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Author/s:

Wakefield, MA;Brennan, E;Dunstone, K;Durkin, SJ;Dixon, HG;Pettigrew, S;Slater, MD

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Brennan Emily (Orcid ID: 0000-0001-9779-0210)

Alcohol harm reduction advertisements

Immediate effects on adult drinkers of exposure to alcohol harm reduction

advertisements with and without drinking guideline messages: experimental study

Melanie A. Wakefield¹, Emily Brennan¹, Kimberley Dunstone¹, Sarah J. Durkin¹, Helen G.

Dixon¹, Simone Pettigrew², Michael D. Slater³

¹Cancer Council Victoria, Melbourne, Australia

²Curtin University, Western Australia

³Ohio State University, Columbus, Ohio, United States

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What This Research Adds: Alcohol harm reduction television advertisements that communicate the short-term and long-term harms of alcohol consumption increase adult drinkers' intentions to reduce their drinking over the next week. When these alcohol harm reduction advertisements additionally convey low-risk drinking guidelines, they also improve drinkers' estimates of the levels of alcohol consumption associated with increased harm.

Key Words: alcohol, adults, mass media campaigns, drinking guidelines, experimental study, intentions

ABSTRACT

Aims: To compare the immediate effects on drinkers of television advertisements focusing on short-term vs long-term harms with and without low-risk drinking guidelines.

Design: Between-participants online experiment, with random assignment to view: (a) alcohol product advertisements (ALC control); (b) advertisements unrelated to alcohol (NON ALC control); (c) advertisements featuring short-term harms (STH) of alcohol; (d) advertisements featuring STH plus a STH guideline (STH+G); (e) advertisements featuring long-term harms (LTH); or (f) advertisements featuring LTH plus a LTH guideline (LTH+G).

Setting: Australia, 2016.

Participants: 3,718 drinkers aged 18-69 years (48.5% male).

Measurements: Post-exposure likelihood that participants provided a correct estimate of drinking levels associated with short- and long-term harms; post-exposure intentions to avoid alcohol or reduce consumption.

Findings: After exposure to STH+G or LTH+G advertisements, participants were more likely to estimate correctly rather than over-estimate drinking levels associated with harm, compared with those exposed to STH ($p<0.001$) and LTH advertisements without guidelines respectively ($p=0.019$), and ALC control (STH+G, $p<0.001$; LTH+G, $p<0.001$) and NON ALC control Conditions (STH+G, $p<0.001$; LTH+G, $p=0.011$). Drinkers exposed to STH Conditions were more likely to intend to reduce next week alcohol consumption than those exposed to ALC control (both $p<0.001$) and NON ALC control Conditions (STH, $p=0.001$; STH+G, $p<0.001$); a similar pattern was observed for intentions to avoid alcohol. Drinkers exposed

to LTH Conditions were also more likely than drinkers exposed to ALC or NON ALC controls to intend to avoid and reduce alcohol in the next week. Additionally, drinkers exposed to LTH+G were more likely to intend to reduce drinking than those exposed to LTH advertisements without guidelines ($p=0.022$). Response patterns for low- and high-risk drinkers by Condition were similar.

Conclusions: Alcohol harm television advertisements increase intentions to reduce alcohol consumption among both low- and high-risk drinkers. The addition of low risk drinking guidelines can enhance these effects for advertisements featuring long-term harms and improve estimates of both short and long-term harmful drinking levels.

INTRODUCTION

Alcohol consumption causes substantial harm globally through both short-term risks from injuries and long-term risks from cancer, cardiovascular disease, neuropsychiatric disorders, and infectious diseases, among others [1-3]. While many countries have implemented guidelines for low-risk drinking [4], there is inconsistency in how the guidelines have been formulated [5, 6]. They may be rejected or even backfire among heavy drinkers who rely on their own experience of how much they can drink [7], and publicising any level may implicitly give permission to low-risk drinkers to drink more [8]. However, some propose that there is a moral imperative to inform consumers of the risks and how to reduce them [9]. Guidelines for low-risk drinking may provide an anchor towards which high-risk drinkers can reduce consumption [10], and influence broader social norms for drinking [11].

Alcohol consumption guidelines have rarely been the subject of ongoing mass-reach public education campaigns [12]. More typically, guidelines are publicised via news media [13], but awareness and knowledge of guidelines remain low in Australia and internationally [13-15]. For example, over 65% of Australians are unaware of or overestimate the level to reduce risk of short term harm and over 50% are unaware of or overestimate the level to reduce risk of long term harm [16]. Public understanding and acceptance of guidelines is likely compromised by inadequate appreciation of alcohol's long-term risks [17-20].

