was between 58-68 per cent.

In each year and in each media market, beer advertising made the largest contribution to total adolescent and adult alcohol advertising TRPs. For instance, in Sydney adult monthly beer advertising TRPs was 60 per cent of total alcohol TRPs in 1997, and 65 per cent in 2011. In contrast, retail outlet advertising contributed to 4 per cent of total alcohol advertising TRPs in both 1997 and 2011. After beer, advertising for spirits made the next largest contribution to total alcohol advertising TRPs.

Figures 1-6 shows trends in the ratio of adolescent to adult monthly alcohol advertising TRPs in each capital city for all alcohol (Figure 1), beer (Figure 2) spirits (Figure 3), premixed spirits (Figure 4) wine (Figure 5) and retail outlets (Figure 6). For each alcohol category, the ratio of adolescent to adult alcohol advertising decreased between 1997 and 2011. While there is some variation between media markets, a general pattern emerged across the six advertising categories, with the ratio of adolescent to adult advertising at its highest in the late 1990s, and lowest at the end of the study period. The exception to this was for spirits, where the ratio was lowest in 2007-2008, after which the ratio started to increase. The decrease in the ratio of adolescent to adult advertising TRPs over the entire study period was statistically significant for all advertising markets and for all advertising categories ($p<0.01$) with the exception of wine in Melbourne.

The increase in the ratio of adolescent to adult advertising TRPs for spirits after 2007-08 was not statistically significant in any advertising market. The ratio of adolescent to adult advertising was greater than 1 for premixed spirits and spirits in 1999-2000. For premixed spirits, this pattern of results was found in all capital cities except Brisbane. For spirits, a ratio greater than 1 was found only in Melbourne and Perth. The ratio of adolescent to adult advertising TRPs for premixed spirits could not be calculated in 2008 as TRPs for both groups dropped to 0 (Figure 4).

Despite the decrease in the ratio of adolescent to adult advertising TRPs for all alcohol categories, only wine had a ratio less than 50 per cent by 2011.

Table 1: Average monthly adolescent and adult total alcohol advertisements TRPs for each metropolitan market and year

	ADOLESCENT					ADULT				
	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH
1997	3020	2143	2522	3379	3234	3504	2708	3600	3868	3909
1998	2747	2264	2400	3406	3245	3546	2866	3298	4358	3946
1999	2274	2081	2260	2426	2431	2877	2569	3261	3220	2927
2000	2459	2797	2031	2298	2547	3107	3366	3271	3107	3066
2001	2399	2344	2526	1959	2111	2969	2830	3032	2638	2594
2002	2102	2313	1917	2053	2028	3138	3032	2879	2964	2859
2003	2019	2051	2106	2278	2306	3186	2812	3231	3188	3409
2004	2011	1786	2392	1874	2302	3020	2434	3281	2776	3310
2005	1854	1725	1716	2285	2177	2597	2253	2664	3071	3127
2006	1287	1407	1256	1995	1653	2191	1897	2292	3042	2627
2007	856	863	938	1428	1086	1609	1483	1648	2371	1837
2008	725	618	854	888	712	1355	994	1527	1575	1090
2009	788	824	691	955	747	1433	1378	1439	1668	1427
2010	724	698	759	974	740	1342	1366	1479	1732	1158
2011	861	924	618	863	703	1473	1504	1289	1550	1267
% change 1997-2011	-72%	-57%	-75%	-74%	-78%	-58%	-44%	-64%	-60%	-68%

Table 2: Average monthly adolescent and adult beer advertisement TRPs for each metropolitan market region and year

	ADOLESCENT					ADULT				
	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH
1997	1810	988	1582	2184	2209	2092	1304	2346	2548	2722
1998	1655	1080	1472	2047	2132	2146	1420	2101	2710	2633
1999	1425	1191	1603	1632	1655	1981	1656	2396	2375	2203
2000	1387	1434	1146	1314	1500	1905	1966	1977	1997	1966
2001	1350	1212	1441	1032	1176	1735	1512	1752	1506	1481
2002	1112	1105	1071	1192	1132	1707	1517	1623	1809	1666
2003	1030	940	1172	1326	1359	1595	1328	1779	1867	1992
2004	1040	720	1402	1019	1351	1545	1022	1881	1555	1964
2005	887	726	887	1210	1259	1191	913	1350	1558	1762
2006	753	752	747	1292	1003	1240	975	1309	1895	1565
2007	508	469	554	967	702	893	749	927	1519	1141
2008	482	335	577	604	486	873	551	1048	1038	733
2009	521	521	472	752	559	940	879	977	1256	1076
2010	511	469	535	729	529	943	909	1023	1279	832
2011	544	553	378	558	481	956	928	795	993	862
% change 1997-2011	-70%	-44%	-76%	-7974%	-78%	-53%	-29%	-66%	-61%	-68%

Table 3: Average monthly adolescent and adult spirits advertisement TRPs for each metropolitan market region and year

	ADOLESCENT					ADULT				
	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH
1997	778	716	587	565	528	907	859	800	635	625
1998	645	709	516	763	612	837	861	683	926	741
1999	487	509	344	448	441	514	508	419	451	414
2000	576	651	408	498	539	619	630	553	525	531
2001	586	596	521	559	470	657	660	564	599	520
2002	569	703	399	425	496	767	843	536	505	622
2003	538	613	490	437	499	800	772	716	549	701
2004	283	318	236	156	196	414	430	335	214	269
2005	305	314	264	331	298	422	405	421	464	437
2006	247	274	229	289	247	435	410	447	546	483
2007	190	211	205	254	202	414	433	387	526	387
2008	147	151	182	117	115	298	248	316	282	186
2009	121	124	120	85	62	242	202	251	187	155
2010	96	100	114	91	80	165	189	216	156	109
2011	177	214	139	147	107	270	289	254	255	180
% change 1997-2011	-77%	-70%	-76%	-74%	-80%	-70%	-66%	-68%	-60%	-71%

Table 4: Average monthly adolescent and adult premixed spirits advertisement TRPs for each metropolitan market region and year

	ADOLESCENT					ADULT				
	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH
1997	311	302	247	388	354	320	334	289	399	390
1998	305	344	301	418	381	379	401	366	486	430
1999	308	331	197	295	289	299	320	258	292	246
2000	305	506	284	364	411	317	457	413	368	411
2001	271	291	384	242	268	299	336	459	292	307
2002	253	285	313	281	255	384	353	477	370	326
2003	295	312	313	349	305	469	396	479	467	453
2004	380	364	417	353	378	554	479	618	537	574
2005	299	300	293	390	331	390	386	437	519	476
2006	181	226	173	241	232	286	294	304	340	296
2007	44	35	67	52	45	84	49	122	65	72
2008	0	0	4	0	0	0	0	4	0	0
2009	75	81	56	65	73	115	128	112	91	103
2010	49	48	53	87	74	91	107	97	151	97
2011	86	108	65	106	81	143	175	137	180	140
% change 1997-2011	-72%	-64%	-74%	-73%	-77%	-56%	-48%	-53%	-55%	-64%

Table 5: Average monthly adolescent and adult wine advertisement TRPs for each metropolitan market region and year

	ADOLESCENT					ADULT				
	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH
1997	121	136	106	240	143	185	211	165	284	172
1998	142	132	110	178	121	184	184	149	236	142
1999	55	50	116	50	46	83	85	189	101	63
2000	191	207	194	123	98	266	312	328	217	158
2001	192	246	181	127	197	278	323	257	241	285
2002	168	220	133	155	144	280	318	243	281	244
2003	156	187	131	165	144	322	316	258	305	263
2004	308	384	337	347	378	508	502	447	470	503
2005	363	386	272	354	288	594	549	456	531	453
2006	106	155	107	173	171	231	218	232	261	283
2007	115	148	112	155	137	218	253	212	260	237
2008	96	132	91	167	112	184	196	160	255	172
2009	71	98	42	52	53	136	169	98	126	94
2010	67	81	58	67	58	143	161	142	146	119
2011	53	49	37	50	34	105	111	103	110	85
% change 1997-2011	-56%	-64%	-65%	-79%	-76%	-43%	-48%	-37%	-61%	-50%

Table 6: Average monthly adolescent and adult alcohol retail outlet advertisement TRPs for each metropolitan market region and year

	ADOLESCENT					ADULT				
	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH	SYDNEY	MELBOURNE	BRISBANE	ADELAIDE	PERTH
1997	127	122	123	508	171	154	144	179	607	216
1998	166	201	106	479	258	211	250	136	637	316
1999	52	162	46	438	314	63	190	72	598	420
2000	93	139	102	413	143	148	192	150	560	164
2001	98	101	99	211	151	109	135	97	354	211
2002	59	56	127	605	275	90	70	203	872	353
2003	95	162	189	388	134	136	222	300	518	146
2004	199	309	257	670	353	309	438	323	1034	521
2005	149	231	84	552	157	251	373	159	741	248
2006	302	416	158	540	326	546	609	298	822	560
2007	209	305	253	432	417	373	469	495	737	753
2008	142	176	89	301	447	236	283	163	535	735
2009	117	193	28	258	371	217	316	50	449	674
2010	92	199	42	197	306	179	380	75	373	481
2011	38	67	28	139	139	65	130	61	292	261
% change 1997-2011	-70%	-45%	-77%	-73%	-19%	-58%	-10%	-66%	-52%	-21%

Figure 1: Ratio of adolescent to adult monthly all alcohol advertising TRPs for five advertising markets in each survey year

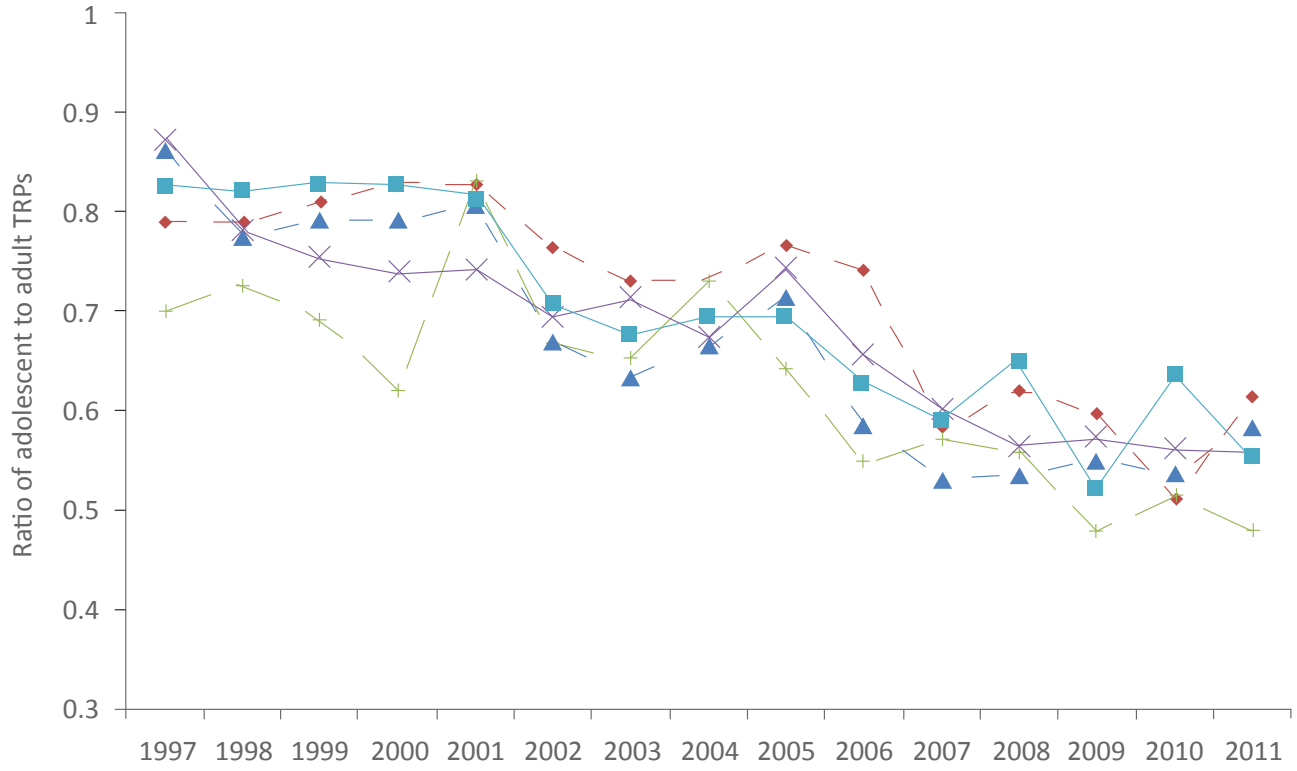


Figure 2: Ratio of adolescent to adult monthly beer advertising TRPs for five advertising markets in each survey year

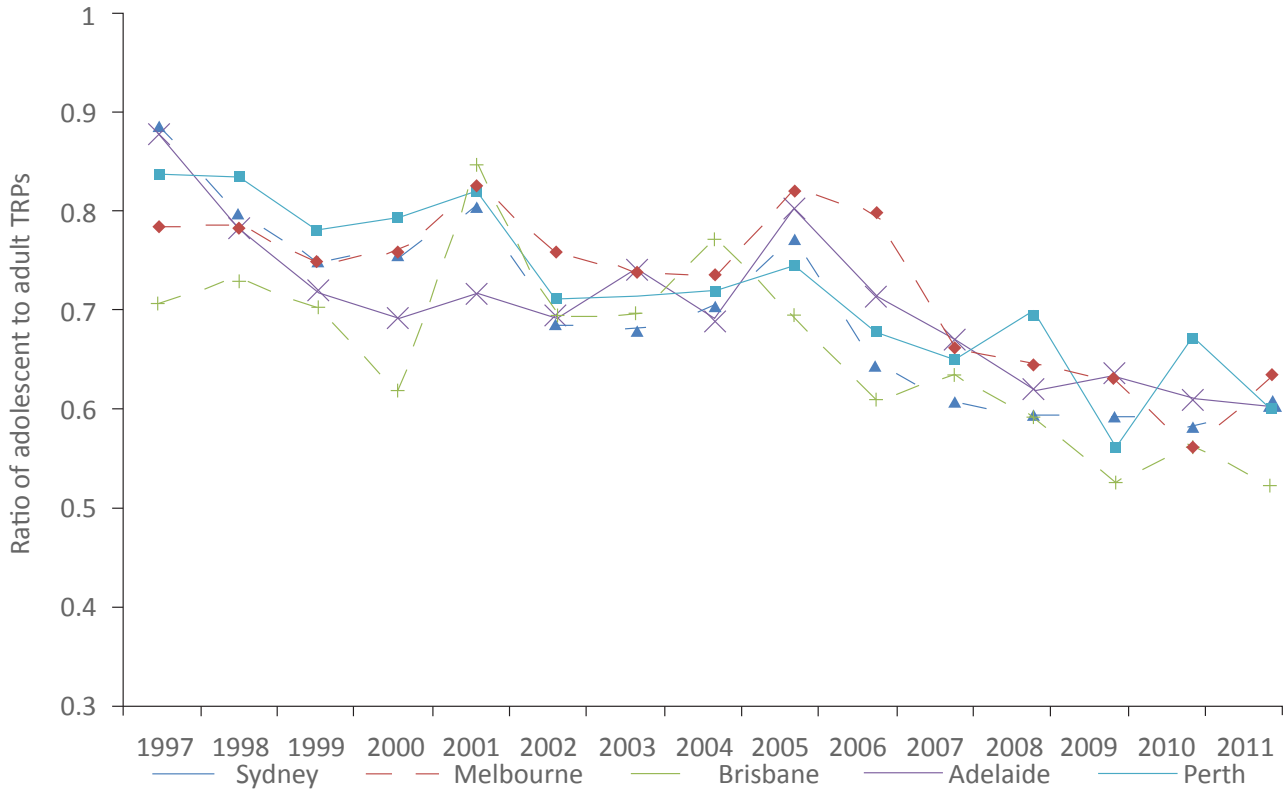


Figure 3: Ratio of adolescent to adult monthly spirits advertising TRPs for five advertising markets in each survey year

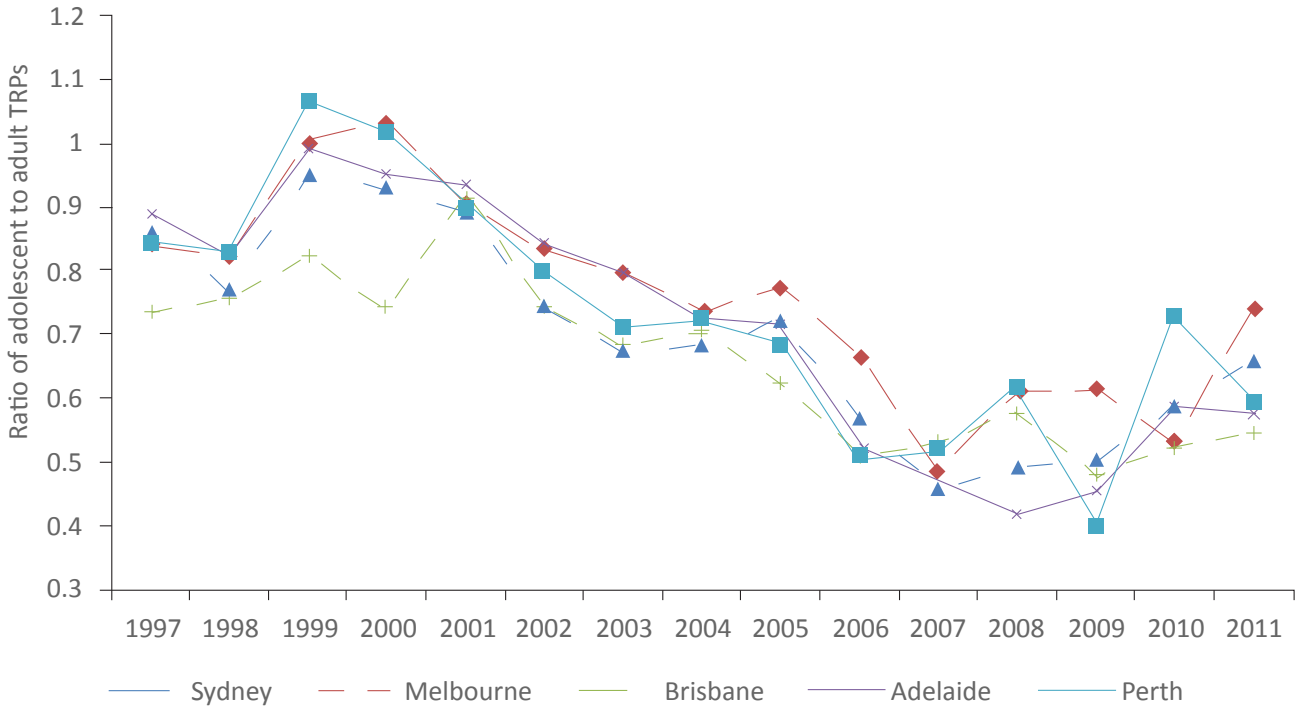


Figure 4: Ratio of adolescent to adult monthly premix spirits advertising TRPs for five advertising markets in each survey year

