Evaluation of a public education campaign to support parents to reduce adolescent alcohol use

Short running Title: Adolescent alcohol use campaign evaluation

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Abstract

Introduction: Mass media education campaigns targeting parents may influence parent factors that reduce adolescent drinking, however few such campaigns have been evaluated.

Design and Methods: The Parents, Young People and Alcohol campaign included two phases of mass media advertising, *Cogs* and *I See*, to deliver consistent messages across multiple media channels. The campaign targeted Western Australian parents of 12-17 year olds with messages describing alcohol's effect on the developing brain and adolescent physical and mental health. The campaign reinforced the National Health and Medical Research Council (NHMRC) Guideline that for under 18s, not drinking is the safest option. Parent knowledge, attitudes and behaviours were assessed via cross-sectional surveys administered before the campaign (Time 1) and at two post-tests (Time 2; Time 3). Post-test campaign awareness and perceptions were also assessed.

Results: Campaign awareness was high (48% Time 2; 80% Time 3) and over 86% of parents found the campaign believable and relevant at both post-tests. Increased knowledge of the NHMRC guideline and lower belief in alcohol myths were found at both post-tests compared to Time 1. Less positive attitudes to parental supply were found at Time 2, but were not sustained at Time 3. Parents were more likely to have discussed alcohol risks and limiting drinking with their child at Time 3, but parent-to-child alcohol supply did not change significantly.

Discussion and Conclusions: The campaign achieved high awareness and positively influenced parental outcomes. Longer term campaign implementation supported by policy and environmental measures may be required to change parental supply.

Key words: parents; adolescent; alcohol use; mass media; public education campaign

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Introduction

Despite evidence of declining alcohol consumption among Australian adolescents during the past decade[1-3], in 2014 9% of 16 year old and 17% of 17 year old school students reported drinking at risky levels for short-term harm (5+ standard drinks on one occasion) during the previous week[2]. Adolescent drinking has been associated with a range of acute [4-6] and longer term harms[7-9] including negative impacts on the developing brain[5, 7].

Based on these risks the National Health and Medical Research Council (NHMRC) low-risk drinking guidelines recommend that "for children and young people under 18 years of age, not drinking alcohol is the safest option"[10](p.4). In 2014, 38% of Australian 12-17 year olds who had drunk alcohol reported obtaining their last drink from a parent[2]. A considerable minority of parents support introducing children to alcohol prior to the legal purchase age (18 years in Australia), citing perceived protective effects of parental supply[11-13], such as reducing curiosity about alcohol[14], teaching responsible drinking[12] and controlling the amount their child drinks[13]. However, recent research has documented the association between parental supply and increased adolescent alcohol use and does not support the perceived protective effect of early alcohol provision[15, 16].

There is a need for population-based interventions that increase parents' awareness of the risks associated with adolescent alcohol use and the important role parents can play in reducing these risks by not providing alcohol to their children. Behavioural theories such as Theory of Planned Behaviour (TPB)[17] can guide intervention approaches. When viewed through the TPB framework, parents' alcohol provision behaviours are seen as influenced by their attitudes and beliefs about providing alcohol to their underage child, their perceived control over their child's drinking, plus their perception of social norms, and environmental influences around underage drinking. Given parent's attitudes and actions influence adolescent alcohol use[18-20], ensuring parental awareness of the NHMRC guideline and the risks it addresses may be an important step in reducing adolescent drinking[21]. While there are no published estimates of parental awareness of the NHMRC guidelines, awareness is likely to be low based on figures from surveys conducted on the broader population[22-24]. Mass media campaigns can be a cost effective approach to increasing public awareness of health messages and may assist in changing social norms[12, 25] and build support for legislated environmental changes[26]. Within a comprehensive approach, mass media campaigns have made important contributions to tobacco control, road safety, immunisation, and HIV/AIDS[25, 27, 28].

To date, literature reviews have shown limited[25, 29] or mixed evidence[30] for the effectiveness of educational mass media campaigns in contributing to reducing alcohol use and related harms. Success may have been limited by: insufficient campaign intensity/duration, ineffective campaign messages, competing messages from well-funded alcohol marketing, and lack of integration of mass media campaigns within comprehensive approaches to alcohol control[25, 27, 31-33].

Expectations of the impact of public education campaigns on behaviour need to be realistic[34], and campaign evaluations should assess appropriate process and impact measures. Alcohol consumption is influenced by numerous factors (e.g., alcohol price, promotion and availability)[29] that may be beyond the direct influence of public education campaigns and limit their ability to demonstrate behavioural effects. Evaluations that focus narrowly on behaviour change may ignore the role of

education campaigns in improving mediators of individual behaviours[21, 35] and raising community awareness of issues that may build support for environmental measures that encourage behaviour change[26].

Several Australian studies have evaluated alcohol-related mass media education campaigns[36-38]. Dixon and colleagues[36] used cross-sectional pre-, post-intervention surveys to evaluate a campaign addressing the link between alcohol and cancer. At post-test, campaign awareness was high (68-81%) and knowledge and intentions to reduce drinking were higher than at pre-test. However, no reductions in drinking behaviours were found after one year of the campaign.