One reason for lack of investment in mass-reach public education might be that there has been little evidence to suggest that alcohol harm reduction campaigns other than those

relating to drink-driving would be effective in reducing alcohol use [21-24]. Recent research on alcohol harm reduction campaigns provides more optimism. An evaluation of a campaign linking alcohol and cancer that promoted the Australian guidelines showed a sustained increase in awareness that alcohol causes cancer, as well as more transient increases in accurate recall of drinking guidelines to reduce risk of long-term harm, and in intentions to reduce consumption [25]. In a study of 83 alcohol harm reduction advertisements, adult drinkers in Australia rated advertisements as making them more motivated to reduce their consumption if they: featured an explicit health warning message than a how-to-change drinking behaviour message; presented long-term rather than short-term harms; provided drinking guidelines; and were aimed at the general drinking population rather than specifically at young adults or parents [26]. Furthermore, there was substantial overlap among low- and high-risk drinkers in the advertisements that most motivated them to drink less [26]. A recent experimental study found young adults in England reported lower urges to drink alcohol after exposure to six alcohol warning advertisements featuring short- and long-term harms, compared to either six control advertisements or six alcohol promotion advertisements [27]. Similar patterns were observed irrespective of level of alcohol consumption, although there was low statistical power to detect subgroup differences [27]. However, there is inconsistency, with another UK study recently finding no change relative to controls in explicit attitudes to alcohol among young adult drinkers exposed to four health warning advertisements, but a reduction in negative implicit drinking attitudes among heavy drinkers, suggestive of a reactance effect [28].

Examining behavioural outcomes, the same study found no behavioural differences in selection of an alcohol or non-alcohol voucher after exposure to alcohol warning messages compared with alcohol promoting or control messages [28]. Another UK study using a sham taste test found young adult heavy drinkers in the UK exposed to a set of advertisements mostly featuring short-term harms did not differ from controls in post-exposure alcohol consumption, although there was an indirect effect on reduced alcohol consumption via negative affect experienced in response to the advertisements [29]. This led the authors to suggest that alcohol warning advertisements that elicit negative emotion may hold promise in reducing alcohol consumption [29]. Overall, these findings suggest changes in awareness and intentions may be achievable with exposure to alcohol harm reduction advertisements, although careful pre-testing of advertisements is needed to avoid reactance effects [28]. Direct effects on behavioural change should not be expected, at least in an experimental setting where message exposure is brief and in contexts where pervasive alcohol advertising and social norms promote drinking once participants return to the real world.

We conducted an experimental study to compare whether alcohol harm reduction advertisements perform better when they promote guidelines or not, and compared to two control Conditions. Outcome measures were drinkers' estimates of the level of drinking that increases harm and intentions to reduce their drinking in the next week. In this respect, our study was a critical simulation test of whether such advertisements could influence these proximal outcomes, with the link between intentions and later behaviour change being well established [30]. Only advertisements demonstrated to have these capabilities would be

considered as candidate advertisements for high reach advertising campaigns where more distal outcomes could be assessed after repeated exposure. Also, we explored whether effects varied for low- and high-risk drinkers. The Australian guidelines for low-risk drinking recommend no more than two standard drinks on any day to reduce the risk of long-term harms from drinking, and no more than four drinks on any occasion to reduce the risk of short-term harms [31].

Our study differed from previous studies in three main respects. First, we examined the effects of advertisements with and without guidelines for short- and long-term harms separately. Second, our audience was drinkers aged 18-64, not just young adults. Third, all included alcohol harm reduction advertisements had previously been highly rated by adult drinkers in terms of motivating them to reduce their alcohol consumption [26].

METHOD

Design

The study used a between-subjects experimental design with random assignment by randomly permuted blocks to one of six advertisement exposure Conditions: (a) alcohol products (ALC control); (b) products and services unrelated to alcohol (NON ALC control); (c) short-term harms of alcohol (STH); (d) short-term harms, edited to include a visual and audio promotion of the guideline to reduce short-term harms (STH+G); (e) long-term harms of alcohol (LTH); or (f) long-term harms, edited to include a visual and audio promotion of the guideline to reduce long-term harms (LTH+G). It was important to test the advertisement

intervention groups (c) to (f) against the NON ALC control Condition since it is possible that alcohol harm advertisement have no beneficial effects. We used the ALC Control group to test whether the advertisements in (c) to (f) performed better against alcohol promotion advertisements, given the possibility that alcohol harm advertisements could paradoxically promote drinking through their inclusion of alcohol cues [28, 32]. In addition, the inclusion of both control conditions increases the generalisability of our results to multiple jurisdictions (i.e., those with and without high levels of alcohol advertising). The STH vs STH+G comparison and the LTH vs LTH+G comparison sought to determine any unique effects of the guideline messages.