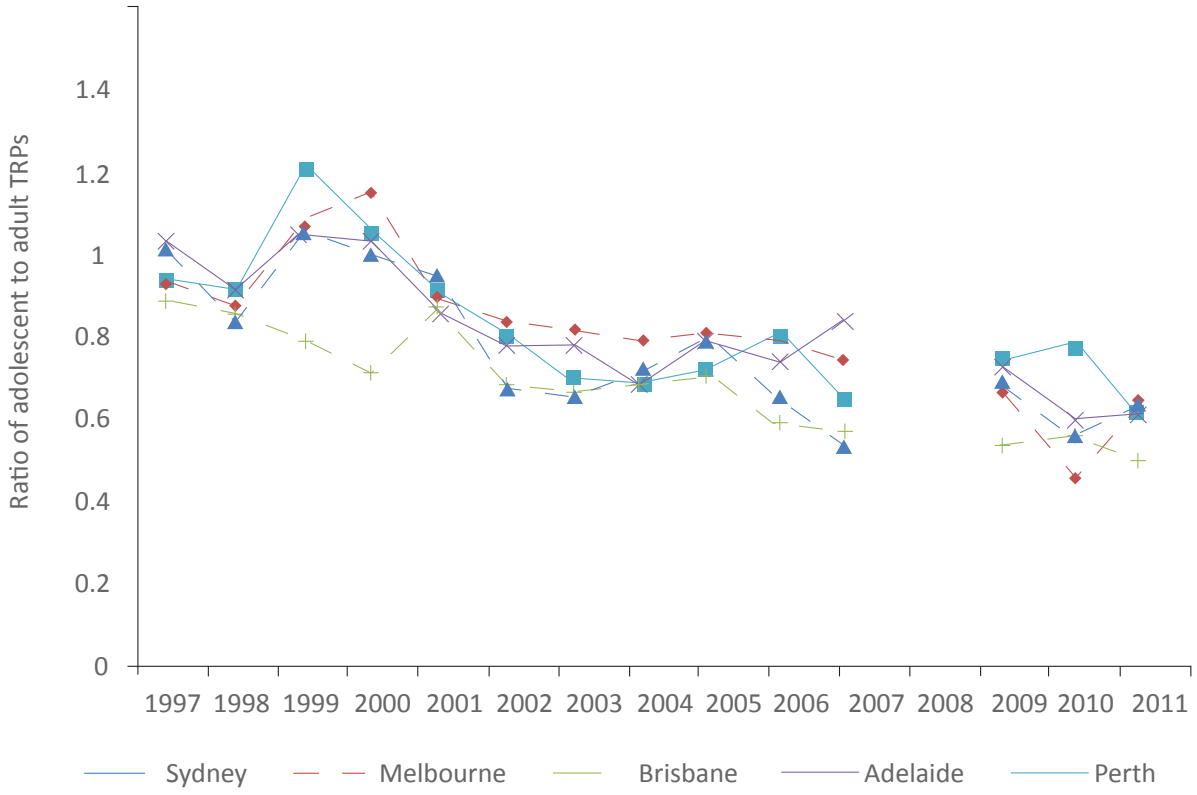


Figure 5: Ratio of adolescent to adult monthly wine advertising TRPs for five advertising markets in each survey year

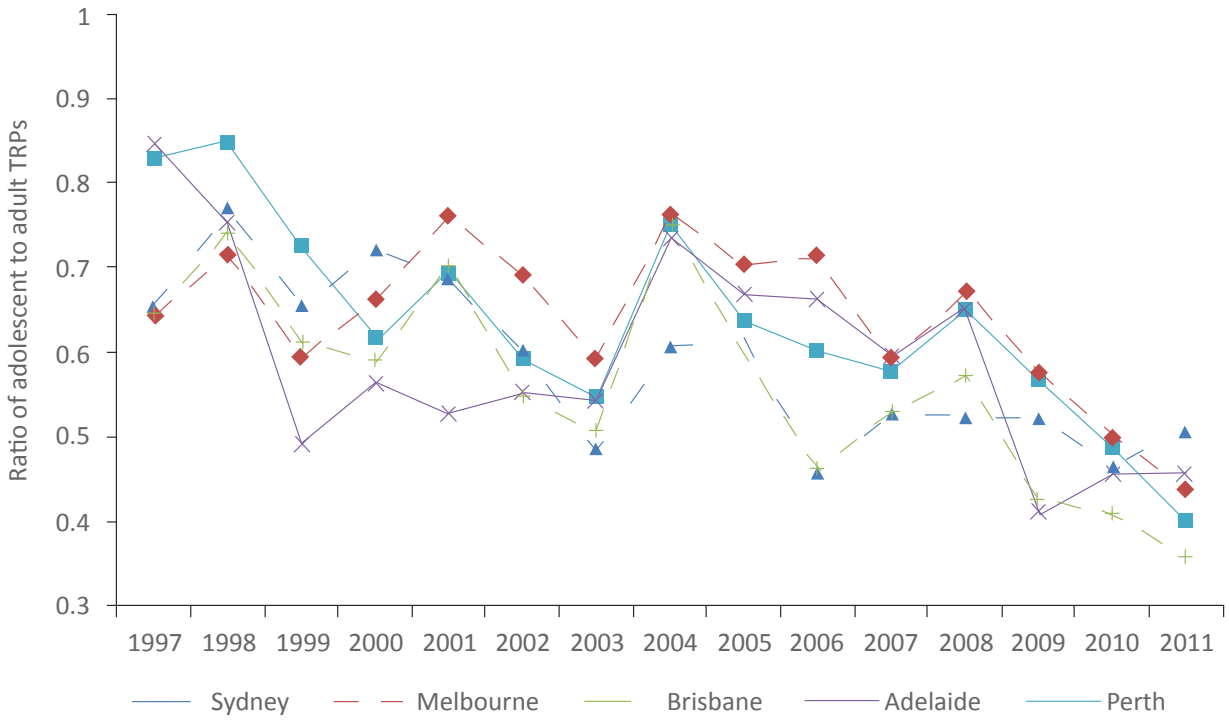
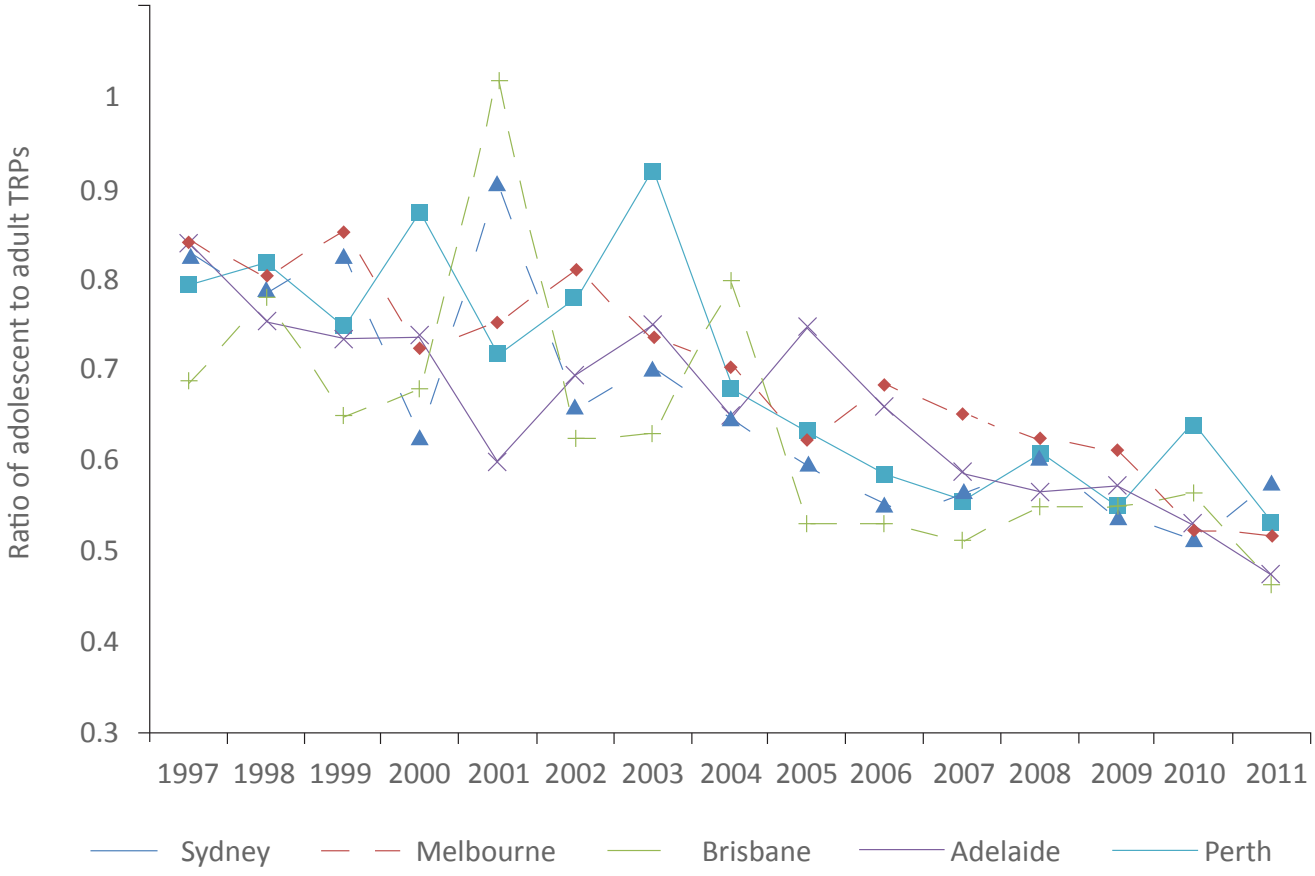


Figure 6: Ratio of adolescent to adult monthly retail outlets advertising TRPs for five advertising markets in each survey year



DISCUSSION

The analyses presented here provide new insights into the potential exposure of Australian adolescents to alcohol advertising over the period 1997-2011. At the beginning of our study period, adolescents in the media markets associated with the five largest Australian capital cities were on average potentially exposed to between 21-34 alcohol advertisements a month. By the end of the study period, adolescents' average potential exposure had reduced to an average of between six and nine alcohol advertisements a month. The decrease in alcohol advertising on television was not restricted to adolescents, with adults' potential exposure to alcohol advertising halving over the study period, from an average of 27-39 advertisements a month in 1997 to 13-16 alcohol advertisements a month in 2011. As the proportion of 14-24 year olds who watched television was relatively stable between 1997-2008 (at approximately 94 per cent)[51, 52], the decrease in adolescent alcohol TRPs during these years is not due to a declining adolescent audience.

Our study also found that in the late 1990s-early 2000s, adolescents were potentially exposed to alcohol advertisements at almost the same level as adults. Between 1997-2001 the ratio of adolescent to adult potential exposure to alcohol advertisements ranged between 70-80 per cent in all five media markets. This means that during these years, for every 10 alcohol ads potentially seen by adults, adolescents were potentially exposed to between seven to eight alcohol advertisements. While this ratio had decreased by 2011, even then, for every 10 alcohol advertisements adults were potentially exposed to in an average month, adolescents were potentially exposed to around five or six. This study's results suggest that despite substantial decreases in alcohol advertising on television, in 2011 an audience who could not legally purchase the advertised product was still exposed to many alcohol advertisements.

This is the first study to examine the level of alcohol advertising on Australian television using TRPs over a 15-year period. It is also the first study to undertake this examination of long-term trends using data from media markets covering the five most populous capital cities in Australia. Previous Australian studies that have examined adolescents' exposure to alcohol advertising on television using TRPs have focused on either one or two media markets, or on data for a far more limited time period, generally spanning one to three years[30, 47, 48]. One study that utilised data from the Sydney market over the period February 2005 to March 2006 found adolescents were potentially exposed to an average of around 4.3 alcohol advertisements a week (approximately 17 a month)[48]. Another study using data for five mainland capital cities for the period October 2005 to November 2006 reported that adolescents were exposed to an average of between 4 and 5 advertisements a week (approximately 16-20 ads a month). These estimates are similar to our estimates of adolescents in these markets potentially exposed to between 17 and 23 advertisements a month in 2005- 06.

Fielder, Donovan and Ouschan (2009)[47] and Winter, Donovan and Fielder (2008)[48] reported differences in the level of advertising TRPs adolescents in the five capital city markets were potentially exposed to, with adolescents in the Adelaide and Perth markets potentially exposed to the highest levels of TRPs in a 12-month period during 2005-06. That study also showed adolescents in these two markets were potentially exposed to higher levels of advertising than 18-24 year olds in Sydney, Brisbane and Melbourne[47]. Our study also found higher adolescent alcohol TRPs in the Adelaide and Perth markets in 2005, with our longer period of study enabling us to determine that this pattern of results was not unique to 2005-06. Rather, our data suggests that adolescents in Adelaide and Perth were potentially exposed to greater levels of alcohol advertising than their same-age counterparts in other Australian capital cities in most years between 1997-2007. However, our study also shows that by 2011, adolescent alcohol advertising TRPs were fairly similar in the five media markets.

Of the five alcohol beverage categories we examined, advertising for beer made the largest contribution to overall alcohol TRPs in all study years. Adolescent and adult TRPs in each beverage category decreased over the study period and the percentage change between 1997-2011 was similar across all categories. Retail outlet advertising TRPs made the smallest contribution to overall alcohol advertising TRPs. Our study on alcohol advertising expenditure in Australia found that the preferred advertising channel for retailers were newspapers[49] with around 80 per cent of their advertising expenditure spent on this media channel.

At the beginning of our study period, the level of alcohol TRPs adolescents in all media markets were potentially exposed to was similar to adult levels. While for most beverage types the ratio of adolescent to adult potential exposure was under 1, this was not the case for the beverage categories of premixed spirits and spirits. We found that for premixed spirits in 1999 in four of five markets, the ratio of adolescent to adult TRPs was greater than 1. In 2000, this ratio was greater than 1 in two markets, with ratios close to 1 in another two markets. Spirits had a ratio greater than one in two media markets in 1999 and 2000 and ratios close to 1 (>0.90) in another two media markets in these years. A ratio greater than 1 implies that on a per capita basis, adolescents are 'overexposed' to that advertising relative to adults[50]. Winter, Donovan and Fielder (2008)[48] also found similar levels of TRPs for adolescents and young adults in their study of alcohol advertising on Sydney's television in 2005-06. They suggested that this situation could arise from either inefficient advertising strategies of media buyers, or active targeting of adolescents by marketers. Given premixed alcohol products have been shown to have strong appeal to adolescents through their sweet taste, product design and marketing campaigns[53, 54], the overexposure of adolescents to premixed alcohol beverage advertisements during this period seems unlikely to have been due to inefficient media buys.

We found virtually no adolescent or adult TRPs for premixed spirit drinks in 2008, the year the tax on premixed spirit based drinks increased. In both the lead up to the introduction of this tax increase and in the year following it, there was substantial debate in the news media and in parliament about the influence of premixed spirit drinks on young people's drinking, loopholes allowing these drinks to be taxed as lower rates than straight spirit drinks, and the potential of tax increases to reduce heavy consumption of these drinks by young people[55]. The lack of advertising for these beverages during 2008 might reflect an industry strategy of trying to reduce their profile during this time.

Our finding that the ratio of adolescent to adult alcohol advertising TRPs decreased over the study period may be the result of more age appropriate media buys for alcohol in the later part of our study. However as adult alcohol advertising TRPs decreased by around 60 per cent in four of the five media markets, other factors seem to be influencing the diminution of alcohol advertising on Australian television. A consistent downward trend was seen from 2004 onwards in both adolescent and adult TRPs in all media markets, except Adelaide. Our analysis of alcohol advertising expenditure in traditional media outlets, found that the amount of money directed towards television for advertising decreased after 2004, and by 2011 television captured only 19 per cent of the total alcohol advertising expenditure[49]. That study found that advertising expenditure in newspapers increased during the 2000s, and by 2011 newspapers captured the largest proportion of alcohol advertising expenditure (41 per cent). This change resulted in retailers, rather than a specific beverage category, becoming the main advertisers of alcohol products in Australian mainstream media.

The decrease in alcohol advertising on free-to-air television may reflect a move to other advertising channels such as internet advertising, sponsorship, point-of-sale advertising, letterbox drops and/or direct marketing. Information on advertising expenditure or the reach of advertising in these channels is not readily available in Australia. Data on alcohol advertising expenditure in a broader range of advertising channels is available in the USA [36] and the UK[56, 57]. In the USA the percent of total alcohol advertising spent on point of sale marketing increased from 19 per cent in 2005 to 29 per cent in 2011, while the per cent captured by sponsorship grew from 16 per cent in 2005 to 18 per cent in 2011. In both the USA and the UK, online/digital alcohol advertising expenditure grew in the late 2000s with this channel accounting for 8 per cent (up from 2 per cent in 2005) of total alcohol advertising expenditure in 2011 in the USA, but only 1.5 per cent (up from 0.7 per cent in 2008) of total alcohol advertising expenditure in 2011 in the UK [56]. This data suggests that the newer advertising channels are growing in importance in the overall marketing strategy of alcohol in some countries. While data from other countries may provide an indication of what may be happening in Australia, Australian specific data are needed to ensure the complete picture of alcohol-related marketing is developed.