The National Binge Drinking Campaign's two-year mass media component addressed alcohol's negative effects on young people, targeting 15-25 year olds, with parents a secondary target group. Pre- and post-test (after 5 months of the campaign) cross-sectional surveys of parents of 13-17 year olds indicated less permissive parental attitudes toward child drinking and fewer parent-child alcohol-related discussions at post-test than at pre-test[37]. Despite high campaign recall and believability no other changes in parent outcomes were found.

Dunstone and colleagues[38] used a post-intervention, cross-sectional survey to compare alcohol harm reduction advertisements' effectiveness in motivating changes in Australian adult drinkers' behaviours. Behaviours included not supplying alcohol to adolescents, limiting drinking around children, and discussing alcohol with their child. After viewing each advertisement once, respondents' average motivation scores ranged from 3.15 to 4.05 on a 5-point scale, suggesting the advertisements were motivating for these behaviours.

While providing evidence of the impact of alcohol-related mass media campaigns in Australia, these studies either did not specifically address parents[36], or evaluated only short-term parent outcomes[37, 38]. Further, Dunstone et. al.'s[38] study's experimental results may not reflect the effects of viewing the campaign in a real-world setting over time, thus limiting their ecological validity[39].

The current study addresses these limitations by evaluating the effect on parents of a multi-year campaign delivered within a real-world setting. This study evaluated parent outcomes during 2.5 years of the Parents, Young People and Alcohol (PYPA) public education campaign. The PYPA campaign was developed to inform parents of 12-17 year olds (primary target audience) and 12-17 year olds (secondary target audience) of harms associated with adolescent alcohol use and the NHMRC guideline for under 18s. The campaign was launched in 2012 in Western Australia by the Mental Health Commission of the Government of Western Australia, as part of the Alcohol.Think Again Program.

Consistent with TPB[17] and the communication-behaviour-change model[33], the campaign rationale acknowledged that individuals must first be aware of an issue and hold sufficiently motivating beliefs and attitudes which, if reinforced by environmental support, may lead to behaviour change. Messages about the effects of alcohol on adolescents' brain and social functioning aimed to change attitudes and correct normative beliefs that early alcohol provision protects under 18s from alcohol-related harms. Community-wide message delivery aimed to build social support and positive reinforcement for non-supply to under 18s[17, 33]. Following Morley et. al.'s[40] approach, the campaign drew on health promotion theory but did not aim to test one particular theoretical model.

Campaign objectives specific to this evaluation were to:

    i.   Increase awareness of the NHMRC guideline, for under 18s, no alcohol is the safest choice.

    ii.   Increase knowledge of the reasons why no one should supply alcohol to under 18s.

    iii.   Increase understanding of the importance of preventing the supply of alcohol to young people and delaying alcohol use.

    iv.   Decrease misconceptions regarding factors that protect and prevent young people drinking in harmful ways.

    v.   Decrease the number of parents who provide alcohol to under 18s.

Based on these objectives the hypotheses tested were that, compared to parents before the campaign, parents surveyed after the campaign would:

H1. be more aware of the NHMRC guideline for under 18s;

H2. have greater knowledge of the harms of alcohol to under 18s;

H3. be more likely to disagree with myths around alcohol and under 18s;

H4. have more negative attitudes to alcohol use by under 18s;

H5. be more likely to talk to their child about alcohol;

H6. be less likely to provide their under 18 year old child with alcohol.

Methods

Campaign Evaluation Design and Sample

Online cross-sectional surveys were conducted with Western Australian parents at three time points (See Table 1). A market research company (International Organisation for Standardisation 20252 accredited) conducted the sampling and survey administration, including coordination of three web panel providers who recruited participants from an existing database of adult panellists via emailed invitations. Respondents provided informed consent. Screening questions determined eligibility (i.e., parent of a 12-17 year old; aged 25+ years; haven't participated in research about alcohol and adolescents during past year; not employed in alcohol production/sales, market research or health promotion). At survey completion, respondents were allocated points redeemable for gift cards as reimbursement for their time. A university Research Ethics Committee granted approval for this evaluation.

Information on the number of invitations sent and the proportion of panellists who were parents of 12-17 year olds was unavailable. Therefore response rates could not be calculated. Sample size was based on numbers used in evaluations of previous similar campaigns conducted by Mental Health Commission. Soft quotas were set for age, gender and location to ensure adequate representation within the sample.

Intervention

The PYPA campaign targeted parents of 12-17 year olds as between these ages many adolescents begin experimentation with alcohol, and may move to more regular drinking[2, 9]. Campaign development was informed by theory-guided[17, 33] analysis of the youth consumption/parental supply behaviours it sought to change, and by consultation with the target population. Campaign concepts were pre-tested via discussion groups and online bulletin boards with parents and adolescents. Parents identified alcohol's effect on the developing brain as the message most likely to discourage them from providing alcohol to their child.