Based on prior research, we aimed to detect a difference of 8% in the proportion of participants providing a correct estimate of drinking levels associated with harm between those exposed to the guidelines [13, 25] and the control conditions [16]. Power calculations showed a sample size of 610 participants per Condition would allow the detection of such differences with power of 0.80 ($p=0.05$).

Participants

A total of 3,718 Australian adults completed the study. Eligible participants had consumed alcohol at least twice per month on average over the past year, were not currently pregnant or soon planning to become so, and did not work in health promotion, market research, advertising, or the alcohol industry. Quotas were applied to achieve approximately even numbers by sex and age group (18-29, 30-49, and 50-64 years). Participants were recruited

through an Australian online non-probability panel accredited under the International Organization for Standardization's standards for Market, Opinion and Social Research (AS ISO 20252), where participants have opted to receive invitations to participate in research. They receive points from the panel for study participation that can be redeemed as gift vouchers.

Procedure

After receiving an email invitation, panel members clicked through to the study and were informed they would be shown a number of different television advertisements and asked to answer some questions about these advertisements. Participants then implied their consent to participate by clicking through to a set of eligibility questions. Eligible participants completed further demographic and alcohol consumption questions, after which they were randomised to Condition. After advertisement exposure, participants completed questions assessing drinking intentions and estimates of the level of drinking associated with short- and long-term harm. Ethical approval for the study was obtained from Cancer Council Victoria's Institutional Research Review Committee. Fieldwork was undertaken in October and November 2016.

Advertising stimuli

Participants each viewed four advertisements, with each advertisement viewed twice. The first and third advertisements for a popular brand of coffee and a sugar-sweetened beverage served as fillers. The filler advertisements helped to conceal the true purpose of the study as

they allowed us to also ask consumption and intention questions about coffee and sugar-sweetened beverages throughout the experiment, thereby minimising demand characteristics and the likelihood of socially desirable responding. The second and fourth advertisements comprised the experimental stimuli specific to the assigned Condition. Participants were randomly assigned to view two advertisements from the pool of four advertisements in their Condition (see Table S1 for all advertisements), a design that facilitated generalisation of findings by advertisement Condition.

Reflecting the current advertising environment that is dominated by pro-alcohol advertising [33, 34], the ALC control Condition contained a pool of four advertisements from the top advertised beer (2 ads), wine (1 ad) and spirits (1 ad) brands in Australia [35]. The NON ALC control Condition advertising covered four general services and commodities unrelated to alcohol—banking, telecommunications, hardware, and motor vehicles—selected from the top 10 sectors of advertising in Australia [36], and related to popular Australian brands. This Condition was not expected to exert any impact on outcome measures, thereby providing a neutral advertising control against which to compare the public health advertising Conditions.

The STH and STH+G Conditions featured the same four alcohol harm reduction advertisements. The advertisements were selected from a sample of recent short-term harm reduction advertisements that had scored most highly in making drinkers feel motivated to reduce their alcohol consumption [26]. The final advertisements were selected by the research team and communication experts as able to convey the short-term harm guideline in

a seamless manner. In the STH+G Condition, an additional frame was edited onto the end of each advertisement with an accompanying voiceover to communicate the relevant guideline. Inclusion of an advertisement Condition without the guideline allowed for assessment of the effect of the guidelines over and above the STH advertisements alone when compared to Control ads. The four advertisements included in the LTH and LTH+G Conditions were similarly selected from an audience response study as the highest ranked long-term harm messages that made drinkers feel motivated to reduce their drinking [26]. Figure 1 depicts the end frame and voiceover for advertisements within each STH+G and LTH+G Condition. These guideline messages were developed through focus group testing with drinkers to ensure good comprehension and motivational response.

Figure 1 here.

Measures

Baseline measures

Demographics

Participants recorded their sex, age, highest level of education completed (not tertiary vs. tertiary), whether they were a parent or carer of children, and their residential postcode, from which metropolitan vs. rural location and area-based socioeconomic status (SES) [37] were determined.