Several limitations of the study need to be acknowledged. First we were not able to capture information on exposure to alcohol advertising on pay or cable television. However, as subscription rates to pay television in Australia were only around 30 per cent by the late 2000s[37], free-to-air television dominated Australian television viewing in the period of the study. Second we did not examine the time of day or types of programs that are most likely to expose adolescents to alcohol advertising. Third we

compared adolescent alcohol-related TRPs to those for the population of adults aged 18 years and over. Other studies in this area have compared adolescent TRPs with those for young adults (aged 18-24)[47, 48]. Had we compared our adolescent TRPs to those for young adults, greater similarities may have been observed. Finally, as our analysis only examined paid advertising, exposure to alcohol advertising generated through sponsorships was not assessed. As a recent study suggested that for every minute of paid alcohol advertising in televised sports broadcast there was about four minutes of 'in-game' alcohol advertising[58], our study is likely to have underestimated the levels of alcohol advertising adolescents and adults were potentially exposed to on television.

Despite substantial decreases in both adolescent and adult alcohol advertising, TRPs on Australian television over the 15-year period of this study show that in 2011 adolescents were still exposed to a significant number of alcohol advertisements each month. Our findings suggest that self-regulation of alcohol advertising on television is not sufficient to stop adolescents from being exposed to these advertisements. Further research is needed to determine whether the decreasing trends we found for 2011 have continued.

CHAPTER 4:
Trends in alcohol coverage in Australian newspapers: 2000-2011

This chapter is based on the following publication:

Azar D, White V, Bland S, Livingston M, Room R, Chikritzhs T, Durkin S, Gilmore W, Wakefield M. 'Something's Brewing': The Changing Trends in Alcohol Coverage in Australian Newspapers 2000-2011. Alcohol & Alcoholism 2014; 49(3):336-42.

INTRODUCTION

News media, including newspapers, play a key role in setting public agendas and can help to frame discussion of issues[59]. How alcohol use is portrayed in the media can influence the public's notion of acceptable or unacceptable use.[60, 61] Several American studies have examined the frequency of reporting and thematic framing of alcohol-related stories in the print media finding that anti-alcohol issues and stories relating to harmful consequences of drinking, such as trauma, violence and drink driving, dominated the coverage[62-66]. One set of studies from the USA found that greater coverage of drink driving issues in newspapers was associated with increased policy in this area, which related to changes in drink driving behaviour and reduced perceptions of the social acceptability of this behaviour[60, 67].

Australian studies of news stories have tended to examine reports of a specific alcohol-related policy issue. One study examined print and television news stories relating to the implementation of an increase in excise on ready-to-drink alcoholic beverages[68]. Another study[55] examined news stories covering proposed restrictions on alcohol-advertising in the 12 months before and after the release of a report recommending restrictions on alcohol promotion.

The present study provides a comprehensive overview of trends in the frequency, prominence, content and slant of newspaper articles relating to alcohol issues published in Australia over a 12-year period, 2000-2011.

METHODS

NEWSPAPERS AND SEARCH CRITERIA

The daily and Sunday newspapers published in each Australian state and the Northern Territory's capital cities between 2000 and 2011 were eligible for study. Throughout the study period, only one daily newspaper (and its Sunday edition) was published in five Australian states/territories. Articles were sourced from Factiva — a database that indexes all newspaper articles in plain text format. Search terms shown in Box 1 were searched for in an article's headline and body.

Box 1: Search strings used in Factiva database search

1. Alcohol* AND at least four of the following: drink*, drunk*, drank, intoxicat*, detox*, driv*, bing*, beer*, spirits, wine*, alcopop* beverage*, grog, booz*, bottle*, consum*, breath test*, blood, liquor*, licen*.
2. Alcohol* at least four times AND at least one of the terms above.
3. Booz* AND drink* AND at least one of the following: drunk*, driv*, beer*, wine*, alcopop*, liquor*, licen* NOT alcohol*.

A total of 40,370 articles were identified from the search. As a sample of newspaper articles can capture similar information to a review of all articles[69], we identified a sample of newspaper articles by selecting every fifth article. A sample of 8,059 articles were selected and reviewed for eligibility. Eligible articles had to be at least five sentences long (including the title), with at least 50 per cent of its paragraphs focusing on alcohol or alcohol-related issues. A total of 4,217 articles were identified as eligible for content analysis.

CODING PROCEDURES

Two trained coders reviewed hard copies of all eligible articles. For each article the name and date of the newspaper publication were recorded, along with prominence of the article (first four pages of the newspaper or not), article type (hard news, commentary (included editorials, letters, columns, opinion-editorials, information pieces and reviews) and other.

Articles were coded for 'topic slant' with coders judging whether the topic slant was social disapproval (e.g. long-term health effects of heavy alcohol consumption), social approval (e.g. opening of a new cocktail bar), mixed (e.g. increase in sales of cider beverages while beer sales declined) or neutral about alcohol use. Commentary articles were coded for 'opinion slant' of the author, e.g. social disapproval, social approval, mixed, or neutral about alcohol use.

All articles were coded for each source mentioned and the number of sources mentioned. The sources coded for were: alcohol industry (e.g. bar owner); politicians; law enforcement; research organisations; health professional/organisation/campaign; community organisation; sports industry; general public; victim/accused/family/friends; or other. The distinction between research, health and community organisations was difficult to discern at times as some sources could fit into all three categories. In these instances, the source was coded as research organisation if it primarily conducted research, health if it primarily provided health services, and community if it aimed to prevent alcohol problems in the community.

The article's dominant theme was identified and coded for one of ten themes listed in Box 2. Articles relating to advertising restrictions were included in the promotion theme.

Box 2: Themes coded for in newspaper articles

ARTICLE THEME	DESCRIPTION
Alcohol consumption	Alcohol consumption trends; how or why people drink.
Trauma	Alcohol-related violent and non-violent crimes, injury; drink-spiking.
Drink driving	Drinking and driving enforcement, legislation and litigation.
Prevention	All articles relating to efforts to stop or limit drinking, national and local campaigns, task forces.
Health & information	Positive and negative health effects of alcohol use; physical and social aspects of alcohol use.
Restrictions/policy	Alcohol taxation and price; venue trading lockouts; warning labels on beverages.
Promotion	Critiques of alcoholic beverages, alcohol outlets and alcohol-containing recipes; restrictions on advertising and promotion.
Beverage services	Liquor licensing issues such as licence enforcement, legislation and litigation; trading hours, happy hours.
Business	Production, sales patterns of beverages, alcohol company stock prices and mergers.
Other	Articles that do not match any other themes.

DATA ANALYSIS

Poisson regression analysis was used to assess the extent to which article characteristics changed over time, accounting for the total number of articles coded each year. Where an inadequate fit of the Poisson model was observed, negative binominal regression analysis was used.

RESULTS

The number of alcohol-related articles found increased over the study period from 186 in 2000 to a high of 546 in 2009 (Table 1).

Table 1: Number of alcohol-related newspaper articles reviewed by year: 2000-2011

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Count	186	228	274	300	305	341	309	401	503	546	452	372

Type: Across the study period, 61 per cent of articles were classified as hard news with commentary articles accounting for 37 per cent. While the proportion of hard news and commentary articles was relatively stable over time, there was an increase in the proportion of 'other' articles.

Theme: Over the study period, the most common themes were: promotion (21 per cent), drink driving (16 per cent), restrictions/policy (16 per cent) and alcohol consumption issues (13 per cent) (Table 2).

Themes that declined over time were promotion (2002: 28 per cent; 2008:14 per cent; p=0.003), business-related issues (2003: 10 per cent; 2009: 4 per cent; p=0.013) and 'other' (p<0.001).

Table 2: Themes covered in newspaper alcohol-related articles across the study period

THEME	%	FIRST 4 NEWS PAGES (%)
Promotion	20.6	3
Drink driving	16.4	28
Restrictions	15.7	23
Alcohol consumption	12.6	13
Beverage services	8.3	21
Prevention	7.1	20
Trauma	6.6	24
Health and information	6.4	16
Business	6.0	8
Other	0.4	19
Total		17

Topic slant: Around half of the articles (53 per cent) were coded as socially disapproving of alcohol use, while 40 per cent approved of alcohol use. The proportion of articles expressing disapproval of alcohol use increased over time from 40 per cent in 2000 to 60 per cent in 2009 (p=0.003), while approval of alcohol use decreased from 51 per cent in 2000 to 34 per cent in 2009 (p=0.002) (Table 3).

Table 3: Trends in topic slant of alcohol-related newspaper articles over the study period

	SLANT OF ARTICLE			
	SOCIAL DISAPPROVAL	SOCIAL APPROVAL	MIXED	NEUTRAL
YEAR	%	%	%	%
2000	40	51	8	2
2001	54	41	5	0
2002	47	45	7	1
2003	46	48	4	2
2004	49	44	7	0
2005	52	41	6	1
2006	53	41	5	1
2007	56	37	6	1
2008	57	36	6	1
2009	60	34	6	1
2010	53	40	7	1
2011	53	41	5	0

Article prominence by theme: Of the total news articles, 17 per cent appeared in the first four pages of the newspaper, which did not vary over time. The proportion of articles published in the first four pages of the newspaper varied by theme category, with 28 per cent of drink driving articles and 24 per cent of trauma articles appearing in the early general news sections, whereas promotion (3 per cent) and business articles (8 per cent) were less prominent.

Opinion slant: Sixty-two per cent of commentary articles expressed approval of alcohol use, 27 per cent expressed disapproval, 7 per cent had a mixed opinion and 4 per cent were neutral. The proportion of commentary articles approving alcohol use decreased from 75 per cent in 2000 to 45 per cent in 2009 (p=0.002), while the proportion that disapproved alcohol use increased from 17 per cent in 2000 to 38 per cent in 2009 (p<0.001) (Table 4). Mixed opinions about alcohol use also increased over time from 4 per cent in 2000 to 14 per cent in 2008 (p=0.006).

Table 4: Proportion of commentary articles classified into one of four opinion slants in each study year

	OPINION SLANT OF COMMENTARY ARTICLES			
	SOCIAL DISAPPROVAL	SOCIAL APPROVAL	MIXED	NEUTRAL
Year	%	%	%	%
2000	17	75	4	4
2001	20	74	5	1
2002	18	73	4	5
2003	19	74	3	3
2004	16	74	5	5
2005	27	71	1	2
2006	19	73	2	6
2007	31	58	8	3
2008	37	48	14	1
2009	38	45	11	6
2010	30	59	8	4
2011	31	56	9	5
2000-11	27	62	7	4

Sources: Across all articles, 74 per cent cited at least one source, with 22 per cent citing an alcohol industry representative, 22 per cent a law enforcement source, 18 per cent a politician, 14 per cent a researcher, and 14 per cent included a health source. The majority (58 per cent) of articles citing a source cited only one, with 28 per cent citing two sources. The appearance of alcohol industry spokespeople in articles decreased over time from 31 per cent in 2000 to 19 per cent in 2007; (p=0.023), as did the appearance of victims/accused (from 7 per cent in 2000 to 2 per cent in 2011; p=0.033) and sources coded as "other" (2003: 10 per cent; 2010: 5 per cent; p=0.037). In contrast, the appearance of politicians (2002: 11 per cent; 2008: 27 per cent; p=0.010), health professionals (2000: 10 per cent; 2008: 20 per cent; p=0.048) and researchers (2003: 11 per cent; 2007: 17 per cent; p=0.038) became more common over the study period.

Table 5: Proportion of articles including comments from different types of spokespeople

SPOKESPERSON	2000 %	2001 %	2002 %	2003 %	2004 %	2005 %	2006 %	2007 %	2008 %	2009 %	2010 %	2011 %
Alcohol industry	31	21	27	25	25	21	23	19	21	19	22	24
Politician	15	14	11	13	16	12	17	20	27	18	19	18
Law enforcement	20	27	24	22	20	24	22	22	17	24	23	22
Research	15	11	12	11	13	12	14	17	17	15	16	14
Health	10	10	12	10	18	12	11	19	20	16	10	17
Community	5	10	5	7	7	9	4	10	4	5	8	6
Sports industry	1	4	2	3	3	4	4	3	7	6	2	4
General public	6	7	3	4	6	8	7	8	5	7	8	5
Victim/ accused/ family	6	5	5	7	2	6	5	5	2	5	4	2
Other	6	7	7	10	9	8	5	8	6	6	5	6

DISCUSSION

Between 2000 and 2011 the number of alcohol-related articles in Australian newspapers more than doubled suggesting that alcohol became an increasingly prominent story in the news media. The type of article reporting an alcohol-related story changed over the study period from a dominance of promotional stories in the early 2000s, to a similar proportion of restriction articles and promotion articles by the end of the study period. The type of spokesperson highlighted in articles also changed over the study period, with a decreasing representation of alcohol industry representatives to a greater appearance of health advocates and politicians.

Alcohol-related stories appearing in the first four pages of the news section most commonly concerned drink driving, alcohol-related violence, alcohol excise, venue trading hours, and mass media preventative campaigns. This positioning could reflect the relationship between drink driving and road accidents, political agenda-building, and heightened interest in alcohol consumption or control stories in Australia.

Articles about alcohol restrictions and policy became more common during the study period. Restriction-themed stories peaked in 2008 coinciding with the introduction of an increase in the tax levied on ready-to-drink spirits. The increase in the number of restriction-themed articles published reflects the debate regarding the need for an increase in the price of these drinks in the lead up to the introduction of this tax increase. Responsible serving of beverages also received increased attention over time, reflecting liquor licensing issues such as licence enforcement and trading hours becoming more newsworthy.

The type of spokesperson cited in a newspaper article can provide insight into how a story is framed and reflects the broader cultural assumptions surrounding a topic[66]. Although alcohol industry sources were the most common spokespeople over the study period, their appearance in articles decreased, while the appearance of politicians, researchers and health professionals increased.

In this study we examined alcohol-related stories in only one media channel – newspapers. Alcohol news coverage for newspapers and television news is highly correlated [55, 70]. Additionally daily television and radio agendas are influenced by the lead morning newspaper stories[71].

There are several limitations to this study that need to be acknowledged. The study focused on capital city newspapers and did not include regional newspapers in our sample. The exclusion of regional newspapers means we do not know how alcohol-related stories have been framed or how this framing has changed over time in these areas of Australia. We looked only at articles in hard copy newspaper publications and did not examine online articles. The study period saw the move to an online format for all newspapers in Australia. If over this time there was an increase in the number of articles appearing online but not in the hard copy of the paper, our search strategy may under-estimate the presence of alcohol-related stories in newspapers. We relied on our search strategy to identify all relevant alcohol-related newspaper articles. If our search terms missed some article types, we are likely to have under-estimated the presence of alcohol-related stories in Australian newspapers. During the coding of articles, it became apparent that we failed to capture some articles reporting on wine releases and tastings, therefore the proportion of promotional articles is likely to be underreported in our study. Finally we did not examine whether the presentation of alcohol within a single newspaper edition was consistent across articles. While we suspect there would be inconsistencies, future research could explore this and examine how the public perceives any inconsistency.

In sum, during the 2000s the daily newspapers in Australia's capital cities became more disapproving in their presentation of alcohol-related stories with alcohol control advocates appearing more frequently. However despite these changes, the highest proportion of alcohol-related articles continued to be positively slanted promotional articles. The quantification of positively and negatively slanted alcohol-related articles in newspapers provides the groundwork for further study examining the association between the level of alcohol-related stories in newspapers and the drinking behaviours of Australian adolescents and adults.

CHAPTER 5:
Trends in the adoption of alcohol control policies in Australia

This chapter was originally published:

Trends in the adaption of four Alcohol control policies in four Australian states.

INTRODUCTION

Alcohol control policy is the set of laws, regulations or practises that regulate the supply and demand for alcohol in a community to reduce the likelihood of community members experiencing potential harm associated with alcohol use[9, 72]. It has been suggested that policy in seven broad areas can influence alcohol use and reduce harm from its misuse in the general population[73]. The seven areas recommended for policy intervention include higher prices, restrictions on physical availability, and restrictions on drink driving (see Box 1 for full list along with example policies).

Box 1: Policy areas for alcohol control in communities[73]

Price:	Increasing price of alcohol through, for example, taxes levied on alcohol products, setting minimum floor price.
Availability:	Reducing availability of alcohol through restricted trading hours, restricting the number of alcohol outlets, raising minimum age for purchase.
Drinking context/ environment:	Modifying or managing the drinking environment particularly licensed premises through measures including mandatory responsible server training, server liability, barring orders, lockouts.
Drink driving:	Reducing the likelihood of drink driving through controls on blood alcohol concentration limits, tougher penalties for drink driving, graduated license system.
Promotion of alcohol:	Restricting the promotion of alcohol through advertising, discounts, promotional offers etc.
Education:	Educating the population and target groups about possible harm associated with alcohol use through mass media counter marketing campaigns, health warnings, school-based education for adolescents.
Early intervention and treatment:	Interventions to assist dependent drinkers, preventing at risk drinkers from experiencing further harm.

In Australia, alcohol control policy is shared between federal and state governments with each level of government having responsibility for different areas. Currently, responsibility for policy relating to price via taxation and advertising lies with the Commonwealth Government, while states have responsibility for policies relating to the availability of alcohol, drink driving and treatment/intervention. Both federal and state governments share responsibility for education programs including counter-marketing initiatives[74]. While these two levels of government have a long history of policy and legislation in this area, the first national alcohol control strategy was only introduced in 1989[74]. National strategies have aimed to ensure consistency in the approach taken towards alcohol control throughout the country.

There is recognition that for policies to be effective in reducing alcohol harm, they need to be appropriate to the community and implemented appropriately[74]. Howard, et al (2014)[75] undertook a narrative review of the extent to which Australian states and/or the Federal Government had adopted policies recommended in each of the seven areas shown in Box 1 by 2013. This study found that while there was some similarity in the alcohol control policies Australian states had adopted, there was also substantial variation. For instance, while all Australian states had adopted a penalty for blood alcohol content of less than 0.05 for drivers, the blood alcohol content level for immediate suspension of

driving licenses differed. For example, Victoria used a level of 0.07, while NSW, SA, NT and WA used 0.08. Other differences were found in the area of trading hours, secondary supply regulations and delivery of drug and alcohol education programs in schools[75].