PYPA comprised two mass media campaigns, *Cogs* and *I See*, which aired in Western Australia from 2012. The two campaigns, each with a unique visual and message identity, included television

advertisements as the primary delivery channel, supported by press, radio and online advertisements (for *Cogs* and *I See*) plus cinema and outdoor advertisements (*I See* only).

The *Cogs* campaign addressed alcohol's effect on the developing brain, likening an adolescent's brain to a system of cogs potentially disrupted by alcohol. The key campaign message was that a child's brain development continues until their early 20s and described alcohol's effect on adolescent mental performance and emotional health. The call to action summarised the NHMRC guideline, "Under 18. No alcohol. The safest choice" (Figure S1).

The *I See* campaign built on *Cogs* and addressed potential harms associated with supplying alcohol to adolescents. The I See campaign materials featured professionals including a school psychologist and a paediatrician describing alcohol-related harms they see in adolescents (Figure S2). The call to action was "No one should provide alcohol to under 18s". Both campaigns can be viewed at http://alcoholthinkagain.com.au/Campaigns.

Four bursts of *Cogs* and two bursts of *I See* aired in six-week blocks between November 2012 and March 2015. The level of paid television advertising reach per burst was reflected in the achieved Target Audience Rating Points (TARPs)(Table 1). TARPs estimate audience size by multiplying the audience proportion exposed to the advertisement, by the number of exposures[36, 40, 41]. The PYPA campaign achieved TARPs similar to other effective health-related campaigns aired recently in Western Australia[36, 40].

Measures

Each survey assessed demographics, parental alcohol consumption (measured using the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) scale[42]), knowledge, attitudes, and behaviours with a set of common questions. Possible Audit-C test scores range from 0-12. For analyses, scores were categorised into low (scores of 0-3), medium (scores of 4-7), and high (scores of 8-12) levels of harm risk[43]. The parent knowledge, attitude, and behaviour measures were developed to evaluate the current campaign and were not previously assessed for reliability and validity.

Campaign Awareness and Perception:

The post-campaign surveys included additional questions examining parents' awareness and perceptions of the campaigns. Unprompted campaign recall was measured by asking respondents to describe any advertisements about parents, adolescents and alcohol they had seen recently. Respondents were coded as recalling the campaign if their description was consistent with the *Cogs* advertisement at Time 2 or the *I See* advertisement at Time 3. Prompted campaign recognition was assessed by showing the press, outdoor (Time 3 only) and television advertisements (telestills, Time 2 and 3; full advertisement, Time 3 only) from the relevant campaign at Time 2 or 3. Prompted recognition was classified as seeing the advertisement via any channel. "Not sure" responses were treated as missing (Time 2, n=0; Time 3, n=34).

Campaign believability and relevance were assessed via two questions on five-point scales. Higher scale scores indicate higher perceived relevance and believability.

Parent Knowledge /Awareness of Alcohol-related Harms:

Knowledge items assessed key campaign message recall. Parents' awareness of alcohol harms was measured with four (correct) statements describing alcohol's effects on young people (e.g., "Alcohol can affect a young person's mood and mental health"), including one statement about the NHMRC guideline ("NHMRC guidelines/Medical experts recommend that for young people under 18 not

drinking alcohol is the safest option"). Response options were "yes/no" for whether they had heard the information.

Parent Attitudes and Beliefs:

Parents' attitude to providing their child with alcohol was measured by asking "Do you think it is appropriate for parents to provide alcohol to their children who are under 18 years of age?" Response options were "yes, in at least some circumstances" and "no, under no circumstances".

Parental belief in myths related to alcohol use by adolescents were assessed through the degree to which parents agreed/disagreed with two statements: "Introducing young people under the age of 18 to alcohol is important to teach them to drink responsibly" and "Giving alcohol to your child will help control the amount they drink". Four response options ranged from strongly agree to strongly disagree, dichotomised as agreement or disagreement with the statement.

The campaign highlighted the importance of no alcohol use by under 18s. Parents' belief in the importance of alcohol-related parenting was assessed with one statement asking how important it was to "prevent their child from drinking any alcohol at all". Five response options ranged from "Very important" to "Not at all important" plus "Don't know". For analyses, responses were collapsed into two categories, "very/fairly important" and "not very/not at all important" with "Don't know" responses treated as missing (Table 3 shows missing value frequencies).

Parent Behaviours:

Parental supply was measured with one question asking whether parents had given their child alcohol and in what context(s). Parents could select multiple responses from six response options representing different levels of supply and adult supervision (e.g., "I have never given alcohol to my child," "I have given them alcohol to take to an unsupervised party/gathering"). For analyses the responses were categorised, according to parents' most permissive behaviour, as: "Never given my child alcohol"; "Given child a sip of my alcoholic drink"; or, "Given child more than a sip of alcohol".

Parent-child alcohol-related discussions associated with key campaign messages were assessed with three items asking how recently parents had discussed with their child, "the dangers of drinking alcohol", "the health effects of alcohol on the body and/or brain", and "that they shouldn't be drinking alcohol". Response options included "in the last 12 months" "more than 12 months ago" and "never" dichotomised as "in the last 12 months" or "more than 12 months ago/never".