Alcohol consumption

Alcohol consumption was assessed using the graduated quantity frequency measure, an internationally recommended measure of average level of consumption in the past 12 months [16, 38, 39]. Applying the Australian guidelines for low-risk drinking [31], participants were classified as being at high risk of short-term harm if they reported having >4 drinks on any occasion at least once a month, and as being at high risk of long-term harm if they consumed >2 drinks per day on average. Following prior research [40], participants were asked to report their perceptions of their current level of alcohol consumption (“self-perceived risky drinking”: “How would you describe the amount of alcohol you currently drink?”. Response options (a) “I definitely drink more than I should” and (b) “I probably drink more than I should” were combined and classified as “at risk”. Response options (c) “The amount I drink is ok” and (d) “I could drink more than I do” were combined and classified as “low-risk”. Similar questions were asked about consumption of and perceived level of risk for coffee and sugar-sweetened beverages.

Outcome measures

Subjective estimates of drinking levels associated with harm

Participants were asked “how many standard drinks of alcohol do you believe an adult could drink on a single occasion before they put their health and safety at risk?”. Responses were recorded in whole numbers with participants also given the option to select “don’t know”. An estimate was considered correct if it was equal to or below the level set in the guidelines [31], hence ≤ 4 standard drinks for short-term harm. To assess long-term harm estimates, participants were asked “how many standard drinks of alcohol do you believe an adult could

drink every day for many years without harming their health?” A correct estimate was considered to be ≤ 2 standard drinks. These two questions were adapted from Australia’s National Drug Strategy Household Survey [16]. A standard drink in Australia is classified as 10g of alcohol [41], and to aid accurate responses participants were provided with a visual guide of the number of standard drinks in common serving sizes of different alcoholic beverages.

Next week drinking intentions

Participants in all Conditions completed three questions about drinking intentions for the next week. Participants indicated on a four-point ordinal scale (1 “definitely will not”, 2 “probably will not”, 3 “probably will”, 4 “definitely will”) the extent to which they will “avoid drinking alcohol completely”, “reduce the number of occasions when you drink alcohol” and “reduce the amount of alcohol you have on each drinking occasion”. Response options were combined and classified as “definitely/probably will not” or “definitely/probably will”. The two items “reduce the number of occasions when you drink alcohol” and “reduce the amount of alcohol you have on each drinking occasion” were highly correlated ($r=0.81$). Therefore we combined them so that participants who answered “definitely/probably will” for either or both of the original variables were classified as “definitely/probably will” in the combined variable and only those who responded “definitely/probably will not” to both original variables were coded as “definitely/probably will not” in the combined variable. Similar questions were asked about intentions to consume coffee and sugar-sweetened beverages.

Statistical analyses

Data were analysed using Stata/SE 14.2 [42]. A set of analyses to assess the effectiveness of the STH+G Condition was first conducted. We estimated three models: (a) in the first model the ALC control Condition was the referent, (b) in the second model the NON ALC control Condition was the referent, (c) and in the third model the STH Condition without the guidelines was the referent. Multinomial logistic regression models were conducted for the three-level nominal outcome of estimating the drinking levels associated with harm (correct estimate, overestimate, don't know). In these analyses the relative risk of participants in the STH+G Condition providing a correct STH estimate versus an over-estimate, and a correct estimate versus a 'Don't know' response, was compared to the three different referent Conditions described above. Logistic regression models were conducted for the binary outcome of intentions to reduce consumption to test differences between the STH+G Condition and the three different referent Conditions. For each outcome, an additional model was conducted to test the interaction between Condition and risky drinking status (low-risk vs. high-risk for STH).

The same set of models was then replicated to assess the effectiveness of the LTH+G Condition on the LTH outcomes compared to (a) the ALC control Condition, (b) the NON ALC control Condition, and (c) the LTH Condition without the guidelines. Again, for each outcome, an additional model was conducted to test the interaction between Condition and risky drinking status (low-risk vs. high-risk for LTH).

We used chi-square tests to assess if the distribution of the baseline demographic and alcohol consumption variables varied across Conditions, and found only one significant difference in the distribution of self-perceived risky drinking (Table 1). Since this variable was also related to each of the outcomes in bivariate models (data not shown), it was included as a covariate in all models.