Several researchers from the USA have developed scales to assess the relative comprehensiveness and strength of alcohol policy implementation[76, 77]. One of the first of these was Brand et al's[76] Alcohol Policy Index (API) that assessed implementation of 16 policy topics in five regulatory areas: availability (five topics), price (three topics), drinking context (two topics), advertising (one topic), and drink driving (five topics). The topics included in the API were determined from a review of available public policy data and interviews with key informants.

Using the 2003 publication 'Alcohol: no ordinary commodity'[73], the strength of the evidence for each topic's potential effectiveness was determined, effectiveness weights (limited, moderate, high) assigned to each topic, and a scoring system developed, with higher scores indicating greater implementation of effective alcohol control policies[76]. The API has been used to rate the comprehensiveness of alcohol control policies in 30 countries where it was found to be inversely associated with a country's per capita alcohol consumption[76]. It has also been used to examine the association between adolescents' alcohol use and alcohol control policies[10, 11], with one study showing a significant inverse association between a country's API scores and prevalence of past 30 days drinking[10], while the second found a non-significant trend for an inverse association between API scores and past-week drinking.

American researchers have also developed the 'Alcohol Policy Scale' to assess the implementation of state-based alcohol policies in USA states[77]. Using a Delphi procedure involving 10 alcohol policy experts, the study identified and rated for efficacy and implementation, 29 policies that included: responsible server alcohol training, minimum legal drinking age, social host laws, and roadside sobriety checkpoints. The Alcohol Policy Scale was found to be inversely associated with binge drinking in adults in the USA[9, 77], with work suggesting that policies targeting the general population, including increasing the price and reducing availability of alcohol have the strongest inverse associations with binge drinking.

Evaluations of the alcohol policy landscape in Australia have received attention in recent times[75, 78], although the development of a policy index specific to Australia has yet to be established. Such a scale is a necessary component in gaining a coherent understanding of the policy environment and its relationship with both adult and adolescent drinking. The Alcohol Policy Scorecard developed by the National Alcohol Alliance Association in 2013, provides an indicator of the extent Australian states have adopted key policies in the seven areas shown in Box 1[73] along with items assessing whether a whole of government response to alcohol is taken, and the level of transparency and independence of input into alcohol control policy development.

However unlike the scales assessed above, the scorecard is not intended as a research tool and does not consider the effectiveness of the policies in their assessment. For these reasons we developed an index that could be used in research that assesses the implementation of alcohol policies in four regulatory domains that have the greatest potential to influence youth alcohol consumption: youth access, trading hours, drink driving (incorporating graduated licensing) and alcohol advertising restrictions. We examined change in each of these domains over the period 1999-2011. As this data was for use in analyses examining the relative impact of policies and outlet density on adolescents' drinking behaviours (see Chapter 9), only policies for the four states with historical information on retail outlet numbers (Victoria, New South Wales, Western Australia and Queensland) were examined.

METHODS

ALCOHOL CONTROL POLICIES

The components of the measure developed here are based on Brand et al's Alcohol Policy Index modified to suit the Australian context.[76] Research team members and national alcohol control policy experts were consulted to provide input into both the areas that should be assessed and the policy components

within these areas that should be focused on. Based on these consultations and reviews of the literature, we focused on three regulatory domains that evidence suggests have the greatest potential to influence youth alcohol consumption and that vary between states: youth access, trading hours, and drink driving. Policy topics such as legal purchase age and random breath testing were excluded as there was little or no variation between states or over the study years. We also excluded topics concerning the drinking context, as the effectiveness of policy in this area has not been consistently demonstrated[75]. Although advertising policy is under the Federal Government's jurisdiction and therefore does not vary between states, as there was some variation in policy implementation over the study period, it was retained.

Data sources: We examined legislation from each state's relevant liquor licensing and road safety acts for the period January 1999 to January 2011. Legislation was sought using Austlii (www.austlii.edu.au: an online free-access internet based resource for Australian legal information)[79]or websites that contained state legislation documents. When acts were not available online, state libraries were contacted to seek access to repealed or former versions of the acts. This process allowed further checking of amendments in legislation over time. An alcohol policy expert with a legal background was consulted regarding interpretation of the Acts and legislation. Local alcohol policy experts provided review of the data extracted. As a final check on the accuracy of data extracted regarding trading hours, in each state the government department responsible for overseeing liquor licensing was contacted and asked to review the information we had extracted. State department connections were also contacted to seek clarification or further information for other ad hoc issues for that state.

Two researchers independently reviewed and coded relevant legislation with discrepancies resolved with input from policy staff at state health and liquor licensing departments. Only policies enacted state-wide were assessed. Policies were coded for the year they came into effect.

Effectiveness ratings: Based on previous work[73, 80] effectiveness ratings were assigned to each policy topic to indicate limited (1), moderate (2) or high (3) effectiveness. Following Brand et al, policy topics were scored according to the extent of their implementation in each year, with 0 points allocated when the policy was not operational, full points (3) allocated when it was fully implemented, and points in between for partially implemented policies. Each policy topic's potential full points was determined by its effectiveness rating and therefore could range from 1-3.

The policy domain's total score was the sum of its policy topics effectiveness scores. Scores were standardised to ensure a maximum policy domain score of 100. To this end, we divided 100 by the domain's total possible effectiveness score and assigned policy topic scores according to multiples of this value. For example, the total possible effectiveness score for the youth access domain is 17. Dividing 100 by 17 gives 5.88 which was the base score assigned to topics with limited effectiveness; policy topics deemed moderately effective were assigned a score of 11.76 (2*5.88), and policy topics with high effectiveness assigned a potential score of 17.64 (3*5.88). If the policy topic was only partially implemented, it received half the potential score for that policy. For example, bans on the consumption of alcohol in public places had a moderate effectiveness rating. Where a state implemented this ban fully it received a score of 11.76, if there was a partial ban, it scored 5.88, and if there was no ban, it received a score of 0. Policy scores for each domain in each state and for each year were calculated.

The coding scheme for graduated licensing and penalties for exceeding the legal blood alcohol limit differed slightly to that described above to reflect that the different elements of these policies were complimentary rather than a tiered approach seen in the other policy areas. For graduated licensing and exceeding blood alcohol limit policies, the scoring system reflected the implementation of all policy elements with scores for each element added together to form the overall score. For example, for the graduated licensing laws, the 2-step scheme, passenger restrictions and a night time curfew were all awarded a score of 3.81. If a state had all three elements in place it was scored 11.43 (e.g., 3.81*3 = 11.43), while if a state had only two of these elements in place it would be scored 7.62 (e.g. 3.81*2=7.62).

Policy topics in each domain and points assigned to different levels of implementation are shown in Tables 1-4.

Table 1: Youth access and secondary supply policy components assessed

COMPONENT OF LEGISLATION – POLICY TOPIC	EFFECTIVENESS RATING	MAXIMUM POTENTIAL EFFECTIVENESS SCORE	IMPLEMENTATION SCORE	EXTENT OF POLICY
Prohibits sale and supply of liquor to minors by licensee/permitee on licensed premise	2	11.76	0	Absent
			5.88	Partial (in company of parent/guardian and/or ancillary to meal)
			11.76	Prohibited
Prohibits sale of liquor to adult/parent when purchasing on behalf of minor	2	11.76	0	Absent
			11.76	Prohibited
Requires proof of age card/document to bear a photograph	2	11.76	0	Absent
			11.76	Yes
It is an offence for a person (other than parent/guardian or someone authorised by parent) to supply liquor in a residence to a minor. It is also an offence to not responsibly supervise minor if liquor is supplied	2	11.76	0	Absent
			3.92	Partial (parent/guardian can supply)
			7.84	Partial (covers both parent/guardian supply and responsible supervision)
			11.76	Prohibited (no one can supply minors with alcohol)
Prohibits supply of liquor to minor in public place	2	11.76	0	Absent
			5.88	Partial (in company of parent/guardian)
			11.76	Prohibited
Prohibits minors to enter or remain on premises where liquor is served by a licensee	2.5	14.7	0	Absent
			7.35	Partial (in company of parent/guardian and/or ancillary to meal)
			14.7	Prohibited
Prohibits minors to possess/consume liquor on licensed premises	2.5	14.7	0	Absent
			7.35	Partial (in company of parent/guardian and/or ancillary to meal)
			14.7	Prohibited
Prohibits minors to possess/consume liquor in public place	2	11.76	0	Absent
			5.88	Partial (in company of parent/guardian and/or ancillary to meal)
			11.76	Prohibited
TOTAL	**17**	**100**		

Table 2: Availability policy assessed

COMPONENT OF LEGISLATION	EFFECTIVENESS RATING	MAXIMUM POTENTIAL EFFECTIVENESS SCORE	IMPLEMENTATION SCORE	EXTENT OF POLICY
Off-premises outlets trading hours: Monday-Saturday	2	11.11	0	Midnight close
			5.56	11pm close
			11.11	10pm close or earlier
Off-premises outlets trading hours: Sunday	2	11.11	0	Midnight close
			3.7	11pm close
			7.41	10pm close or earlier
			11.11	No trading
Off-premises outlets: 24-hour trading	2	11.11	0	Yes
			11.11	Prohibited
On-premises outlets trading hours: Monday-Saturday	2	11.11	0	No restriction/commissioner's discretion
			5.56	Midnight close
			11.11	11pm close
On-premises outlets trading hours: Sunday	2	11.11	0	No restriction/commissioner's discretion
			2.78	Midnight close
			5.56	11pm close
			8.33	10pm close or earlier
			11.11	No trading
On-premises outlets: 24-hour trading	2	11.11	0	Yes
			11.11	Prohibited
General (hotels) outlets trading hours: Monday-Saturday	2	11.11	0	No prescribed hours (commissioner's discretion)
			5.56	Midnight close
			11.11	11pm close
General (hotels) outlets trading hours: Sunday	2	11.11	0	Norestriction/commissioner's discretion
			2.78	Midnight close
			5.56	11pm close
			8.33	10pm close or earlier
			11.11	No trading
General (hotels) outlets: 24-hour trading	2	11.11	0	Yes
			11.11	Prohibited
TOTAL	**17.5**	**100**		

Table 3: Drink driving policies assessed

COMPONENT OF LEGISLATION	EFFECTIVENESS RATING	MAXIMUM POTENTIAL EFFECTIVENESS SCORE	IMPLEMENTATION SCORE	EXTENT OF POLICY
YOUTH				
Graduated licensing for young drivers^	2	11.43	3.81	2-step Probationary licensing scheme
			3.81	Passenger restrictions
			3.81	Night time curfew
Legal blood alcohol limit	3	17.14	0	BAC 0.02
			17.14	BAC zero
Penalties for exceeding legal limit^	2	11.43	3.81	Fine
			3.81	Demerit points
			3.81	Disqualification/cancellation of license
Blood alcohol limit for licence suspension	2	11.43	0	Absent
			3.81	BAC 0.15+
			7.62	BAC 0.09-0.14
			11.43	BAC 0.01-0.08
ADULT				
Legal blood alcohol limit	3	17.14	0	BAC more than 0.05
			17.14	BAC less than 0.05
Penalties for exceeding legal limit	2	11.44	2.86	Fine
			2.86	Demerit points
			2.86	Disqualification/cancellation of license
			2.86	Age dependent penalty
Blood alcohol limit for licence suspension	2	11.43	0	Absent
			3.81	BAC 0.15+
			7.62	BAC 0.09-0.14
			11.43	BAC 0.01-0.08
Alcohol ignition interlocks	1.5	8.57	0	Absent
			4.29	Discretionary (determined by courts)
			8.57	Yes
TOTAL	**17.5**	**100**		

^ each policy element scored as being present or not, with total scores for policy topic determined by summing each element's score

Table 4: Alcohol advertising policies assessed

COMPONENT OF LEGISLATION	EFFECTIVENESS RATING	MAXIMUM POTENTIAL EFFECTIVENESS SCORE	IMPLEMENTATION SCORE	EXTENT OF POLICY
Free-to-air television	1	20.0	0	No restrictions
			6.67	Industry self-regulation
			13.33	Partial ban with no exceptions
			20.0	Full ban
Radio	1	20.0	0	No restrictions
			6.67	Industry self-regulation
			13.33	Partial ban with no exceptions
			20.0	Full ban
Outdoor/billboards	1	20.0	0	No restrictions
			6.67	Industry self-regulation
			13.33	Industry self-regulation with location restrictions
			20.0	Full ban
Print	1	20.0	0	No restrictions
			6.67	Industry self-regulation
			13.33	Partial ban with no exceptions
			20.0	Full ban
Internet/social media	1	20.0	0	No restrictions
			6.67	Industry self-regulation
			13.33	Partial ban with no exceptions
			20.0	Full ban
TOTAL	**5**	**100**	**100**	

RESULTS

The alcohol policy environment differed between states and has changed over time (Table 5). While in all domains the average policy score across the four states increased over the 13-year period, the policy index did not reach 100 points in any domain. By the end of the study period, the average policy score was highest in the drink driving domain (average=78) although state scores for this domain varied by as much as 21 points in 2011. Across the study period, the lowest policy scores were found in the advertising domain, with states having a score of 40 points by the end of the study.

In the domain of youth access, policy scores in all states except NSW increased. In 1999 Victoria and WA had substantially lower scores in this domain than either Queensland or NSW. While both WA and Victoria increased their policy in this domain over the study period, by the study end, their scores were still less than that found in Queensland. Much of the increase in policy in this area in Victoria and WA were due to these states strengthening restrictions on the secondary supply of alcohol to adolescents that NSW had adopted at the start of the study period.

While there was no change in Victoria's implementation of policy or legislation to restrict trading hours for alcohol over the study period, there was a slight loosening of trading hour restrictions in WA over the study period (Table 5). Trading hour restrictions increased in NSW (by 24 per cent) and Queensland (by 37 per cent) over the study period. At the end of the study period Queensland had the highest score in this domain.

Drink driving policies increased in all states over the study period, with the greatest increase found in WA (by 135 per cent), and the smallest found in NSW (by 54 per cent). Changes to drink driving policies in WA commenced in 2007 with policy index scores increasing by 41 per cent between 2006-07 and then between 2009-10 with policy scores increasing by 55 per cent.

As would be expected, given that the Federal Government regulates advertising, states did not differ in their policy scores in this area. Advertising policy scores increased over the study period with this increase largely due to the inclusion of internet advertising in the regulatory codes and some limited restrictions on the location of outdoor advertising in regulatory codes from 2008.

Table 5: Scores on each alcohol policy domain for four states for each survey year: 1999–2011. (Scores range from 0–100 with higher scores indicating more extensive alcohol control policies)

POLICY DOMAIN	YOUTH ACCESS					TRADING HOURS				
STATE	VIC	NSW	QLD	WA	TOTAL AVERAGE	VIC	NSW	QLD	WA	TOTAL AVERAGE
	%	%	%	%	%	%	%	%	%	%
1999	44	61	65	69	54	54	46	50	58	52
2000	44	61	65	69	54	54	46	50	58	52
2001	44	61	65	69	54	54	46	50	58	52
2002	56	61	65	69	57	54	46	50	58	52
2003	56	61	65	69	57	54	46	50	58	52
2004	56	61	65	69	57	54	46	50	58	52
2005	56	61	65	69	57	54	46	50	58	52
2006	56	61	65	69	57	54	46	50	55	51
2007	56	61	65	81	60	54	46	50	55	51
2008	56	61	73	81	62	54	57	50	55	54
2009	56	61	73	81	62	54	57	50	55	54
2010	56	61	73	81	62	54	57	69	55	59
2011	60	61	73	81	63	54	57	69	55	59
Change from 1999	36%	0	12%	26%	16%	0	24%	37%	6%	12%

POLICY DOMAIN	DRINK DRIVING					ADVERTISING				
STATE	VIC	NSW	QLD	WA	TOTAL AVERAGE	VIC	NSW	QLD	WA	TOTAL AVERAGE
	%	%	%	%	%	%	%	%	%	%
1999	55	53	48	28	46	27	27	27	27	27
2000	55	57	48	28	47	27	27	27	27	27
2001	55	57	48	28	47	27	27	27	27	27
2002	64	57	48	28	49	27	27	27	27	27
2003	71	61	48	28	52	27	27	27	27	27
2004	71	79	48	28	56	27	27	27	27	27
2005	71	79	48	28	56	33	33	33	33	33
2006	71	79	55	28	58	33	33	33	33	33
2007	74	82	63	39	65	33	33	33	33	33
2008	82	82	63	42	67	33	33	33	33	33
2009	86	82	63	42	68	40	40	40	40	40
2010	86	82	71	65	76	40	40	40	40	40
2011	86	82	79	65	78	40	40	40	40	40
Change from 1999	55%	54%	66%	135%	70%	50%	50%	50%	50%	50%

DISCUSSION

This study examined the extent to which each of four states had adopted a number of different policies in the areas of youth access, trading hours, drink driving and alcohol advertising and promotion. In the three policy areas under the control of states (trading hours, youth access, and drink driving), we found variation between states in the implementation of policy both at the start of the study period and at its end. At the beginning of the study, states differed by as much as 27 points in the drink driving domain and by as much as 25 points in the youth access domain. By the end of the study there was a 21-point difference between states in both these domains. Adoption of policy in the different domains also occurred at different rates, with the greatest increase seen in the drink driving domain and the smallest increase seen in the trading hours domain.

This is one of the few studies that attempts to develop an Australia-specific measure of the implementation of alcohol control policies suggested to influence adolescents' drinking behaviours: youth access, drink driving, trading hours and advertising. Our measure has drawn on international work in this area and has incorporated an indicator of the efficacy of the different policy options into the index score[76, 77]. Unlike other indexes we did not combine scores over the different policy domains but rather assessed implementation of different policies within the four separate domains allowing us to determine the domains where there has been most and least activity in relation to policy implementation.