Data Analysis

Data were analysed using SPSS_24.0[44]. Chi-squared analyses were conducted to assess demographic differences between samples. To test Hypotheses H1-H6, separate logistic and multinomial regression analyses were conducted with parent knowledge, attitudes and behaviours as dependent variables and including time as a main effect to test for differences between pre-test (Time 1) and each post-test (Time 2 and Time 3) respectively. Given the low rate of missing data in each cross-sectional sample (Tables 3, 4 and S1) a pairwise deletion strategy was used and all available data included in each analysis. Primary analyses used the entire sample at each time point regardless of campaign awareness. Secondary analyses repeated these analyses for the subsample of parents aware of the campaign at each post-test. The primary analyses represent a conservative approach that potentially underestimates campaign effects as parents who were unaware of the advertisements at post-test were included. The absence of a control group inhibits our ability to determine the extent to which observed changes over time would have occurred regardless of the campaign. Hence, the findings of the secondary analyses were compared to those of the primary analyses. We hypothesised

that, if there were improvements in parent outcomes based on the full samples, then evidence that these were at least in part due to the campaign would be strengthened if these improvements were greater amongst parents aware of the campaign. The alternate analytic approach testing for differences between parents who were and were not aware of the campaign was not considered appropriate given the bias resulting from self-selection into these groups.

Results

Sample characteristics

Comparisons of the samples showed respondents' socio-economic status and location were similar across the time points, but samples differed on parent gender (p=0.021), age (p=0.006) and AUDIT-C score (p=0.024), as well as the gender (p=0.009) and age (p=0.036) of the parent's child (Table 2). Each regression analysis controlled for all demographic variables (Table 2).

Campaign Awareness and Diagnostics

Awareness of *Cogs* and *I See* is reported in Table 3. Almost one-quarter of the respondents recalled *Cogs* without prompting and a further quarter recognised the advertisement when prompted (24.5%). Corresponding percentages at Time 3 for *I See* were 36.0% and 44.5% respectively. Unprompted recall for *I See* was significantly higher than for *Cogs* (OR=2.2; CI 95% 1. 6 – 3.1; p<.001).

Among respondents aware of the campaigns, most found them believable (97.3% for *Cogs* and 98.3% for *I See*) and relevant (86.5% for *Cogs* and 89.5% for *I See*) (Table 3). Parents were more likely to find *I See* "very believable" than *Cogs* (OR=1.6; CI 95% 1.1-2.3; p=0.027).

Parental knowledge, attitudes and behaviours – association with campaign exposure

Descriptive statistics for parents' reported knowledge, attitudes, and behaviours related to adolescents and alcohol at each time point are shown in Table 4. Table 5 shows regression results assessing differences in these variables between Time 1 and each post-test.

Parent Knowledge

Parental knowledge increased significantly over time, with between 1.3-2.1 higher odds of parents being aware of the harms and recommendations associated with adolescent alcohol use at Time 2 and between 6.2-23.3 higher odds at Time 3.

By Time 3, respondent awareness of the statements about NHMRC drinking guidelines for under 18s, adolescent brain development and harms to adolescents due to alcohol was almost universal, with about 98% reporting they had heard these messages.

Parent Attitudes

At Time 2, respondents had higher odds of indicating it was inappropriate to give their child alcohol in any circumstance than at Time 1 (OR=1.4), but at Time 3 parents' attitudes to supply were no different to Time 1. Similarly, at Time 2, respondents were 2.4 times more likely than at Time 1 to report it was important to prevent their child from drinking any alcohol at all, while Time 3 responses were not significantly different to Time 1.

In contrast, there was a 1.4 fold increase between Time 1 and Time 2 and a 2.6 fold increase between Time 1 and Time 3 in the odds of parents disagreeing that providing under 18s with alcohol was important to teach responsible drinking. Similarly, the odds were 1.7 times higher at Time 2 and 2.8 times higher at Time 3 that parents would disagree that provision of alcohol could help control the amount their child drank.

Parent Behaviours

Parental alcohol provision did not change significantly following either campaign period (p=0.499) and neither did the percentages of parents who spoke to their child about the health effects of alcohol on the body and brain (p=0.547).

Differences over time were found in the percentages of parents who had discussed with their child the dangers of drinking alcohol (p=0.017), and not consuming or limiting their alcohol consumption (p<0.001) (Table 5). Specifically, significant differences were evident comparing Time 3 to Time 1, but not Time 2 to Time 1. Compared to Time 1, there was a significant increase at Time 3 in the odds of respondents reporting they had talked with their child in the last year about the dangers of alcohol (OR=1.88) and that they shouldn't drink/should limit their alcohol use (OR=1.98).

Secondary analyses

As changes in outcomes over time may be due to influences other than the campaign, the above analyses were repeated on the subsamples of respondents aware of the campaign at Time 2 and Time 3. Results are provided in Supplementary Tables S1 and S2. Odds ratios for these regressions were mostly greater or similar in magnitude to those for the analyses conducted on the full samples. Regressions for knowledge showed the greatest magnitude differences in odds ratios. For example, in the full samples, the odds of parental knowledge of the NHMRC guideline increased to 2.1 (Time 2) and 23.3 (Time 3) compared to Time 1, whereas amongst the 'aware' parents these odds showed a greater increase to 4.4 (Time 2) and 37.7 (Time 3).