RESULTS

Sample characteristics

Twenty-eight percent of participants were classified as high risk for short-term alcohol-related harm and 24% were classified as high risk for long-term harm. Risk proportions were similar to those calculated for the equivalent sample of adult semi-monthly drinkers in the 2013 Australian National Drug Strategy Household Survey (NDSHS) [16]. The sample was also largely comparable to the NDSHS sample in terms of sex, age, residential location, SES, tertiary education and parental status (Table 1).

Table 1 here.

Experimental effects on subjective estimates of drinking levels associated with harm

Table 2 shows that participants exposed to the STH+G advertisements were significantly more likely to provide a correct estimate of drinking levels associated with short-term harm than an over-estimate, compared to participants exposed to either control Condition (models 1a and 1b) or STH advertisements without the guideline (model 1c). Participants exposed to

the STH+G advertisements were also significantly more likely to provide a correct estimate of drinking levels associated with short-term harm than a 'don't know' response, compared to participants exposed to ALC control advertisements (model 1a) or NON ALC control advertisements (model 1b), but not compared to the STH advertisements.

Participants exposed to the LTH+G advertisements were significantly more likely to provide a correct estimate of drinking levels associated with long-term harm than an over-estimate (Table 2), compared to participants exposed to ALC control advertisements (model 2a), NON ALC control advertisements (model 2b), or LTH advertisements without the guideline (model 2c). Participants exposed to the LTH+G advertisements were also significantly more likely to provide a correct estimate of drinking levels associated with long-term harm than a 'don't know' response, compared to participants exposed to all other Conditions (models 2a, 2b, and 2c).

Overall, a greater proportion of high-risk than low-risk drinkers over-estimated the level of drinking associated with short-term harms (41.5% cf. 19.1% respectively) and long-term harms (25.4% cf. 5.7% respectively), while fewer high-risk than low-risk drinkers provided a correct response (41.5% cf. 67.8% respectively for short-term harms; 53.7% cf. 74.4% respectively for long-term harms). There was evidence of an interaction between risk status and advertising Condition in the models predicting estimates related to short-term harms ($\chi^2=11.79, p=.067$). Accordingly, we conducted additional models stratified by risk status to explore this interaction. As shown in Table S2, these stratified analyses showed that the

direction and size of effects were largely consistent across the two sub-groups, with two exceptions. In analyses predicting the likelihood of providing a correct vs. a 'don't know' response, the effect of being exposed to STH or STH+G advertisements compared to the ALC control Condition advertisements was larger for low-risk drinkers (STH: RRR=2.92, 95% CI (1.95-4.36), $p<.001$; STH+G: RRR=3.74, 95% CI (2.48-5.64), $p<.001$) than for high-risk drinkers (STH: RRR=1.19, 95% CI (0.64-2.20), $p=.583$; STH+G: RRR=1.65, 95% CI (0.91-2.99), $p=.102$). There was no evidence of an interaction between risk status and advertising Condition in the models predicting estimates related to long-term harms ($\chi^2=1.01$, $p=.985$).

Table 2 here.

Experimental effects on next week drinking intentions

Compared to both control Conditions, participants who viewed STH advertisements with and without guidelines were significantly more likely to report intentions to avoid alcohol completely in the next week (Table 3, models 1a and 1b). However, exposure to STH+G advertisements did not further increase intentions to avoid drinking compared to viewing STH advertisements without guidelines (Table 3, model 1c). A similar pattern of effects was observed for intentions to reduce the number of drinking occasions and/or the amount consumed on each occasion in the next week (Table 4, models 1a-1c).

Exposure to LTH advertising with and without guidelines increased both drinking intention outcomes compared to both control Conditions (Table 3 models 2a and 2b; Table 4 models 2a and 2b). Compared to those who viewed LTH advertisements without guidelines, participants exposed to the LTH+G advertisements did not differ in their intentions to avoid alcohol completely (Table 3, model 2c). However they were significantly more likely to report intentions to reduce their number of drinking occasions and/or the amount consumed (Table 4, model 2c).

Overall, similar proportions of low- and high-risk drinkers intended to avoid alcohol completely in the next week (18.6% cf. 20.0%, respectively in the STH Conditions; 20.0% cf. 17.1%, respectively in the LTH Conditions). In the STH Conditions, the proportion of high - risk drinkers who intended to reduce next week consumption (53.2%) was greater than the proportion of low-risk drinkers with such intentions (45.4%), whereas proportions were similar in the LTH Conditions (51.9% for high-risk drinkers cf. 49.8% for low-risk drinkers). There was no evidence of interactions between risk status and advertising Condition on either intention outcome for either the STH or LTH Conditions (all p 's > .10).