The greatest increase was in the drink driving domain, having the highest policy index scores by the end of the study period. A review of Australia's alcohol policy environment concluded that Australian policy in the area of drink driving was strong, with regulations aimed at reducing the harm associated with drink driving entrenched within Australia's alcohol control policies[75]. Policy scores relating to trading hours showed the smallest change, with trading policy in WA weakened slightly over the study period.

Australia's National Competition Policy (NCP) has been recognised as one issue confronting alcohol control policies in the area of alcohol availability[72]. The NCP was introduced in 1995 with states and territories agreeing to review and repeal legislation that restricted competition unless they could prove that retaining the legislation was in the public interest. Liquor licensing legislation was one area NCP identified for reform, with failure to address anti-competitive legislation incurring financial penalty. Five states incurred financial penalties for not addressing anti-competitive elements of their legislation in 2003-04.[72] The reduction in WA's policy score in this area was due to the lifting of a restriction on Sunday trading for off-premises licenses. Trading hour policy scores in NSW and Queensland increased in the latter years of the 2000s due to the introduction of policies restricting trading hours for off-premises licences to 10pm throughout the week. As our study focused on state-wide legislation. Policies affecting venues in a specific location (e.g. inner city entertainment precincts) were not included in the measure.

While over the study period youth access policy scores in NSW remained unchanged, they increased in other states. In Queensland this was related to the adoption of secondary supply laws in 2008, which made it illegal for an adult to supply minors with alcohol in a private residence without the consent of the minor's parents or legal guardian. Victoria introduced this law late in 2011.

As advertising policy is under the Federal Government's jurisdiction, policy changes in this area were similar across the four states over the study period. Increases in policy scores in this area over time were due to the introduction of internet/online advertising regulations, and regulations placed on the location of outdoor alcohol advertisements, both in 2008. However despite these increases, by the end of the study period policy scores in this domain were the lowest of all four domains.

This study is subject to a number of limitations. The study only examined policies that the evidence suggested were effective at influencing adolescent drinking behaviours, and therefore policies that focused on changing the drinking environment, community or home based interventions, or policies that focused more specifically on adult drinking were not included. In addition, assessment of the effectiveness of different policies comes from international and USA literature rather than Australian

specific data. Additionally, we were not able to access enforcement data for different policies and this may have some impact on their utility. However a recent USA study found that the addition of enforcement data to strength of policy implementation data did not change the classification of a state's alcohol control policies (weak or strong)[81].

Despite these limitations, the development of the policy index in the four areas likely to influence adolescent drinking behaviours shows that the alcohol control environment has differed in four Australian states over the period 1999-2011. A scale that assesses the policy environment provides the basis for further work examining the association between policy and adolescents' alcohol use.

CHAPTER 6:
Assessing secondary students' alcohol use – an overview

INTRODUCTION

This chapter provides overarching information on data collection of adolescent alcohol use undertaken by the Australian Secondary Students' Alcohol and Drug (ASSAD) survey, and informs subsequent Chapters 7-9 in this research paper, which examine the associations between alcohol advertising; alcohol policies; alcohol outlet density; and newspaper articles on alcohol; and trends in adolescents' alcohol use.

As data discussed in the following chapters on adolescent alcohol use was taken from ASSAD research, this chapter describes the methodology used for the study, and the number of students participating in the survey.

ABOUT ASSAD

ASSAD is a national cross-sectional survey which has been conducted every three years since 1984. It was developed from a triennial national survey assessing students' use of alcohol and tobacco that was conducted collaboratively by Cancer Councils across Australia and the Western Australian Health Department. In 1996, the survey was expanded to include questions on the use of illicit substances, and federal, state and territory health departments became collaborators in the project. The ASSAD study was designed to provide estimates of the prevalence of use of tobacco, alcohol and illicit substances among Australian school students aged 12-17 years for the year of the survey

METHODS

The study has been consistent in its selection procedures for schools and students for surveying, and has used the same questions to assess alcohol use in each survey. The consistency in survey procedures and questions enables trends to be compared over time.

SURVEY SAMPLE

The target population for sampling was all students in Years 7-12 across Australia. Within each state and territory, schools were sampled using a random sampling methodology designed to represent students from the three main education sectors: government, Catholic and independent. The basic design of the sampling procedure was a stratified two-stage probability sample, with schools selected at the first stage of sampling, and students selected within schools at the second stage of sampling. Within each state and territory, schools were stratified by the three education sectors and randomly selected from each sector to ensure that the distribution of schools in the three education sectors within a state/territory was reflected in the sample. Since the middle of the 1990s, two samples of schools were drawn to reflect the distinction between junior secondary (up to Year 10) and senior secondary (Years 11 and 12) campuses. In South Australia (SA), Western Australia (WA) and Queensland, Year 7 students are generally still in the primary school system. Therefore, primary schools associated with participating secondary schools in these states were approached regarding the surveying of Year 7 students.

PROCEDURE

Principals of selected schools were contacted and permission to conduct the survey at the school was sought. If a school refused, they were replaced by the school geographically nearest to them within the same education sector.

Between 1984 and the late 1990s, at each participating school, the researchers selected a random sample of students for surveying. Since the 2000s, an increasing number of education authorities and individual schools have required that active parental consent be obtained before students participate in the study. This requirement can reduce the participation rate of students, unless teachers actively assist in reminding students to return their consent forms. In states and territories requiring active parental consent, intact classes of students were randomly selected within the required year levels. Only classes where students were not selected on any ability or performance measure were included in this process. This ensured a representative cross-section of the student population in each year level.

Following the protocol used in past surveys, on a day agreed with the school, members of the research team attended the school to administer the pencil-and-paper questionnaire to classes of students on the school premises. Students completed the survey anonymously. Surveys were administered between May and December of the survey year. All surveys had ethics approval.

QUESTIONNAIRE

All students participating in the survey completed a paper-based questionnaire containing a set of core questions that covered their use of tobacco, alcohol, analgesics, tranquilisers and the use of illicit substances such as cannabis and hallucinogens. To reduce order effects, two versions of the questionnaire were used. The first version commenced with alcohol-related questions, and the second commenced with tobacco-related questions. Questions regarding use of other substances followed both the alcohol and tobacco sections.

ALCOHOL QUESTIONS

The alcohol-related questions assessing alcohol prevalence were the same in all surveys. Questions assessed 'ever use' of alcohol, use of alcohol in the past 12 months (yes, no), four weeks (yes, no) and the number of drinks consumed on each of the seven days preceding the survey. Information on the number of drinks consumed on each seven days was used to calculate a past-week drinking variable (yes, no). Following recommendations for low risk drinking among adults[82], risky drinking was defined as consuming five or more alcoholic drinks on at least one of the previous seven days.

STUDENT CHARACTERISTICS

In addition to questions assessing use of alcohol, tobacco, and illicit substances, students provided information on their sex, age, year level, and residential postcode. Students also indicated whether they were of Aboriginal or Torres Strait Islander descent (yes, no), and their self-perceived academic ability. Socioeconomic status (SES) was coded based on respondents' postcodes using the 2011 national Socioeconomic Index for Areas (SEIFA) Index of Relative Advantage and Disadvantage (IRSAD) [83]. Student postcode-level SES was categorised into quintiles, with a low score indicative of relative disadvantage and a high score relative advantage.

SAMPLE SIZE IN EACH YEAR

Except for 1987, when SA did not participate in ASSAD, all states and the NT have participated in all ASSAD surveys. The Australian Capital Territory (ACT) has participated in all surveys since 1996.

In each survey year, the survey has aimed to recruit students from approximately 350 schools. The number of schools participating in the study in each survey year from 1999 onwards is shown in Table 1. Table 1 also shows the number of students aged 12-17 years surveyed in each survey year. As a number of analyses in this report focus on data from students residing in the capital cities of five Australian states (Victoria, NSW, Queensland, SA and WA), the number of students aged 12-17 years from these five capital cities surveyed in each survey year is also shown in Table 1.

Table 1: Number of schools and students in each survey year between 1999-2011

	1999	2002	2005	2008	2011
Number of participating secondary schools	399	363	367	386	363
Total number of students surveyed	26545	24512	22799	25662	25962
Number of students aged 12-17 years surveyed	25538	23517	21905	24616	24912
Number of 12-17 year old students from five capital cities surveyed	14196	12644	13384	14694	16004

DISCUSSION

ASSAD data results and findings are discussed in subsequent Chapters 7-9 which examine the associations between alcohol advertising, alcohol policies, alcohol outlet density, and newspaper articles on alcohol, and trends in adolescents' alcohol use.

CHAPTER 7:
The association between alcohol outlet density and Australian adolescents' alcohol use

This chapter is based on the following publication:

Azar D, White V, Coomber K, Faulkner A, Livingston M, Chikritzhs T, Room R, Wakefield M. The association between alcohol outlet density and alcohol use among urban and regional Australian adolescents. Addiction. 2016; 111(1):65-67.

INTRODUCTION

Regulating the physical availability of alcohol in a community by controlling the density of outlets is promoted as a key strategy for reducing both alcohol consumption and alcohol-related harm[73]. The majority of alcohol outlets can be categorised into four main types: on-premise, off-premise, general (hotels and taverns) and clubs (sporting and social). While all license types contribute to the 'alcogenic' environment of an area, each type may encourage different drinking behaviours and adolescents may have more or less interaction with the specific license types.

While a systematic review reported that higher outlet density may be associated with greater alcohol use among adolescents[84], the influence of the individual outlet types on underage drinking is less clear. For example, a significant positive association was found between off-premises outlets and adolescent alcohol consumption in two studies [13, 85], while another two studies found no association between these outlet types and drinking for rural adolescents [86, 87]. A longitudinal study from the USA found no association between the density of on-premises outlets and adolescents' past-year alcohol use or heavy drinking, after controlling for drinking beliefs[88].

An Australian study examining the influence of the four main outlet types on Australian adolescents' alcohol use found that greater density of each alcohol outlet type was positively associated with the likelihood of 12-14 year olds, but not 15-17 year olds, drinking in the past 30 days [14]. While this study suggests a link between the drinking behaviours of younger adolescents and alcohol outlet densities, further studies are needed to confirm this link. Further, despite some USA studies suggesting that the relationship between outlet density and adolescent drinking behaviours varies by residential location, this was not examined in the Australian study.

In this study we examined whether adolescents' alcohol use and risky drinking was associated with the density of the four main outlet types, after controlling for individual demographic characteristics and adult drinking. We also investigated whether any association between outlet density and adolescent alcohol use found differed for youth living in urban compared to regional/remote communities.

METHODS

STUDY POPULATION

Adolescent data for this study comes from the Australian Secondary Students' Alcohol and Drug (ASSAD) survey - a triennial national cross-sectional survey conducted since 1984. A description of the study and the data on alcohol use it collects has been presented previously (see Chapter 6). The current study draws on survey data from four Australian states (New South Wales, Queensland, Victoria, Western Australia) and the Northern Territory, as it was not possible to obtain liquor licensing data for the years 2002, 2005, 2008 and 2011 in the other Australian states or territory. After excluding respondents who did not report their residential postcode (2.7 per cent of sample), a total of 68,208 students from across the four survey waves were included in the analysis.

ALCOHOL CONSUMPTION VARIABLES

Two alcohol consumption outcome variables were used: past-month alcohol use and risky drinking in the past week among all respondents ('risky drinking among all students').

ALCOHOL OUTLET DENSITY

We obtained the license type and postcode of all liquor licenses in each state/territory between 2002-2011 from the relevant state licensing authorities. For consistency across jurisdictions the following license types were excluded: wholesalers, producers, restricted clubs, limited licenses, bring your own (BYO) permits, caterer's license, certificate of registration, governor's license and vessel licenses. The remaining licenses were classified into: off-premises (sale of unopened alcohol to take-away; e.g. bottle shops and supermarkets), on-premises (for consumption at the venue; e.g. restaurants, cafes, bars), general (for consumption at the venue and take-away; e.g. hotels), and clubs (sale of alcohol to members and guests of members; e.g. sporting clubs, returned soldiers clubs). The number of licenses in each category in each postcode was calculated for each survey year. To allow for the population size variation between urban and regional areas, outlet density was operationalised using a per capita rate with the number of outlets in each licensed category per 1,000 residents within a postcode determined. Population data were obtained from the Australian Bureau of Statistics (ABS).

GEOGRAPHIC LOCATION

The Australian Standard Geography Standard (ASGS)[83] was used to classify students' postcode into the following categories: major city vs regional/remote (includes inner regional, outer regional, remote and very remote).

CONTROL VARIABLES

The following variables were included in analyses as covariates: gender, age, state, socioeconomic status (SES) based on respondents' postcode using the 2011 national Socioeconomic Index for Areas (SEIFA) Index of Relative Advantage and Disadvantage (IRSAD)[89], smoking status of student, Indigenous status of student and state-based rates of adult weekly drinking.

STATISTICAL ANALYSIS

Change in the proportion of students consuming alcohol in the past month or at risky levels across the study period was examined using chi-square tests – linear regressions examined the significance of change in per capita outlet density over time. Mixed effects logistic regression models (xtmelogit), were used to examine the association between each drinking outcome and outlet density measure.

To test whether the association between outlet density and drinking differed for urban and regional areas, each outlet type was included as an interaction term with the urban/regional variable. When interactions were statistically significant, logistic regressions were performed separately for urban and regional areas. If not significant, the interaction terms were dropped and the main effects were reported from the model including both areas. Bivariate associations between outlet density and drinking were first explored with multilevel logistic regression analyses examining the association between the density of each alcohol outlet type and the two drinking outcomes after controlling for the covariates listed above. In all models, two random components were specified: time (survey wave) and school.

RESULTS

DESCRIPTIVE STATISTICS

Table 1 presents descriptive statistics for each survey sample residential location. The proportion of students drinking in the past month and engaging in risky drinking in the past week was higher in regional/remote areas than in metropolitan areas. The proportion of past-month and past-week risky drinkers declined over time in both areas ($p<0.05$).

Table 1: Sample characteristics of participants in each survey year, by geographic location

	METROPOLITAN AREAS				REGIONAL/REMOTE AREAS			
	2002	2005	2008	2011	2002	2005	2008	2011
Sample size	10,072	10,508	11,491	12,826	6,547	4,981	6,302	5,481
AGE GROUP (%)								
12-15 years	71.6	72.2	70.7	70.3	74.2	75.4	75.5	73.2
Sex (%; Male)	49.1	49.9	49.5	49.4	49.4	50.9	52.3	50.5
Indigenous heritage (%)	3.1	3.2	3.2	3.1	6.5	5.2	5.6	7.8
SEIFA QUINTILE (%)								
1 (most disadvantaged)	13.2	14.3	17.0	12.3	21.6	20.1	35.0	28.6
2	15.3	11.9	16.8	11.6	31.9	36.6	27.7	31.6
3	21.2	17.9	17.8	17.5	28.6	20.8	20.5	29.0
4	22.7	23.5	21.3	24.1	12.3	17.8	14.9	7.8
5 (least disadvantaged)	27.6	32.6	27.2	34.6	5.6	4.0	2.0	3.1
Past-month smoking (%)	16.6	12.8	10.5	8.6	19.7	12.4	9.9	10.2
Past-month drinking (%)	45.6	42.1	35.0	26.2	55.2	45.9	40.1	35.4
Past-week risky drinking (%)	9.4	10.0	7.4	5.2	13.8	11.8	8.2	9.6

SEIFA: Socio-economic index for area (ABS, 2013).

Table 2 shows that per capita outlet density was higher in regional areas than in metropolitan areas. The most common type of outlet was on-premises, which increased over time for urban and regional communities ($p<0.01$). The density of off-premises licenses also increased but this was only significant in metropolitan areas ($p<0.01$). In metropolitan areas, the density of general and club licensed venues decreased ($p<0.05$), while in regional areas, only the density of licensed clubs decreased significantly over time.

Table 2: The average density per 1,000 residents of different license types in postcodes in metropolitan and regional/remote areas

	METROPOLITAN AREAS				REGIONAL/REMOTE AREAS			
	2002	2005	2008	2011	2002	2005	2008	2011
General	0.16	0.16	0.15	0.15	0.66	0.60	0.59	0.70
On-premise	0.52	0.58	0.65	0.61	0.71	0.95	0.96	0.92
Off-premise	0.20	0.23	0.21	0.22	0.35	0.37	0.36	0.36
Clubs	0.15	0.14	0.13	0.11	0.40	0.35	0.35	0.38
Total	1.02	1.10	1.14	1.09	2.12	2.28	2.26	2.37

Statistically significant interactions were found between location and club outlet density for past-month drinking ($X^2 = 4.20$, df = 1, p = 0.04), and past-week risky drinking ($X^2 = 10.88$, df = 1, p = <0.01). A significant interaction was also found between location and off-premises density on past-week risky drinking ($X^2 = 6.03$, df = 1, p = 0.01).

A greater density of general license outlets and on-premises license outlets was positively associated with past-month drinking and past-week risky drinking in bivariate analyses (all $p<0.05$). The positive association between the destiny of general and on-premises outlets and the two drinking outcomes was also seen in multivariate analysis (Table 3). A positive association was also found between density of off-premises license outlets and past-month drinking. However the influence of off-premises license density on past-week risky drinking differed for urban and regional/remote students with the likelihood of urban students engaging in past-week risky drinking increasing for every unit increase of off-premises license outlets (OR=1.36 95% CI 1.05-1.75), while there was no statistically significant association for regional/remote students. Multivariate analyses showed a positive association between density of club licenses and both past-month alcohol use and past-week risky drinking for urban, but not regional/remote students (Table 3).