Discussion

The PYPA campaign achieved high awareness among the target audience. Unprompted awareness was higher for *I See* than *Cogs*, suggesting *I See* built on awareness levels established in the initial campaign phase. The broader range of media channels used for *I See* may have further facilitated message dissemination. PYPA campaign awareness was comparable to that of other recent Australian health-related mass media campaigns[36, 40]– a positive result given the "cluttered" media environment[40](pg. 10) and the need for high campaign exposure for campaign effectiveness[45]. The high relevance and believability ratings across both *Cogs* and *I See* suggest that the use of two campaign phases permitted synergistic messages to be delivered while maintaining audience interest.

The campaign was associated with parental behaviour changes. Parents surveyed at Time 3 were more likely than parents surveyed prior to the campaigns to report recently discussing alcohol-related issues with their child. This finding supports Hypothesis H5 but contrasts with the National Binge Drinking Campaign's findings that parent-child discussions decreased post-campaign[37].

Reductions in reported parental alcohol supply to their child were not statistically significant, thus Hypothesis H6 was not supported. Dunstone and colleagues[38] reported higher motivation not to supply alcohol to adolescents among adults who viewed the *I See* advertisement than among those who viewed *Cogs*. Our findings of limited change in parental supply behaviour after both campaigns support the view that motivation is necessary but not sufficient for voluntary change[21] in this

behaviour. Ongoing campaigns accompanied by legislation and policy measures influencing social norms and alcohol pricing, marketing and availability[27], may be required to convert parent motivation into supply behaviour changes. Laws prohibiting the secondary supply of alcohol to minors without parental permission were introduced in WA after data collection for this study was completed[46]. However, our findings regarding parental alcohol supply behaviour may have been influenced by the way supply was assessed. The survey question used to measure parental supply did not include a time period, thus parents reported whether they had *ever* supplied alcohol. Recent changes in supply behaviour may therefore not be reflected in the responses. Future campaign evaluations should include an appropriate reference period (e.g. past 6 months) to identify recent supply behaviour changes.

Parent disagreement with statements about the protective effects of introducing under 18s to alcohol increased steadily from Time 1 to Time 3, supporting Hypothesis H3. This finding highlights the positive role public education campaigns can play in correcting misperceptions and shifting public attitudes to support reduced drinking [31]. However, changes in other parent attitudes were less consistent. Hypothesis H4 regarding parent attitudes was partially supported. Increased negative parental attitudes to supply and adolescent alcohol use evident at Time 2 were not maintained at Time 3, possibly due to the change in campaigns between surveys.

Findings on parent knowledge support Hypotheses H1 and H2. Large positive changes were seen in parent awareness of the NHMRC guideline and in other knowledge outcomes. Such improvements are important in the initial stages of public education campaigns[36]. Increased awareness of the NHMRC low risk drinking guidelines was also reported following a public education campaign directed at adult women[36]. Together these results support the use of mass media campaigns as an effective method by which to improve low levels of awareness of NHMRC guidelines[22-24].

It is possible this study's results were influenced by factors other than the campaign. However, secondary analyses indicated that for those parents who were aware of the campaigns, the odds ratios indicating changes over time were similar or higher for most dependent variables compared to those for the full samples of respondents. It therefore seems reasonable to suggest that the changes observed over time were due, at least in part, to exposure to the campaign messages. Alternate study approaches, such as a control group or cohort design would have allowed us to control for secular trends and other community-wide influences. However, the PYPA campaign ran state-wide and budget constraints precluded recruitment of an interstate control group.

Study recruitment via online panels, comprising adults not necessarily parents of adolescents, prevented the calculation of response rates. Further, in the absence of state-wide representative data providing the demographic characteristics of the population from which the target sample was drawn (i.e., 25 to 64 year old parents of 12 to 17 year olds), our sample's representativeness cannot be determined. Hence, our findings may not be generalizable to all Western Australian parents of adolescents. However, to limit potential confounding, our analyses controlled for demographic differences in the cross-sectional samples. Further research using representative random samples and interstate control groups is warranted.

This study had a number of strengths. The PYPA campaign was run and evaluated over a 2.5 year period, providing sufficient time and exposure to attain audience cut-through and potentially identify changes in the dependent variables[47]. The evaluation assessed the campaign's impact on parents when implemented in the real-world setting for which it was designed. Finally, while the cross-sectional design may be seen as a limitation, it was also a strength as it eliminated the potential for social desirability bias to impact on post-test responses due to parents being primed by pre-test surveys to consider adolescent drinking[40]. This study adds important positive findings to the limited research on the effectiveness of mass media public education programs in alcohol harm reduction.