Table 3 here.

Table 4 here.

DISCUSSION

Compared to two control Conditions, exposure to low-risk drinking guideline messages within STH and LTH advertisements resulted in a greater proportion of drinkers providing an estimate of drinking levels associated with harms within the respective guideline. This occurred via a reduction in both over-estimates (i.e. corrected misperceptions) and ‘don’t know’ responses (i.e. new information learned). These effects were specific to the advertisements that explicitly featured the guidelines message and were not a function of simply being exposed to advertisements that portrayed the type of short- and long-term harms incurred by drinking at risky levels.

Compared to two control Conditions, exposure to advertisements about short- and long-term harms prompted an increase in the proportion of drinkers reporting next-week intentions to avoid or reduce alcohol consumption. The LTH+G advertisements were more impactful in prompting intentions to drink less compared to the LTH advertisements alone. However, the inclusion of guidelines with the STH advertisements did not yield greater impact on intentions. This suggests that the LTH guidelines message in particular provided new information and extra motivation to reduce drinking over and above exposure to the LTH advertisements alone.

The observed pattern of responses by Condition was largely similar for low- and high-risk drinkers. Our findings thus suggest that all drinkers may benefit from exposure to pre-tested advertisements that portray the short- and long-term harms of drinking and including guideline messages may educate all drinkers about harmful levels of alcohol consumption.

This finding is particularly encouraging given high-risk drinkers are those who stand to gain most health benefit from reduced consumption. Advertisements accompanied by long-term harm guidelines can additionally encourage more high- and low-risk drinkers to intend to reduce drinking over the next week.

A study strength is that it parsed the effects of alcohol harm reduction advertisements alone from guidelines information, and did so separately for short- and long-term harm advertisements and their respective guidelines. Also, we used government and public health organisation-funded alcohol harm reduction advertisements that had previously been highly ranked by adult drinkers (and high-risk drinkers) in terms of being motivating to reduce their drinking [26]. The study minimised social desirability through inclusion of distractor questions about coffee and sugary drinks. Finally, we included multiple advertisements in each Condition, so observed effects are not specific to any single advertisement and are better able to be generalised beyond the specific advertisements tested.

A study limitation is that improved estimates of levels of drinking harm and intentions to drink less may not translate into actual behaviour change, although these outcomes are likely to be important precursors of a path towards change. Also, drinkers received only brief exposure to advertisements within a single study session and our outcomes were assessed immediately after exposure. Effects of exposure decay rapidly so repeated exposure would be important, as would be the case if advertisements like these aired within a population-based mass media campaign [22, 43, 44]. Finally, we note that none of the STH advertisements

were made specifically to carry a low-risk drinking guidelines message, whereas all the LTH advertisements did originally carry a guideline message specific to their country of origin (which we replaced with our standard Australian long-term harms guideline message).

Implications for policy and practice

The study results suggest that there could be value in investing in alcohol harm reduction mass media campaigns that promote short and long term harms along with guideline messages as a population level public health intervention. Furthermore, since a similar pattern of findings was observed in low- and high-risk drinkers, such campaigns could make a contribution to benefitting those who stand to gain most health benefit from reduced consumption.

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Figure 1. End frame and accompanying voiceover edited onto the end of each advertisement in the two guideline Conditions.

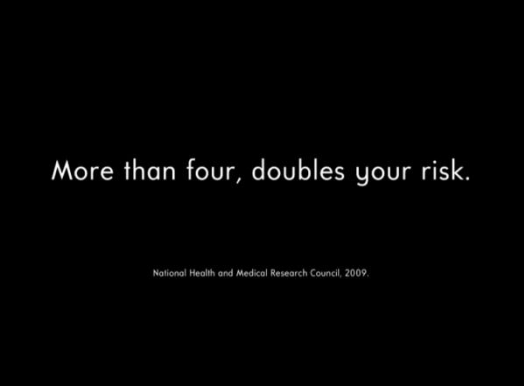
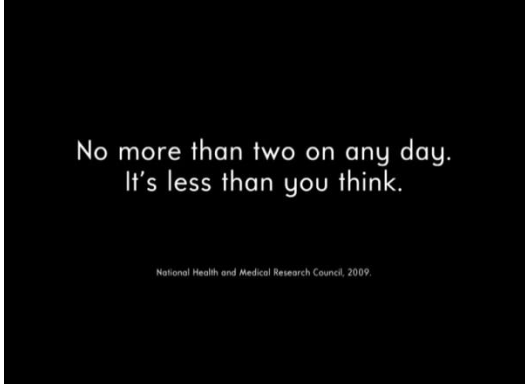
'Short-term harm+guideline' (STH+G) Condition	'Long-term harm+guideline' (LTH+G) Condition
 <p data-bbox="197 909 778 1167">Voiceover: "Having more than four standard drinks on any occasion more than doubles the risk of harm to yourself and others in the hours after drinking."</p>	 <p data-bbox="842 909 1385 1167">Voiceover: "If you choose to drink, health experts recommend no more than two standard drinks on any day to reduce your risk of developing serious diseases."</p>