Table 3: Adjusted Odds Ratios (ORs) and 95 per cent Confidence Intervals (95%CI) for associations between density of different alcohol outlets and drinking outcomes, separated by geographic location where appropriate (models adjusted for covariates)

	PAST-MONTH ALCOHOL USE	RISKY DRINKING AMONG ALL STUDENTS
PREDICTORS	OR (95% CI)	OR (95% CI)
General	1.10 (1.07-1.14)	1.10 (1.05-1.14)
On-premises	1.03 (1.02-1.05)	1.05 (1.03-1.08)
Off-premises	1.19 (1.11-1.28)	-
Urban	-	1.36 (1.05-1.75)
Regional/remote	-	0.94 (0.81-1.09)
Clubs	-	-
Urban	1.32 (1.09-1.59)	1.94 (1.46-2.59)
Regional/remote	1.05 (0.98-1.14)	1.11 (0.99-1.25)

Adjusted for state, gender, age, Indigenous heritage, socio-economic status, tobacco use and adult drinking rates.

DISCUSSION

The density of general, on- and off-premises license outlets was associated with adolescent alcohol consumption, irrespective of geographic location. While in the main the relationship between outlet density and adolescents' drinking behaviours did not differ by residential location, this was not the case for club licenses where there was a stronger effect for urban rather than regional adolescents for both past-month drinking and past-week risky drinking.

Unlike previous studies, we analysed the association between adolescent drinking and the density of licensed clubs separately to other license types. Our results suggest that clubs have a stronger influence on urban adolescents' drinking behaviours than adolescents living in regional areas. Club licenses include a mix of venue types that range from the large clubs associated with Returned Soldier Leagues (RSL) and ethnic social clubs that may serve as a gambling, restaurant and entertainment venue, to local sporting clubs that host adult and children's weekend sports such as football and cricket. Australia has a strong sporting and social club membership, and studies have suggested that the majority of athletes and officials endorse drinking at their club as a way for families to socialise [90]. Witnessing adults drinking may translate to more positive perceptions of drinking, increasing the likelihood of an adolescent engaging in alcohol use.

We found a positive association between the density of general and on-premises outlets and the likelihood of adolescents drinking in the past month, and engaging in risky drinking in the past week. While previous studies have shown a positive association between the density of on-premises outlets and adolescent drinking[12, 91] few have examined the association between general licenses, such as hotels and taverns, and adolescent drinking.

The density of off-premises outlets was positively related to past-month alcohol use for all adolescents in the study. While past research suggests that off-premises density is associated with recent alcohol use[12, 91], some studies have reported non-significant associations with this type of outlet and a range of drinking outcomes[86, 87, 92]. The greater number of outlets selling takeaway alcohol may increase the opportunity for adolescents to buy alcohol themselves[14].

Several limitations to the study need to be noted. We used a per capita measure of outlet density that may not accurately reflect alcohol availability when comparing metropolitan and regional/remote areas. A distance-based measure (e.g. outlets per mile) using geocoding software may have been more appropriate, however, as the student survey did not collect addresses of participants, geocoding was not an option. Our study is cross-sectional in design, thus while it can describe associations between variables it cannot confirm the direction of these associations. While our findings were generally similar to those from other cross-sectional studies, longitudinal studies are needed to confirm the association.

Despite these limitations, our findings provide suggestive evidence that the density of the four main types of alcohol outlets is related to adolescents' alcohol use. Regulating the number of general, on-premises and off-premises establishments in all communities and licensed clubs, particularly in urban communities, may help to reduce underage drinking.

CHAPTER 8:
Does exposure to paid alcohol advertising on television influence adolescent alcohol use?

This chapter is based on the following publication:

White V, Azar D, Faulkner A, Coomber K, Durkin S, Livingston M, Chikritzhs T, Room R, Wakefield M. Adolescents' exposure to paid alcohol advertising on television and their alcohol use: exploring associations over a 13-year period. Addiction 2017;112: 1742-1751

This chapter was originally published:

Is exposure to paid advertising for alcohol on television related to Adolescents' alcohol use?

INTRODUCTION

Expenditure for advertising alcohol beverages in traditional media in Australia reduced substantially between 2000 and 2011, with television's share of total expenditure decreasing from a high of 50 per cent in 1997 to 19 per cent in 201149. Coinciding with this decrease has been a decrease in the level of alcohol beverage advertising on television. As alcohol advertising has been identified as a factor pushing the likelihood of an adolescents drinking alcohol up, decreases in the level of advertising may contribute to decreases in adolescent drinking prevalence93.

The prevalence of alcohol use among Australian adolescents began to decrease in the 2000s. The reasons for this decrease are not clear7, however the decrease in alcohol advertising on television may be one factor contributing to the decrease in youth drinking.

Using data from the Australian Secondary Students' Alcohol and Drug Survey (ASSAD), this study, examines whether any association between alcohol advertising exposure and student drinking is similar for 12-15 year olds (Grades 7 through 10) and 16-17 year olds (Grades 11 and 12).

METHODS

ALCOHOL-RELATED ADVERTISING TARGET RATING POINTS (TRPS)

The advertising industry's measure TRPs was used to measure adolescents' potential exposure to all direct beverage (beer, wine, spirits, premixed/cider) and retail alcohol advertising on television. TRPs data was obtained from the media monitoring company responsible for determining television ratings in Australia. TRPs specific to 13-17 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 i) adults over 18 years and ii) adolescents were obtained. TRPs are calculated from the number of ads aired and the proportion of the target population exposed to those ads within a specified time period. For example, a value of 80 TRPs per month could represent: 80 per cent of adolescents within a media market exposed to the advertisement once during that month; 40 per cent of adolescents exposed to the advertisement twice during the month; or 20 per cent of adolescents exposed four times.

Australia's media market is divided into five metropolitan areas covering the regions associated with five major mainland cities (Adelaide, Brisbane, Melbourne, Perth, Sydney) and six regional areas. Advertising exposure data for 13-17 year olds is only available for metropolitan advertising areas.

STUDENT SURVEY PROCEDURES

Adolescent data are from national, triennial, cross-sectional surveys of secondary students conducted since 1984 (the Australian Secondary Students' Alcohol and Drug (ASSAD) survey). The survey procedures are described in Chapter 6 of this report. As advertising data were only available for metropolitan areas in the capital cities of five Australian states, analyses used only data from students residing in these areas.

SURVEY DATA

Survey date, education sector (government, Catholic, independent) and students' state was recorded for each student by survey administrators after survey completion.

ALCOHOL CONSUMPTION OUTCOME VARIABLES

Two alcohol consumption outcome variables were used: past-month alcohol use (yes or no); and past-week risky drinkers (consumed five or more drinks on any of past seven days) among all students.

STUDENT LEVEL CONTROL VARIABLES

As part of the survey, students reported their sex, current age (dichotomised into 12-15 year olds and 16-17 year olds), 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 was assigned to each student based on their residential[89] postcode. 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 was also obtained. DrinkWise was established in 2005 and is a not-for-profit organisation, largely funded by the alcohol industry, that aims to promote a 'safer drinking culture'.

NUMBER OF NEWSPAPER ARTICLES NEGATIVE TO ALCOHOL USE

Included in this study is data derived from the content analysis of alcohol-related newspaper articles described previously[94]. 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 retail) were merged with student data by media market and survey date, following procedures used elsewhere[95]. In brief 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 TRPs for

the previous month. The resulting variable is termed past-month TRPs. Past-month TRPs for the five alcohol products were combined to produce an indicator of total past-month alcohol advertising TRPs.

The percentage of disapproving news and percentage of disapproving commentary articles 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.

The level of past-month alcohol advertising students were potentially exposed to was examined using means. Logistic regression examined bivariate associations between year and student level variables and the two drinking outcomes (past-month drinking, and past-week risky drinking among all students). Logistic regression also examined bivariate associations between each of the two drinking outcome measures and each predictor variable. Survey year was adjusted for in these analyses. Multilevel logistic regression analysis examined multivariate associations between alcohol advertising TRPs and the two alcohol use outcomes allowing for the clustering of students by school and state after adjustment for covariates and survey time. All multilevel analyses specified a three-level model: individuals within schools within state. Advertising TRPs variables were scaled to per 1,000 TRPs for these analyses.

To assess the specificity of associations between alcohol advertising TRPs and adolescent alcohol use, the multilevel modelling analyses were repeated using past-month smoking as the outcome variable. In this analysis past-month drinking was included as a control variable.

For all analyses excluding the multilevel logistic regression, data were weighted to ensure the distribution of age, gender and education sector was representative of the population of 12-17 year olds in secondary schools in each participating state. In logistic regression analyses, clustering of students at the school level was adjusted for with the Huber-White Sandwich estimator for standard errors. All analyses were conducted using Stata 14.0.

RESULTS

DESCRIPTION OF STUDENT SAMPLE

Data from 70,922 students from across the five surveys was analysed. In the weighted data set, in each survey around 30 per cent were aged 16-17 years. The proportion of students smoking in the past month declined over time ($p<0.01$) (Table 1). The average number of negatively slanted articles about alcohol in daily newspapers in the month prior to students being surveyed increased over the period of the study (Table 1).

Table 1: Description of 12-17 year olds from greater metropolitan areas of 5 relevant jurisdictions participating in each survey

	1999	2002	2005	2008	2011	P-VALUE
Total number of 12-17 year olds surveyed (unweighted)	25,538	23,517	21,905	24,616	24,912	
Study N (capital city TRPs) (unweighted)	14,196	12,644	13,384	14,694	16,004	
	%	%	%	%	%	
Males	50	50	49	50	50	0.99
AGE						
12-15 yo	72	69	73	70	71	0.80
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	<0.01
Average or below	59	59	57	58	54	
Smoked in past month	22	18	13	11	8	<0.01

Table 2 shows the proportion of all students in the two age groups drinking alcohol in the previous month and drinking at risky levels in the previous week. The proportion of 12-15 year olds drinking in the past month started to decrease after 2002. For 16-17 year olds, the proportion drinking in the past month started to decrease from 2008.

For both age groups, the prevalence of past-week risky drinking was relatively stable between 1999 and 2005 (Table 2). However prevalence in both age groups declined between 2005 and 2008 and then declined again between 2008 and 2011.

Table 2: The proportion of metropolitan students engaging in different drinking behaviours by age group and survey year

STUDENT DRINKING INVOLVEMENT	1999 %	2002 %	2005 %	2008 %	2011 %	P-VALUE
PAST-MONTH DRINKING						
12-15	39	40	33	27	17	<0.01
16-17	67	66	67	59	49	<0.01
All students	49	48	42	36	27	<0.01
PAST-WEEK RISKY DRINKING						
12-15	4	5	5	3	2	<0.01
16-17	22	21	23	17	13	<0.01
All students	10	10	10	8	5	<0.01

ALCOHOL ADVERTISING, ALCOHOL CONTROL ADVERTISING OVER TIME

In each jurisdiction, adolescents were potentially exposed to decreasing amounts of total alcohol advertising on television after 2005 (Figure 1). The highest advertising levels were found between 1999 and 2005, with, for example, adolescents in Market 3 potentially exposed to an average of 36 alcohol advertisements in the previous month in 2005.

Figure 1: For each market and for each survey year, average past-month adolescent total alcohol advertising TRPs for students surveyed

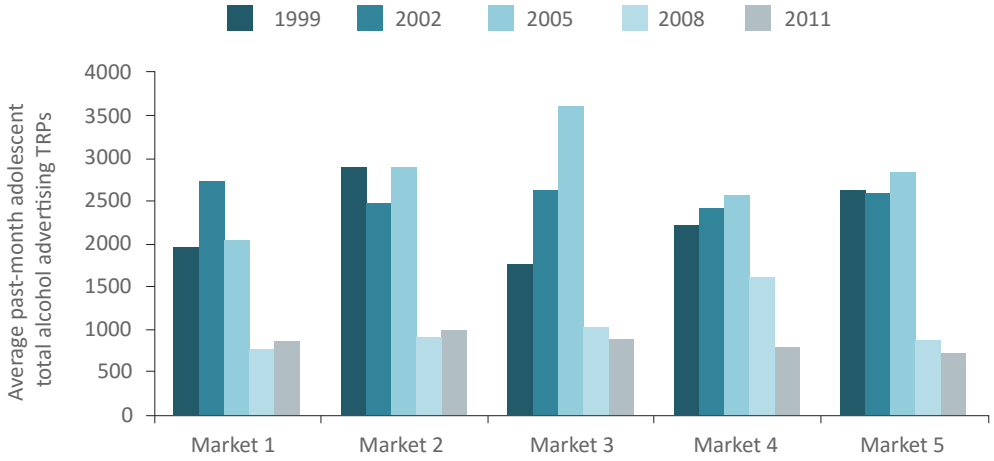
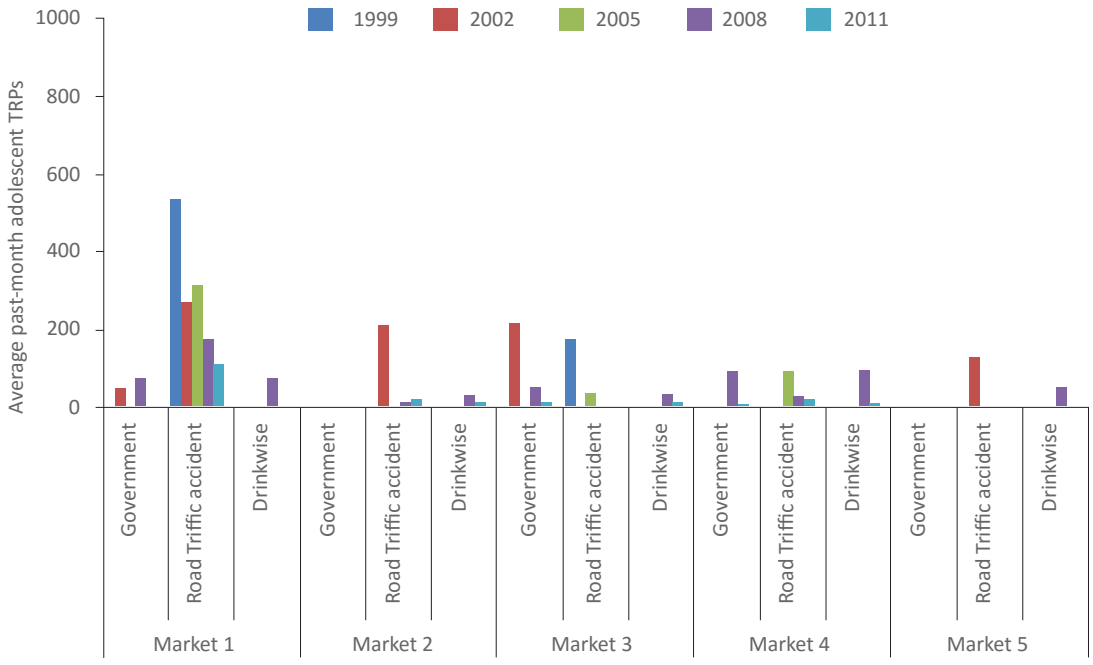


Figure 2 shows advertising levels for different alcohol control organisations. As can be seen, alcohol control advertising TRPs were lower than those for alcohol products. For instance, adolescent TRPs were highest for drink driving advertisements in Market 1 in 1999, with adolescents in this market potentially exposed to around five drink driving advertisements a month. As there was no advertising TRPs for DrinkWise in three of the five survey years, this variable was excluded from subsequent analyses.

Figure 2: For each market and for each survey year, average past-month adolescent government, DrinkWise and drink driving alcohol control TRPs for students surveyed



MULTILEVEL MODELLING ANALYSIS

After adjusting for student-level control variables, percentage of negative alcohol-related news and opinion pieces in newspapers, alcohol control advertising TRPs, and survey timing, multilevel logistic analyses found significant positive associations between alcohol advertising TRPs and drinking behaviours (Table 3). There was a positive association between past-month alcohol advertising TRPs and the likelihood of past-month drinking and past-week risky drinking among all students (Table 3). While government alcohol control advertising TRPs were not related to either drinking outcome, road safety advertising TRPs were inversely related to risky drinking among all students (OR=0.69, 95% CI 0.49-0.98).

Table 3: Associations (Odds Ratios (OR) and 95 per cent Confidence Intervals (95%CIs)) between past-month total alcohol advertising TRPs and the three drinking outcomes after adjusting for control variables^ from multi-level models

VARIABLE	PAST-MONTH DRINKING OR (95%CI)^^	RISKY DRINKING IN ALL STUDENTS OR (95%CI)
ALL ADOLESCENT ALCOHOL ADVERTISING TRPS IN PAST MONTH (PER 1000 TRPS)		
12-17 yo	1.11 (1.07-1.15)*	1.15 (1.09-1.22)*

*significant at p<0.05 level.

^ All models adjusted for clustering of students at the school level and state. Age, sex, socio-economic status, self-rated academic ability, language spoken at home, past-month smoking and per cent of negative news and opinion articles in newspapers, past month government alcohol control advertising TRPs and road safety advertising TRPs also included in models.

Sensitivity analyses found no association between past-month smoking and past-month adolescent total alcohol advertising TRPs (OR=1.02, 95%CI: 0.97-1.07).

DISCUSSION

In this study we examined the relationship between adolescents' alcohol use and their exposure to alcohol advertising on television. Over the study period, Australian adolescents' potential exposure to alcohol advertising on free-to-air television decreased, as did the prevalence of past-month drinking in this age group. We found that greater potential exposure to alcohol advertising on television was associated with a greater likelihood of past-month drinking, and was positively associated with the likelihood of risky drinking for all adolescents. The decreasing level of direct alcohol advertising on television may have contributed to the reduction in adolescents' alcohol consumption. However, as declines in adolescent drinking during the 2000s have been found in other countries[4], other factors may also be contributing to reductions in youth drinking.

In all states there was a large decrease in adolescents' potential exposure to direct alcohol advertising on television between the end of 2005 and 2008. Data presented in Chapter 3 of this report suggests that there were relatively large declines in alcohol advertising TRPs each year between 2005 and 2008, with alcohol advertising TRPs in 2006 an average of 23 per cent lower than TRPS in 2005, TRPs in 2007 on average 32 per cent lower than the 2006 TRPS, and TRPS in 2008 25 per cent lower than those in 2007.