Conclusions/Implications

This evaluation of a mass media campaign addressing drinking by adolescents shows promising results with parents. *Cogs* and *I See* were associated with improved parental knowledge, attitudes and some behaviours related to adolescent alcohol use. High awareness of advertisements perceived as relevant and believable, was achieved in a media market in which alcohol promotion is ubiquitous. Longer term campaigns supported by environmental and policy measures, may be required for changes in parental supply behaviours to be seen. Future research incorporating a control group, for example from other Australian jurisdictions where the campaign has not been run, would allow the degree to which the outcomes were due to the campaign to be determined.

Acknowledgements

Table 1: Campaign and evaluation schedule and achieved Target Audience Rating Points (TARPs) for each campaign phase

Survey Date	Campaign Advertisement and Phase	Dates	Achieved TARPs[a]
Time 1		Early Nov 2012	
	Cogs, Phase 1, burst 1	Mid-Nov - Dec 2012	802
	Cogs, Phase 1, burst 2	Mar-Apr 2013	855
Time 2		May 2013	
	Cogs, Phase 1, burst 3	Nov-Dec 2013	1456
	Cogs, Phase 1, burst 4	Feb-Mar 2014	1822
	I See, Phase 2, burst 1	Nov-Dec 2014	917
	I See, Phase 2, burst 2	Feb – mid-March 2015	793
Time 3		Late Mar 2015	

[a] TARPs estimate audience size by calculating the percent of a target audience exposed to an advertisement multiplied by the average number of times they were exposed to the advertisement[36, 40, 41].

Table 2: Respondent characteristics by evaluation survey time point

Characteristic	Time 1 (n=443)	Time 2 (n=400)	Time 3 (n=308)	Test statistic (Chi Square)
	%	%	%	
Parent Gender				
Male	42.2	33.5*	35.1	$\chi^2(2)=7.7$,
Female	57.8	66.5*	64.9	p=0.021
Parent Age (years)				
25-44	50.3	49.5	37.7**	$\chi^2(2)=13.7$
45+	49.7	50.5	62.3**	p=0.001
Socio-Economic Status [a]				
Low	16.3	15.5	10.4	$\chi^2(4)=6.5$,
Mid	50.3	52.2	52.3	p=0.166
High	33.4	32.3	37.3	
Child Age (years) [b]				
12	13.1	15.5	18.2	$\chi^2(10)=19.3$,
13	15.1	11.0	15.2	p=0.036
14	14.0	19.5	19.5	
15	14.0	15.5	14.0	
16	19.0	18.2	17.5	
17	24.8	20.3	15.6*	
Child Gender				
Male	61.6	56.8	50.3*	$\chi^2(2)=9.5$,
Female	38.4	43.2	49.7*	p=0.009
Location				
Metro	82.2	79.0	82.1	$\chi^2(2)=1.7$,
Regional	17.8	21.0	17.9	p=0.429
Parent Drinking Behaviour AUDIT-C score				
0-3 (low harm risk)	55.3	59.0	46.8***	$\chi^2(4)=11.3$,
4-7 (medium harm risk)	35.9	34.0	43.8***	p=0.024
8+ (high harm risk)	8.8	7.0	9.4	

* Significantly different to Time 1 at p<0.05.
** Significantly different to Time 1 and Time 2 at p<0.05.
*** Significantly different to Time 2 at p<0.05.
[a] Socio-economic Status (SES) as determined from respondent postcode using the Australian Bureau of Statistics 2011 Socio-Economic Index for Areas (SEIFA): Index of Relative Advantage and Disadvantage.
[b] At Time 1 and Time 2 the reference child is the eldest child between 12 and 17 years. At Time 3 the reference child is the child aged between 12 and 17 whose birthday falls next.

Table 3: Respondent awareness and perceptions of the campaign at Time 2 and Time 3

Campaign Awareness	Time 2 (*Cogs*) (n=400)		Time 3 (*I See*) (n=308)	
	n	**%**	**n**	**%**
Yes	193	48.2	248	80.5
Unprompted Recall	*95*	*23.8*	*111*	*36.0*
Prompted Recognition [a]	*98*	*24.5*	*137*	*44.5*
No	207	51.8	26	8.5
Missing	-	-	34	11.0
Perceptions of the campaign [b]	**Time 2 (*Cogs*)** **(n=193)**		**Time 3 (*I See*)** **(n=248)**	
	n	**%**	**n**	**%**
Very believable	112	58.0	169	68.1
Quite/a little believable	76	39.3	75	30.2
Not at all/not very believable	5	2.6	4	1.7
Very relevant	77	39.9	102	41.1
Quite/a little relevant	90	46.6	120	48.4
Not at all/not very relevant	26	13.5	26	10.4

[a] Prompted campaign recognition was assessed by showing respondents the press advertisement, outdoor advertisement (Time 3 only) and television advertisement, in full (Time 3 only) or as telestills (Time 2 and Time 3), from the relevant campaign at Time 2 or 3.

[b] Includes respondents who were aware of the campaign only.