Table 1. Sample characteristics by advertising Condition, and compared with characteristics of semi-monthly drinkers aged 18-64 in the Australian Institute of Health and Welfare's National Drug Strategy Household Survey (NDSHS).

	Condition						Test statistic	Total	NDSHS
	ALC control n=618 %	NON ALC control n=617 %	STH n=620 %	STH+G n=622 %	LTH n=620 %	LTH+G n=621 %		study sample N=3,718 %	2013 n=10,644 ^a %
NHMRC risk status									
At risk of short-term harm at least monthly ^a	28.5	28.2	30.0	30.6	25.7	27.5	$\chi^2(5)=4.75,$ p=0.448	28.4	30.3
At risk of long-term harm ^a	24.1	24.6	25.3	24.4	19.5	23.2	$\chi^2(5)=7.52,$ p=0.185	23.5	24.4
Perceived risk status									
Low-risk	64.9	65.8	62.3	65.0	70.8	63.3	$\chi^2(5)=12.0$ 9, p=0.034	65.3	n/a
At risk	35.1	34.2	37.7	35.1	29.2	36.7		34.7	n/a

Sex (% male)	51.0	49.6	47.6	50.6	45.7	46.7	$\chi^2(5)=5.99,$	48.5	55.7
							p=0.307		
Age							$\chi^2(5)=0.93,$		
							p=0.968		
18-29 years	32.7	32.3	33.7	32.6	34.2	34.0		33.2	25.6
30-64 years	67.3	67.8	66.3	67.4	65.8	66.0		66.8	74.4
Location (% metropolitan)	76.5	71.6	75.0	75.7	71.1	71.5	$\chi^2(5)=9.39,$	73.6	71.0
							p=0.094		
Socio-economic status ^b							$\chi^2(10)=12.$		
							62,		
							p=0.246		
Low (0-40%)	27.8	31.6	29.9	28.3	29.2	30.0		29.5	30.6
Middle (41-80%)	39.8	41.8	43.3	43.4	45.3	44.8		43.1	44.1
High (81-100%)	32.4	26.6	26.8	28.3	25.5	25.3		27.5	25.3
Completed tertiary education ^a (% yes)	74.1	70.3	73.6	74.0	71.6	71.3	$\chi^2(5)=3.91,$	72.5	71.1
							p=0.562		
Parent/carer of child of any age ^a (% yes)	47.3	46.8	47.4	46.8	48.7	47.7	$\chi^2(5)=0.62,$	47.4	45.2

p=0.987

^a Due to missing data, the total sample size for the NDSHS 2013 data is slightly reduced for some variables (N=10,498 for the NHMRC risk status variables; N=10,298 for completed tertiary education; N=9,645 for parent/carer of child of any age).

^b Due to missing data, the total sample size for the study sample is N=3,717 for socioeconomic status.

ALC control, alcohol product advertisements; NON ALC control, advertisements unrelated to alcohol; STH, advertisements featuring short-term harms of alcohol; STH+G, advertisements featuring short-term harms of alcohol and guidelines; LTH, advertisements featuring the long-term harms of alcohol; LTH+G, advertisements featuring the long-term harms of alcohol and guidelines.

Table 2. Relative risk ratios (and 95% CIs) from six multinomial regression models predicting correct vs. over-estimate and correct vs. ‘Don’t know’ responses to estimates of drinking level associated with short-term harm (Models 1a-1c) and long-term harm (Models 2a-2c), for short-term harm (STH) and long-term harm (LTH) Conditions.