As TRPs is a function of both the frequency of an advertisement being screened and the proportion of the target audience exposed to these advertisements, this decrease could result from reductions in the frequency of alcohol advertisements on television and the proportion of adolescents watching television. As the proportion of 14-24 year olds watching television was relatively stable between 2000-08 at around 94 per cent,[51] the decrease in TRPs between 2005 and 2008 is unlikely to be due to fewer adolescents watching television in 2008. The decrease may reflect a change in the marketing strategy of alcohol beverage companies, from television to greater use of other advertising channels including the internet and sponsorships. Work from the USA and the UK has suggested that marketing via the internet expanded over our study period[36,56]. Currently it is not possible to quantify alcohol-related

industries' advertising expenditure in channels like the internet, sponsorship, in-store promotions or letter box drops in Australia.

Of the alcohol control advertising we examined, most TRPs were associated with road safety advertisements. We found that greater potential exposure to these advertisements reduced the likelihood of an adolescent engaging in past-week risky drinking. Since the 1990s, the road safety advertisements shown on television in many Australian cities have depicted realistic images of road accidents and their aftermath, with advertisements evoking a strong negative emotional response. These advertisements may have some resonance with young people who are starting to drive. We did not find an association between adolescent drinking behaviours and potential exposure to government alcohol control television advertising. However we note that throughout the study period, adolescents' potential exposure to alcohol control advertising including road safety advertisements was very low. In general, the level of alcohol control advertising to which adolescents have been potentially exposed, is substantially less than levels shown to be effective in reducing adolescent smoking[95], with ongoing adequate exposure being a critical element of effective campaign advertising[96]

Although the current study covered many years, the study employed a cross-sectional design. Differences between states and study years in students' alcohol consumption and their potential exposure to alcohol advertising increased the variation in the study's predictor and outcome variables. While schools and students in the different survey years were not the same, older students in a survey year would be drawn from the cohort of younger students (12-14 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 12-15 year olds, who had significantly lower levels of drinking than previous cohorts. A longitudinal study from the USA found that youth living in low alcohol advertising markets were less likely to consume alcohol and increased their consumption of alcohol more modestly than those living in high advertising markets[16]. The lower level of advertising in 2008 and 2011 may have helped younger students maintain low levels of alcohol consumption as they moved into their senior school years.

As noted above, other countries including the UK and the USA have also found declining youth drinking rates in the 2000s[4-6]. 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 adolescent alcohol use. However, reports from the UK show that expenditure on television alcohol advertising decreased by about 54 per cent between 2005-09[56, 57]. During this period past-month drinking prevalence in English youth also decreased from 36 per cent in 2005 to 31 per cent in 2009, and 25 per cent in 2010[6]. While this pattern of results is consistent with the proposition that reduced television alcohol advertising contributes to declining adolescent drinking, television alcohol advertising expenditure in the UK increased by 56 per cent between 2009 and 2011, while alcohol prevalence continued to decline.

One factor that may have contributed to changes in youth drinking rates in the latter part of the study period was a 70 per cent tax increase on premixed or ready-to-drink alcoholic beverages in April 2008[97]. This tax increase was associated with a 30 per cent decrease in the sale of premixed drinks and a 1 per cent decrease in total pure alcohol sold in Australia[98]. Secular changes including the way adolescents socialise (e.g. greater use of social media and the internet) and changing attitudes towards alcohol may also be contributing to declines in youth drinking. The late 2000s saw the rise of several social movements promoting alcohol-free months or lifestyles. Although many of these movements are adult focused, their rise may reflect as well as influence changing alcohol attitudes. Further work is needed to determine the influence of different secular trends on youth drinking.

Several study limitations 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 advertising an individual received. The measure of television advertising exposure used in this study did not include cable or subscription television advertising; thus potential advertising exposures may have been under-estimated. However, as by 2011 only around 29 per cent of Australian households had subscription television, free-to-air television dominated the Australian market during the study period. Our study focused on alcohol advertising in only one media channel—television—and therefore cannot comment on the impact of alcohol advertising in other channels (e.g., the internet, point of sale and sponsorship)

or total advertising exposure on adolescent drinking. In addition, similar to other studies, the current study did not control for the potential impact of different alcohol control policies or changes in price of alcohol in the analysis. As studies have shown an inverse association between adolescent drinking and policies controlling alcohol availability and price, future work needs to examine the role of alcohol advertising on adolescents' alcohol use after controlling for the possible impact of different alcohol control policies.

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.

CHAPTER 9:
How do alcohol control policies, outlet density, alcohol advertising and newspaper coverage influence adolescent drinking behaviours?

This chapter is based on the following publication:

White V, Azar D, Faulkner A, Coomber K, Durkin S, Livingston M, Chikritzhs T, Room R, Wakefield M. Adolescents' alcohol use and strength of policy relating to youth access, trading hours and driving under the influence: findings from Australia. Addiction 2018; Jan 22. [Epub ahead of print]

This chapter was originally published:

What is the influence of alcohol control policies, alcohol outlet density, promotional advertising on television and alcohol newspaper coverage on trends in adolescents' drinking behaviours?

INTRODUCTION

While the prevalence of alcohol use by Australian adolescents increased by approximately 19 per cent during the 1990s[99], during the 2000s the prevalence started to decline, and by 2011, 33 per cent fewer adolescents had consumed alcohol in the past month than in 2005 (43 per cent compared to 29 per cent).[3] The decrease in adolescents' alcohol use was not unique to Australia with the USA[100], UK [6], France and Germany[4] also reporting decreases in the use of alcohol by their adolescents during the 2000s. Reasons for the decrease in youth drinking in Australia and other countries are not clear[4, 7].

Babor et al [73] identified seven broad strategies that can reduce alcohol consumption and related harm in the general population including: price increases, reduced availability, drink driving counter-measures, marketing controls, and changing the drinking context. As previous chapters in this report have shown, there has been some change in the extent Australian states have implemented at least some aspects of these different alcohol control strategies. However across policy areas the direction of change has not been consistent, with some areas strengthening (e.g. drink driving policies) and others weakening (alcohol availability). In addition to policy changes, the level of paid advertising on television for alcoholic beverages was reduced considerably during the 2000s. These changes suggest that the alcohol environment for Australian children entering adolescence in the late 1990s and early 2000s would have been different from that experienced by children entering adolescence by the late 2000s.

Multiple studies have shown positive associations between adolescents' drinking and alcohol outlet density[12, 14, 92, 101, 102], alcohol advertising[103-106], the extent of policy implementation[9, 10, 88, 107], or for specific policies[108, 109]. While studies have examined the relative influence of policies and retail outlet density and/or price, few have examined simultaneously the relative impact of advertising, policy and outlet density on adolescent drinking. One study[110] examined the impact of alcohol outlet density and policies in the areas of advertising control, hosting underage drinking parties, public drinking and selling of alcohol on alcohol consumption by youth in California over a 3-year period. This work suggests that both outlet density and alcohol policies are related to lower rates of past-year drinking. Another study [108] examined the impact of social host policies on adolescent drinking while adjusting for bar density, policy enforcement and adult drinking prevalence. This study found an association between youth drinking and bar density but not between youth drinking and social host laws or policy enforcement.

In addition to the policy areas listed above, alcohol price has been suggested to influence adolescents'

alcohol use with research suggesting an inverse association between price and adolescents' alcohol consumption[111, 112]. However few studies have looked at the influence of price and other alcohol-related variables including advertising exposure and alcohol control policy implementation on adolescent drinking behaviours. A USA study examined the influence of potential advertising exposure of alcohol brands adolescents consume on adolescents' drinking after adjusting for the average price of alcohol and the brands' market share. This study found significant associations between alcohol use and all three variables with an inverse association found between alcohol use and price. Another USA study examined the association between adolescents' alcohol consumption and adult binge drinking levels and alcohol tax levels[113]. This study found that after adjusting for adult binge drinking levels, tax levels were not significantly related to youth drinking, suggesting that part of the impact of tax increases on youth drinking may be due to their role in reducing the likelihood of adult binge drinking[113]

Room et al's framework for understanding change and stability in alcohol use in a population[8] suggests that social norms for drinking can work to push population alcohol use up when *favourable* or down when *unfavourable*. News media plays a key role in setting public agendas[59], with newspapers playing a key role in shaping the news for the day, commonly setting the agenda for breakfast radio and television programs, talkback radio and television and radio news programs during the day.[71] Assessing the prevalence of positively or negatively framed newspaper articles relating to alcohol use can therefore provide an indicator of how alcohol-related stories are being framed in the broader community-wide news media.

As research has shown that the media's portrayal of alcohol use as either positive or negative can influence the public's notion of acceptable or unacceptable use[60, 61], assessing the way alcohol is portrayed in newspaper articles can provide an insight into a community's attitudes towards alcohol use. While several studies have examined the relationship between newspaper coverage of specific alcohol-related topics and behaviour (e.g drinking driving articles and drink driving behaviour[114], binge drinking articles and youth binge drinking [60]), to our knowledge an indicator of how alcohol-related stories are framed in the media has not been included in studies that have examined the impact of policy and alcohol outlets on adolescent drinking.

Therefore, the current study aims to understand the relative influence of a number of different factors on Australian adolescents' alcohol use. Specifically, we examine the relative associations between adolescents' alcohol use and implementation of three specific alcohol control policies (youth access, drink driving, and trading hours), alcohol outlet density, potential exposure to alcohol advertising on television, alcohol-related newspaper article coverage and an indicator of alcohol price.

METHOD

ADOLESCENT DATA

Adolescent alcohol use data is taken from the Australian Secondary Students' Alcohol and Drug (ASSAD) survey [1, 3, 99], a national self-completion survey administered every three years since 1984. The survey's methodology is described in Chapter 6. In brief, a stratified two-stage probability sample was employed, with schools selected at the first stage and students at the second. The survey was administered at the school by external research staff and students completed the survey anonymously. Data utilised for this paper are from students residing in metropolitan areas of the four Australian states where both advertising exposure data and outlet density data was available. Data analyses used data from these students captured in surveys conducted in 2002, 2005, 2008 and 2011.

OUTCOME MEASURES: PAST-MONTH ALCOHOL CONSUMPTION AND RISKY DRINKING

Students' recent alcohol use was assessed, with students indicating if they had an alcoholic drink in the past month. Students also indicated how many alcoholic drinks they consumed on each of the previous seven days. Students consuming five or more drinks on at least one of the days in the past week were classified as risky drinkers. Questions assessing alcohol use were identical in all survey years.

INDEPENDENT VARIABLES

ALCOHOL CONTROL POLICIES

Alcohol control policy implementation was determined at a state level. The current analysis focused on the three regulatory domains under the control of state legislatures: youth access, trading hours, and drink driving. The number of different policy topics assessed in each domain is as follows: i) youth access and secondary supply (8 topics); ii) trading hours (9 topics); and iii) drink driving (8 topics). Legislation from the relevant liquor licensing and road safety acts in each state was reviewed for the entire study period. Two researchers conducted the coding independently of each other. Results from each researcher were pooled and discrepancies were resolved with input from policy staff at state health and liquor licensing departments. We coded for policies in effect by the January of the survey year.

Based on effectiveness assessments of the World Health Organization[73] and Nelson[80], an effectiveness rating was assigned to each policy topic that reflected: limited (1); moderate (2); or high (3) effectiveness. Following Brand et al[76], a scoring system based on policy effectiveness was developed for each policy domain. Each state received points based on the strictness of the policy in each year, with 0 points allocated when the policy was not operational, full points when it was fully implemented, and points in between for partially implemented policies. Each policy topic's potential full points were pre-determined according to that topic's likely effectiveness (ranged from 1-3). Each policy domain's score was the sum of the relevant policy topic scores.

As the total number of policy topics within each policy domain differed, a standardised measure with a maximum score of 100 was calculated to enable comparability across policy domains. To do this we divided 100 by the total possible effectiveness score for each policy domain and assigned policy topic scores according to multiples of this value. For example, the total possible effectiveness score for the sum of policy topics in the youth access domain was 17. Dividing 100 by 17 gave 5.88, which was then used as the base score for the youth access domain. This then provided a potential score of 5.88 for topics with limited effectiveness, a potential score of 11.76 for topics with moderate effectiveness, and a potential score of 17.64 for policy topics with high effectiveness. If there was partial implementation of a moderately effective policy, then it received half the potential score for that policy. For example, a moderate effective policy with a potential maximum score of 11.76, such as bans on the consumption of alcohol in public places, was assigned 0 for no bans, 5.88 for partial bans and 11.76 for a total ban. Alcohol policy data was combined with student data at a state and year level.

ALCOHOL OUTLET DENSITY

As described elsewhere[115], postcode-level liquor licensing information was obtained from the relevant state licensing authorities. Four main licence types counted were: on-premises (consumption at the venue); off-premises (take-away sales); general (consumption at the venue and take-away); and clubs (sale of alcohol to members and guests of members; e.g. sporting clubs, ethnic/social clubs). Following Huckle[101], in this study we used total alcohol outlet density to provide in one measure an estimate of the pervasiveness of alcohol outlets in an adolescent's local environment. To this end, the total number of alcohol outlet licences within each student's postcode in the year prior to the survey year was computed and the density per 1,000 residents within a postcode determined. Postcode-level population data were obtained from the ABS for each survey year.[26] Historical data on the number of alcohol outlets in each postcode was only available in four Australian states and one territory.

ALCOHOL-RELATED ADVERTISING TARGET RATING POINTS (TRPS)

Adolescents' past-month potential exposure to all alcoholic beverage (beer, wine, spirits and premix/cider) and retailer advertisements on television was assessed using Target audience Rating Points (TRPs). Adolescent TRPs data for alcohol control advertising was obtained from a media monitoring company. TRPs are an extension of the Gross Rating Points (GRPs) measure[50] which are based on the reach of an advertisement in the population of households with televisions, along with how often the advertisement is screened to that audience (frequency). TRPs specific to 13-17 year olds are derived

from television programs watched by this age group, which can include both youth-specific and more general programs. GRPs and TRPs are calculated from the number of advertisements aired and the proportion of the target population (i.e., 13-17 year olds) potentially exposed to those advertisements within a specified time period. Therefore, a specific value could mean several different combinations of exposure frequency and audience reach, with, for example, 80 TRPs per month equivalent to 80 per cent of adolescents within a media market exposed to the advertisement once during that month, or 40 per cent of adolescents exposed twice during the month, or 20 per cent of adolescents exposed to the advertisement four times.

Advertising TRPs for 13-17 year olds were obtained for the four media markets covering the capital cities in this study.

ALCOHOL-RELATED NEWSPAPER COVERAGE

Included in this study are data derived from a previously described content analysis of alcohol-related articles in Australian newspapers94. In brief, a sample of alcohol-related articles appearing in each state's daily and Sunday newspapers were identified and coded for alcohol-related content. For each month, the number of alcohol-related articles (news and opinion/commentary) where the alcohol-related topic of the article was presented in a negative slant was calculated, as was the number of all alcohol-related articles (news and opinion/commentary) appearing in that month. We created an article impression variable for each state and year by multiplying the number of articles appearing in a newspaper by the newspaper's estimated readership for each day of the week. The per capita number of potential article impressions was obtained by dividing impressions by the state's population aged 14 years and over116. The percentage of impressions for negatively slanted alcohol-related news/opinion articles out of all alcohol-related news/opinion articles was determined. As research suggests that four months of news coverage exposure can affect attitudes117, for each student, data were aggregated to reflect impressions over the four months preceding their survey date. Students completing the survey between the 1st and 15th of the month were assigned the preceding 4-month sum, while students surveyed on or after the 16th of the month received all the values for that month.

ALCOHOL PRICE

State-specific data on alcohol price were obtained from the ABS for the period March 2001-December 2011[33] . A 'real alcohol price index' was calculated by dividing the quarterly consumer price index data for alcoholic beverages by the quarterly all-goods consumer price index (CPI)[118] and multiplied by 100 to get a percentage score. This index provides an estimate of the CPI change in alcohol prices relative to the total CPI change in the student's metropolitan area. Annual data for each student was ascertained by averaging the indices from current and previous three quarters, with the current quarter based on student's survey date. Scores under 100 indicate alcohol's price change was below the CPI for general consumer goods for that year.

For this analysis, we calculated the percentage of all alcohol-related articles with a negative topic slant (reflecting more social disapproval) in each state and year.

CONTROL VARIABLES

Student level variables: Age (12-15 years and 16-17 years), sex, socioeconomic status (SES), self-rated academic ability (above average, average or below), and past-month smoking status (yes or no) were controlled in the analyses. SES was coded based on the respondents' postcode using the 2011 national Socioeconomic Index for Areas Index of Relative Advantage and Disadvantage[89]. Postcode-level SES was categorised into quintiles and then collapsed into three groups with a low score indicative of relative disadvantage (lowest 40 per cent) and a high score indicative of relative advantage (highest 20 per cent).

Adult drinking prevalence: Estimates of the proportion of adults (18+ years) in each state who consumed alcohol at least weekly were from the triennial, population-based National Drug Strategy Household Survey conducted in 2001, 2004, 2007 and 2010 (e.g. [36,37]).

STATISTICAL ANALYSIS

Data were weighted to ensure the distribution of age, gender and education sector was representative of the population of 12-17 year olds in secondary schools in each participating state. Logistic regression models examined whether there was a statistically significant change in our two measures of alcohol consumption over the study period. Linear regression models were used to identify significant change over time in advertising exposure, per capita outlet density and newspaper impressions. A variable indicating the timing of the survey (in months) was calculated using students' survey month and year.

Multivariable mixed effects logistic regression modelling was used to examine the relative associations between the three alcohol policies scores, advertising TRPs, outlet density, newspaper impressions, and CPI price change with past-month drinking and risky drinking adjusting for sex, age, SES, self-rated academic ability, past-month smoking, survey timing and state-specific adult alcohol use prevalence. For these analyses, the alcohol advertising TRPs variable was scaled to per 1,000 TRPs, while the policy variables were scaled to represent a 10 per cent change in implementation. In multivariable mixed-effect models, students, school and state were included as random effects. Where appropriate, regression models adjusted for clustering of students at the school level with the Huber-White Sandwich estimator used to calculate standard errors. Multilevel modelling was conducting using xtmelogit procedures in Stata. All analyses were conducted using Stata 14.0.