Table 4: Descriptive statistics of parental behaviours, attitudes and knowledge at each survey time point

Parenting Variable		Time 1 (n=443) %	Time 2 (n=400) %	Time 3 (n=308) %
Parent Behaviours				
Parental alcohol provision	Never provided alcohol	56.5	60.7	63.2
	Provided a sip of my drink of alcohol	21.1	20.0	22.7
	Provided more than a sip of alcohol	22.4	19.3	14.1
	Missing	n=2	n=1	n=4
Discussed with child within last 12 months:				
	Dangers of drinking alcohol	80.8	84.0	88.6
	Health effects of alcohol on the body or brain [a]	81.5	84.8	84.1
	That child shouldn't be drinking or should limit use of alcohol	74.5	71.5	84.1
Parent Attitudes and Beliefs				
Believe it is *not* appropriate in any circumstance for a parent to give their underage child alcohol		62.8	72.0	62.3
Believe it is very/fairly important to prevent my child from drinking at all before age 18	Missing	84.6 / n=8	93.2 / n=2	84.2 / n=4
Disagree that introducing under 18s to alcohol is important to teach them to drink responsibly	Missing	56.7 / n=27	66.5 / n=12	76.9 / n=0
Disagree that giving alcohol to your child will help control the amount they drink	Missing	68.7 / n=31	79.6 / n=28	85.4 / n=0
Parent Knowledge- Have heard the following statements:				
A young person's brain continues to develop until around their early 20s		83.3	89.8	98.4
Alcohol can affect a young person's memory, learning, problem solving skills		87.4	89.8	97.7
Alcohol can affect young person's mood/mental health		86.9	92.8	97.7
Guidelines recommend that for young people under 18, not drinking alcohol is safest option		67.9	82.3	98.1

[a] The Time 2 survey, asked parents about their discussion of the health effects of alcohol on the body and brain separately, whereas at Time 3 these statements were combined. Therefore, the Time 2 score is the average score for the two questions about the body and brain

Table 5: Results of logistic and multinomial regressions comparing parent behaviours, attitudes and knowledge at Time 1 to each post-test.

Parenting Variable	Time	OR[a]	P value	95% CI	Z^2	df	p
Behaviours							
Parental alcohol supply :							
Never	Time 2	1.135	0.522	0.77, 1.67			
	Time 3	1.501	0.080	0.95, 2.36			
Provided sip of my drink	Time 2	1.020	0.930	0.65, 1.60			
	Time 3	1.382	0.213	0.83, 2.30			
Provided more than a sip[b]	-	-	-	-	3.37	4	0.499
Discussed with child in last year:							
The dangers of drinking							
	Time 2	1.196	0.339	0.83, 1.73	8.14	2	0.017*
	Time 3	1.881	0.004*	1.22, 2.90			
Health effects of alcohol on body or brain							
	Time 2	1.200	0.336	0.83, 1.74	1.21	2	0.547
	Time 3	1.197	0.377	0.80, 1.78			
That they shouldn't be drinking or should limit alcohol use							
	Time 2	0.878	0.411	0.64, 1.20	18.51	2	0.000*
	Time 3	1.980	0.000*	1.36, 2.89			
Attitudes							
Believe it is not appropriate for parent to give their underage child alcohol							
	Time 2	1.425	0.025*	1.05, 1.94	7.89	2	0.019*
	Time 3	0.910	0.565	0.66, 1.26			
Believe it is very/fairly important to prevent my child from drinking at all before age 18							
	Time 2	2.361	0.000*	1.46, 3.82	16.61	2	0.000*
	Time 3	0.863	0.494	0.56, 1.32			
Disagree that:							
Introducing under 18s to alcohol is important to teach them to drink responsibly							
	Time 2	1.424	0.020*	1.06, 1.92	29.61	2	0.000*
	Time 3	2.578	0.000*	1.83, 3.63			
Giving alcohol to your child will help control the amount they drink							
	Time 2	1.728	0.002*	1.23, 2.43	28.14	2	0.000*
	Time 3	2.827	0.000*	1.90, 4.21			
Knowledge							
Guidelines recommend that for young people under 18 not drinking alcohol is safest option							
	Time 2	2.100	0.000*	1.51, 2.91	66.28	2	0.000*
	Time 3	23.332	0.000*	10.14, 53.69			
A young person's brain continues to develop until their early 20s							
	Time 2	1.685	0.013*	1.12, 2.54	29.22	2	0.000*
	Time 3	11.245	0.000*	4.48, 28.24			
Alcohol can affect young person's memory, learning, problem solving skills							

	Time 2	1.267	0.278	0.83, 1.94	20.06	2	0.000*
	Time 3	6.222	0.000*	2.80, 13.85			
Alcohol can affect young person's mood / mental health							
	Time 2	1.916	0.008*	1.18, 3.10	25.79	2	0.000*
	Time 3	7.335	0.000*	3.25, 16.54			

[a] Odds ratios compare the odds at Time 2 or Time 3 to Time 1 controlling for parent gender, parent age, child gender, child age, parent AUDIT-C score, location and socio-economic status.

[b] Reference category "More than a sip".

* Significantly different to Time 1 at $p<0.05$.