RESULTS

DESCRIPTION OF STUDENT SAMPLE

A total of 45,245 students from the four surveys were included in analyses. In the weighted data set, in each survey around 70 per cent were aged 12-15 years. SES distribution of students was similar over the study period. The prevalence of past-month smoking declined over time ($p<0.01$) (Table 1).

The proportion of all students consuming alcohol in the past month decreased over the study period (Table 1), with this decrease commencing after 2005 for the 16-17 year olds. The prevalence of risky drinking among all students began to decline after 2005.

Table 1: Sample characteristics of metropolitan students in each survey year

	SURVEY YEAR				
VARIABLE	**2002**	**2005**	**2008**	**2011**	**P-VALUE**
Students surveyed (n)	9805	10497	11824	13119	
Age (years) % 12-15	68.8	73.0	70.3	71.1	0.83
Males (%)	49.8	50.7	49.8	49.5	0.98
SES TERTILES (%)					
0-40 (most disadvantaged)	27.1	27.2	34.4	25.4	
40-80	42.5	28.8	39.0	40.6	
81-100 (least disadvantaged)	30.4	34.0	26.6	34.0	0.20
SELF-RATED ACADEMIC ABILITY (%)					
Above average	41.5	43.4	42.6	46.1	
Average or below	58.6	56.6	57.4	53.9	0.01
Smoked in past month (%)	17.8	12.9	10.9	8.5	<0.001
ALCOHOL USE					
DRINKING IN PAST MONTH (%)					
All students	47.4	41.8	36.0	26.3	<0.001
12-15 years	33.6	26.3	20.3	13.3	<0.001
16-17 years	61.8	61.2	53.8	41.3	<0.001
RISKY DRINKERS (%)					
All students	10.3	10.0	7.5	5.2	<0.001
12-15 years	2.9	3.0	1.9	1.2	<0.001
16-17 years	18.1	18.9	14.0	9.8	<0.001

Note: Population weighted percentages.

While there was variation between states, in general strength of policy in each of the three domains increased between 2001 and 2010 (Figure 1).

In all states, potential exposure to alcohol advertising on television was greatest in 2002 and 2005 (Figure 2). Assuming a value of 100 TRPs means that all students were exposed to one advertisement in the past month. Data in Figure 2 suggest that in 2002 students in different states were potentially exposed to between 24-28 alcohol advertisements per month and an average of between 20-29 advertisements per month in 2005. However, after 2005, all states saw a substantial decrease in adolescent past-month alcohol advertising TRPs.

The density of all alcohol outlets did not change over the study period in any state.

Figure 1: Implementation of alcohol control policy domains, in the year preceding the student survey in each state (2001-2010)

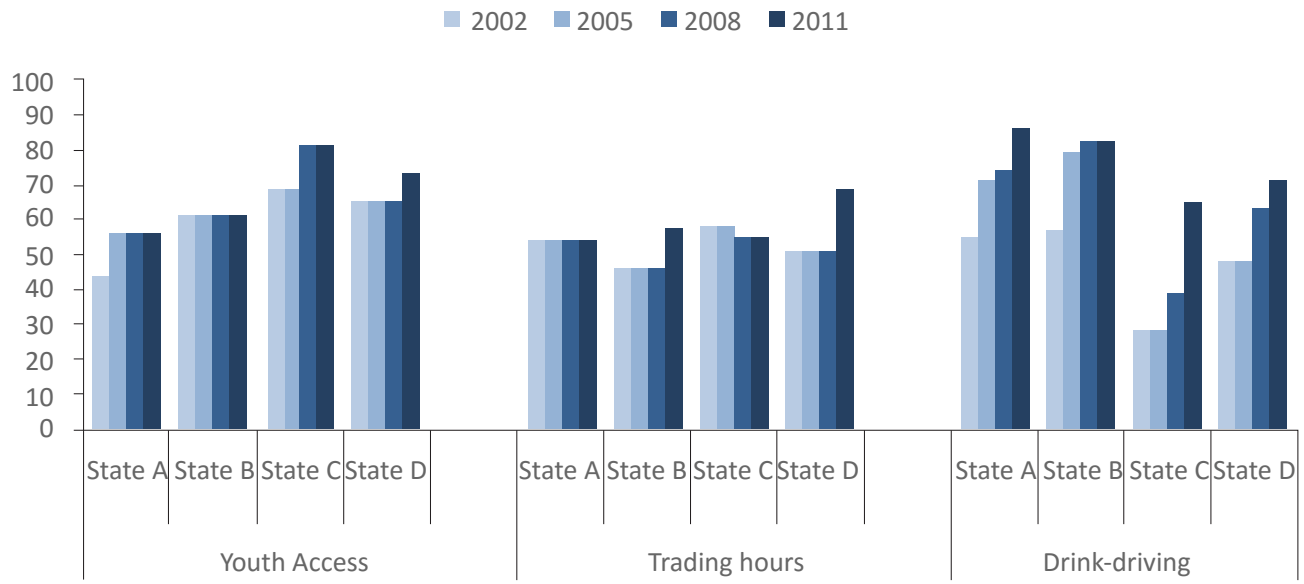
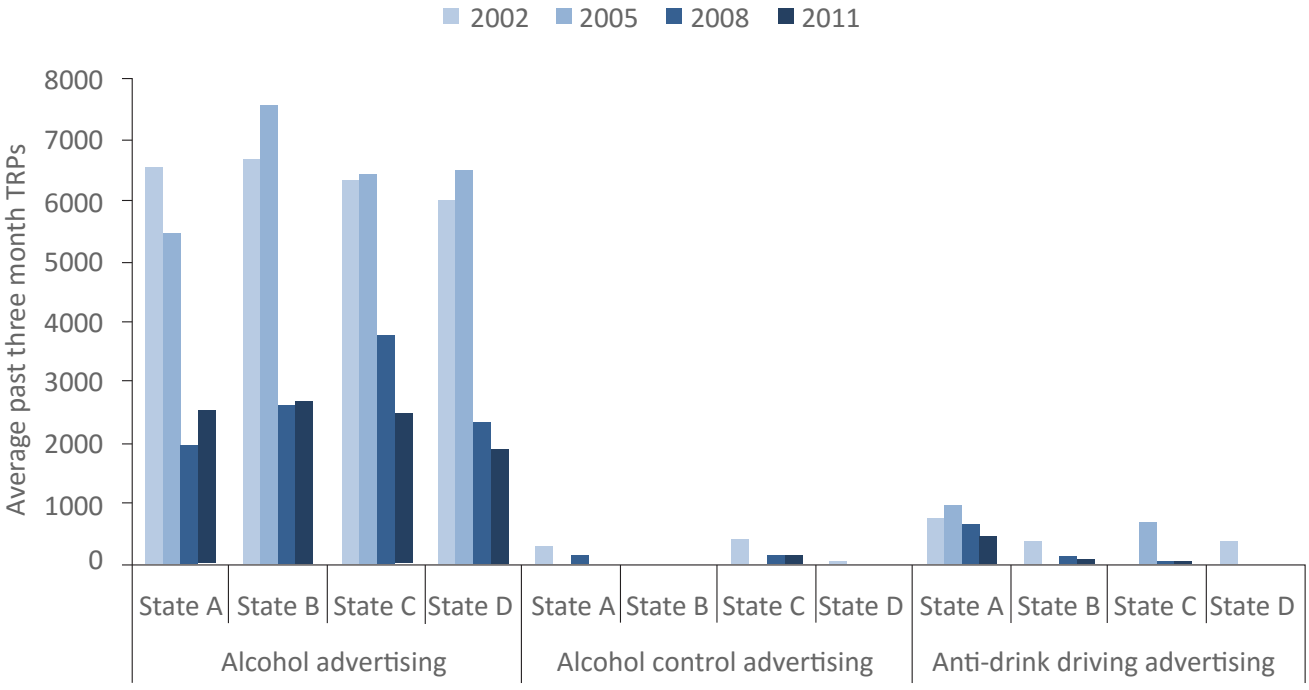
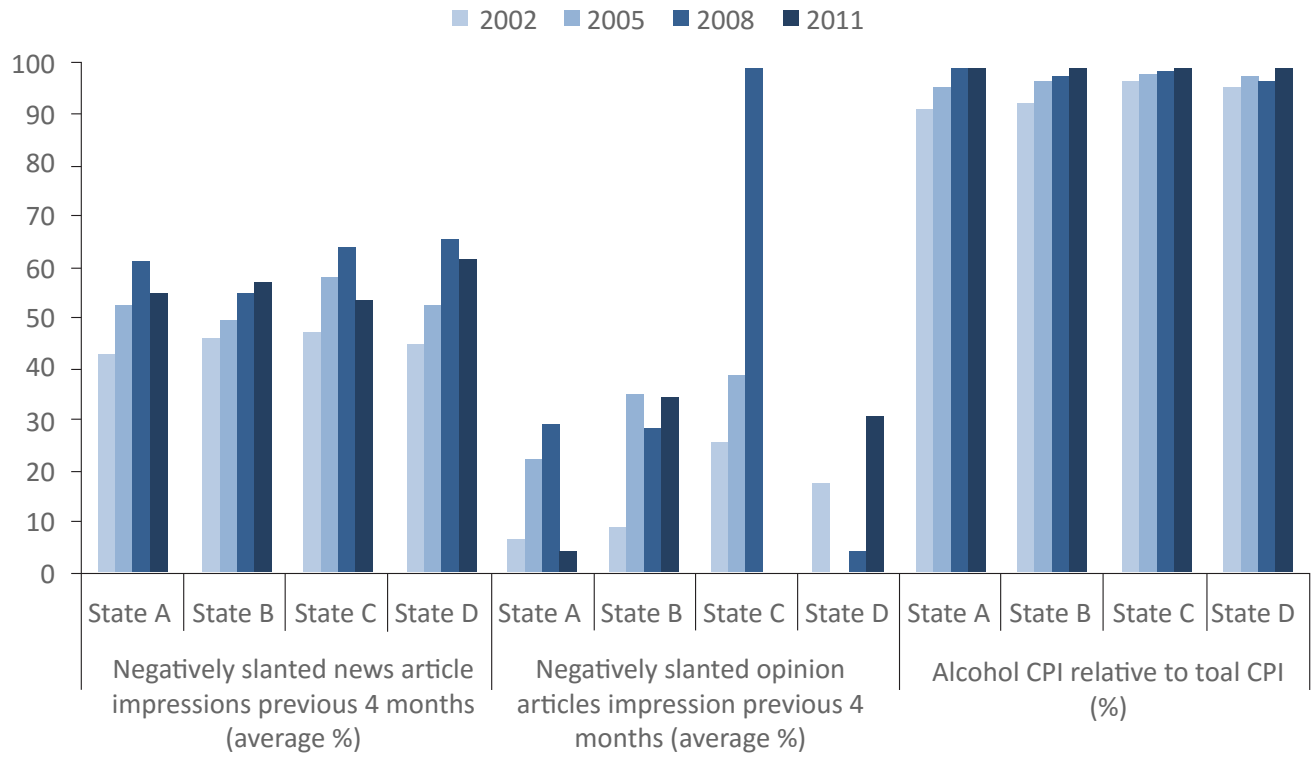


Figure 2: For each state, average students' past three month potential TRPs exposure in each survey year 2002, 2005, 2008 and 2011



In general there was an increase in the proportion of negatively slanted articles students were potentially exposed to in each state over the study period (Figure 3).

Figure 3: Average students' past 4 months percent of negatively slanted news or opinion alcohol-related article impressions and alcohol consumer price index (CPI) relative to total CPI expressed as percentage in each state for each survey year 2002, 2005, 2008 and 2011



MULTILEVEL MODELLING ANALYSIS

Multilevel analyses found inverse associations between past-month drinking and implementation of more restrictive trading hour policies (OR=0.80 95%CI 0.69, 0.94) (Table 2). The results suggest that for every 10 per cent increase in the implementation of stricter trading hours policies, the odds of an adolescent engaging in past-month drinking reduced by approximately 20 per cent. There was a significant positive association between alcohol outlet density and past-month drinking (OR=1.02 95% CI: 1.00, 1.03) with results indicating that for every additional outlet in an adolescent's local area the odds of an adolescent drinking in the past month increased by approximately 2 per cent (Table 2). Greater potential exposure to negatively slanted alcohol-related news stories in newspapers reduced the odds of an adolescent drinking in the past month.

Table 2: Multivariate Odds Ratios (OR) and 95 per cent Confidence Intervals (CI) for associations between past-month drinking and past-week risky drinking and alcohol policies, alcohol industry and alcohol control advertising TRPs, outlet density, and newspaper coverage, adjusting for student level covariates and all other independent predictors[a]

	PAST-MONTH DRINKING	PAST-WEEK RISKY DRINKING
VARIABLE	OR (95% CI)	OR (95% CI)
ALCOHOL POLICIES (10% INCREMENTS)		
Youth access and supply	0.92 (0.81, 1.04)	0.79 (0.66, 0.95)*
Trading hours	0.80 (0.69, 0.94)**	0.85 (0.66, 1.09)
Drink driving	1.00 (0.93, 1.09)	1.02 (0.90, 1.14)
13-17 YO ADVERTISING TRPS (EVERY 1000 TRPS)		
Alcohol industry	1.03 (1.00, 1.05)	1.05 (1.00, 1.10)*
Government alcohol control	1.05 (0.73, 1.52)	1.03 (0.58, 1.85)
Drink driving	0.99 (0.83, 1.18)	0.83 (0.63, 1.09)
OUTLET DENSITY PER 1000 ADULTS		
All outlets density	1.02 (1.00, 1.03)*	1.04 (1.02, 1.06)**
NEWSPAPER COVERAGE		
% negative news articles (10% increments)	0.99 (0.98, 0.99)**	1.00 (0.99, 1.00)
% negative opinion articles (10% increments)	1.00 (1.00, 1.00)	1.00 (0.99, 1.00)
Price CPI index	1.02 (0.99, 1.06)	1.04 (0.99, 1.10)

[a] Adjusted for clustering of students at the school level and state, all policy variables, all other variables in the table, and sex, age, socioeconomic status, students self-reported academic ability, language spoken at home, smoking in the past month, prevalence of adult weekly drinking in previous year and timing of survey (year and month).

*P<0.05; **P<0.01.

For past-week risky drinking, a statistically significant inverse association was found with youth access polices (OR=0.79, 95%CI: 0.66, 0.95) indicating that stronger regulations in this area reduced the likelihood of an adolescent engaging in risky drinking. Greater potential exposure to alcohol industry advertising on television (OR=1.05, 95%CI: 1.00, 1.10) and a greater number of alcohol outlets per 1000 adults in an adolescent's local area (OR=1.04, 95% CI: 1.02, 1.06) increased the likelihood of an adolescent engaging in risky drinking in the past week.

DISCUSSION

This is the first Australian study to examine the relative influence of multiple alcohol policies, television alcohol advertising, retail alcohol outlet density and the proportion of alcohol-related articles in daily newspapers that were negatively framed, on the drinking behaviours of adolescents. We found that after adjusting for the influence of alcohol advertising and alcohol outlet density, stronger policy in the areas of trading hours and youth access reduced the likelihood of past-month drinking and past-week risky drinking respectively. We found that alcohol product advertising on television was positively related to risky youth drinking. We also found that greater density of alcohol outlets in an adolescent's local area was positively related to both past-month drinking and risky drinking. Taken together, our results suggest that population-based policies that attempt to restrict the availability of alcohol, reduce youth access to alcohol, and reduce alcohol advertising on television may contribute to reductions in youth drinking.

Studies from the USA or those involving international comparisons have shown an inverse association between stronger implementation of alcohol control policies and youth drinking[9, 10, 88]. In these studies, the policy index generally provides a measure of the implementation of policies in a number of different domains. As the current study is one of the first Australian studies to investigate the role of policy implementation on youth drinking, rather than adopt an overall index approach, we examined the role of three separate policy areas, allowing us to understand what role, if any, these policy areas had on adolescent drinking. The youth access policy components we assessed concerned youth prohibition of purchasing and drinking alcohol in licensed premises, public consumption of alcohol, and supply of alcohol by persons other than parents (secondary supply). While our results need confirmation in other studies, the inverse association we found between youth access policy strength and risky drinking may suggest that the youth access policies Australia adopted during our study period have a stronger impact on the amount of alcohol consumed rather than preventing access.

Stronger policies in the area of trading hours were also inversely associated with adolescent drinking. As most adolescents who drink do not buy their alcohol, trading hour policies can be considered to be a population-oriented policy rather than a youth-oriented policy. Trading hour policies may influence youth drinking by their impact on perceived social norms for drinking.

We found an association between the density of alcohol outlets in an adolescents' postcode area and youth drinking after controlling for alcohol advertising and alcohol-related policies. Our outlet density indicator combined the densities of all alcohol licence types into one measure in an attempt to assess the total alcohol outlet environment for an adolescent. Our study suggests higher alcohol outlet density increases the likelihood of Australian adolescents engaging in past-month drinking and risky drinking.

A number of study limitations need to be kept in mind. Although the study used data from several survey years, our analyses are cross-sectional. Thus the associations found in this study are correlational rather than predictive, and so our findings need to be confirmed in longitudinal studies. Our measure of policy implementation did not consider enforcement, so we do not know the extent that the policies assessed in our study were implemented at a level that might be experienced by an adolescent and their community. This may be particularly relevant to the youth access measure. Our measure of television advertising exposure did not consider advertising on pay or subscription television. However as only around 30 per cent of Australian households had subscribed to pay television by 2011[34], most Australian still watched free-to-air television during our study period. Additionally, we did not include alcohol advertising in other domains (point of sale, sponsorship, online) in our advertising exposure measure. Thus our results only relate to alcohol advertising on television that adolescents may be exposed to.

Despite these limitations, findings from the current study provide important quantitative information on the potential role a number of alcohol-related policies can have on adolescents' drinking behaviours. Specifically, our results suggest that policies that aim to reduce the availability of alcohol in a community and reduce exposure to alcohol advertising may reduce the likelihood of youth drinking. Our findings also suggest that strengthening policies regulating availability of alcohol reduce youth drinking. Although our findings need to be confirmed by other studies, they provide evidence that population-directed policies that influence alcohol availability and promotion may also influence adolescents' alcohol use behaviours.

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