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Figure S1: *Cogs* Campaign Poster and TV advertisement outline (female versions)

Figure S2: *I See* Campaign Poster and TV advertisement outline

Table S1: Percentage of respondents reporting alcohol-related behaviours, attitudes and knowledge for Time 1 and for those aware of the campaign at each post-test

Parenting Variable	Time 1 Total (n=443) %	Time 2 Any Campaign Awareness (n=193) %	Time 3 Any Campaign Awareness (n=248) %
Behaviours			
Parental supply of alcohol			
Never	56.5	59.6	63.9
Sip of own drink	21.1	20.2	21.7
More than sip	22.4	20.2	14.3
Missing	n=2		n=4
Discussed with child in last year:			
The dangers of drinking	80.8	83.4	89.9
The health effects of alcohol on body or brain	81.5	84.5	85.9
That they shouldn't be drinking or should limit alcohol use	74.5	71.5	85.5
Attitudes			
Believe it is not appropriate in any circumstance for a parent to give their underage child alcohol	62.8	75.1	62.9
Missing		n=5	
Believe it is very/fairly important to prevent my child from drinking at all before age 18	84.6	95.8	85.3
Missing	n=8	n=1	n=3
Disagree that:			
Introducing under 18s to alcohol is important to teach responsible drinking.	56.7	71.4	77.4
Missing	n=27	n=8	
Giving alcohol to your child will help control the amount they drink.	68.7	80.7	86.3
Missing	n=31	n=12	
Knowledge			
Guidelines recommend that for under 18's not drinking alcohol is safest option.	67.9	90.7	98.8
A young person's brain continues to develop until their early 20s.	83.3	95.9	98.8
Alcohol can affect young person's memory, learning, problem solving skills.	87.4	94.3	98.4
Alcohol can affect young person's mood / mental health.	86.9	95.9	97.6

Table S2: Results of logistic and multinomial regressions comparing parent behaviours, attitudes and knowledge at Time 1 to post-test responses for those aware of the campaign at each post-test.

Parenting Variable	Awareness/Time	OR[a]	P value	95% CI	Z^2	df	p
Behaviours							
Parental alcohol supply :							
Never	Time 2 aware	0.857	0.532	0.529, 1.389			
	Time 3 aware	1.594	0.057	0.986, 2.575			
Provided sip of my drink	Time 2 aware	0.828	0.215	0.474, 1.446			
	Time 3 aware	1.409	0.507	0.820, 2.420			
Provided more than a sip[b]	-	-	-	-	5.45	4	0.244
Discussed with child in last year:							
The dangers of drinking							
	Time 2 aware	1.192	0.458	0.750, 1.893	9.38	2	0.009*
	Time 3 aware	2.140	0.002*	1.315, 3.485			
Health effects of alcohol on body or brain							
	Time 2 aware	1.207	0.433	0.754, 1.932	2.04	2	0.360
	Time 3 aware	1.363	0.169	0.877, 2.117			
That they shouldn't be drinking or should limit alcohol use							
	Time 2 aware	0.885	0.536	0.600, 1.304	16.08	2	0.000*
	Time 3 aware	2.161	0.000*	1.420, 3.290			
Attitudes							
Believe it is not appropriate for parent to give their underage child alcohol							
	Time 2 aware	1.559	0.030*	1.045, 2.327	6.04	2	0.049*
	Time 3 aware	0.931	0.685	0.660, 1.313			
Believe it is very/fairly important to prevent my child from drinking at all before age 18							
	Time 2 aware	3.686	0.001*	1.716, 7.918	13.46	2	0.001*
	Time 3 aware	0.835	0.443	0.526, 1.325			
Disagree that:							
Introducing under 18s to alcohol is important to teach them to drink responsibly							
	Time 2 aware	1.720	0.006*	1.167, 2.536	28.29	2	0.000*
	Time 3 aware	2.653	0.000*	1.831, 3.845			
Giving alcohol to your child will help control amount they drink							
	Time 2 aware	1.698	0.020*	1.086, 2.654	24.85	2	0.000*
	Time 3 aware	2.997	0.000*	1.925, 4.666			
Knowledge							
Guidelines recommend that for young people under 18 not drinking alcohol is safest option							
	Time 2 aware	4.441	0.000*	2.624, 7.516	64.46	2	0.000*
	Time 3 aware	37.725	0.000*	11.870, 119.902			
A young person's brain continues to develop until their early 20s							
	Time 2 aware	4.426	0.000*	2.085, 9.394	34.10	2	0.000*
	Time 3 aware	15.824	0.000*	4.928, 50.809			
Alcohol can affect young person's memory, learning, problem solving skills							
	Time 2 aware	2.394	0.011*	1.225, 4.679	21.66	2	0.000*
	Time 3 aware	8.827	0.000*	3.161, 24.649			
Alcohol can affect young person's mood / mental health							
	Time 2 aware	3.815	0.001*	1.751, 8.314	26.55	2	0.000*
	Time 3 aware	6.782	0.000*	2.844, 16.176			

[a] Odds ratios compare the odds at Time 2 or Time 3 to Time 1 controlling for parent gender, parent age, child gender, child age, parent AUDIT-C score, location and socio-economic status.

[b] Reference category "More than a sip".

* Significantly different to Time 1 at p<0.05.