Estimates related to STH				Model 1a: Comparison with ALC control Condition		Model 1b: Comparison with NON ALC control Condition		Model 1c: Comparison with STH Condition	
Advertising Condition	N	Correct ^a	Over-estimate	<u>Correct vs Overestimate for STH</u>		<u>Correct vs Overestimate for STH</u>		<u>Correct vs Overestimate for STH</u>	
		n (%)	n (%)	RRR (95% CI)	p value	RRR (95% CI)	p value	RRR (95% CI)	p value
ALC control	618	356 (57.6)	175 (28.3)	Referent					
NON ALC control	617	317 (51.4)	169 (27.4)	0.91 (0.70 – 1.19)	0.503	Referent			
STH	620	364 (58.7)	187 (30.2)	0.97 (0.75 – 1.25)	0.824	1.06 (0.82 – 1.38)	0.646	Referent	
STH+G	622	451 (72.5)	104 (16.7)	2.15 (1.63 – 2.85)	<0.001	2.35 (1.77 – 3.13)	<0.001	2.21 (1.68 – 2.93)	<0.001
		Correct ^a	Don’t know	<u>Correct vs Don’t know</u>		<u>Correct vs Don’t know</u>		<u>Correct vs Don’t know</u>	
		n (%)	n (%)	RRR (95% CI)	p value	RRR (95% CI)	p value	RRR (95% CI)	p value
ALC control	618	356 (57.6)	87 (14.1)	Referent					
NON ALC control	617	317 (51.4)	131 (21.2)	0.59 (0.43 – 0.80)	0.001	Referent			
STH	620	364 (58.7)	69 (11.1)	1.30 (0.92 – 1.85)	0.136	2.22 (1.60 – 3.08)	<0.001	Referent	

STH+G	622	451 (72.5)	67 (10.8)	1.66 (1.17 – 2.35)	0.004	2.82 (2.03 – 3.92)	<0.001	1.27 (0.88 – 1.83)	0.197
Estimates related to LTH				Model 2a: Comparison with ALC control Condition		Model 2b: Comparison with NON ALC control Condition		Model 2c: Comparison with LTH Condition	
Advertising Condition	N	Correct^b	Over-estimate	<u>Correct vs Overestimate for LTH</u>		<u>Correct vs Overestimate for LTH</u>		<u>Correct vs Overestimate for LTH</u>	
		n (%)	n (%)	RRR (95% CI)	p value	RRR (95% CI)	p value	RRR (95% CI)	p value
ALC control	618	411 (66.5)	92 (14.9)	Referent					
NON ALC control	617	405 (65.6)	60 (9.7)	1.51 (1.06 – 2.16) 0.023		Referent			
LTH	620	428 (69.0)	58 (9.4)	1.57 (1.10 – 2.25) 0.014		1.04 (0.70 – 1.53) 0.851		Referent	
LTH+G	621	480 (77.3)	43 (6.9)	2.59 (1.76 – 3.83) <0.001		1.71 (1.13 – 2.60) 0.011		1.65 (1.08 – 2.51) 0.019	
		Correct^b	Don't know	<u>Correct vs. Don't know</u>		<u>Correct vs. Don't know</u>		<u>Correct vs. Don't know</u>	
		n (%)	n (%)	RRR (95% CI)	p value	RRR (95% CI)	p value	RRR (95% CI)	p value
ALC control	618	411 (66.5)	115 (18.6)	Referent					
NON ALC control	617	405 (65.6)	152 (24.6)	0.75 (0.56 – 0.99) 0.039		Referent			
LTH	620	428 (69.0)	134 (21.6)	0.89 (0.67 – 1.18) 0.415		1.19 (0.91 – 1.56) 0.202		Referent	
LTH+G	621	480 (77.3)	98 (15.8)	1.38 (1.02 – 1.86) 0.037		1.85 (1.39 – 2.46) <0.001		1.55 (1.16 – 2.07) 0.003	

^a 'Correct' estimate for STH ≤ 4 standard drinks.

^b 'Correct' estimate for LTH ≤ 2 standard drinks.

Note. ALC control, alcohol product advertisements; NON ALC control, advertisements unrelated to alcohol; STH, advertisements featuring short-term harms of alcohol; STH+G, advertisements featuring short-term harms of alcohol and guidelines; LTH, advertisements featuring the long-term harms of alcohol; LTH+G, advertisements featuring the long-term harms of alcohol and guidelines; RRR = relative risk ratio; 95% CI = 95% confidence intervals.

Table 3. Odds ratios (and 95% CIs) from logistic regression models predicting intentions to avoid alcohol completely, for short-term harm (STH) Conditions and long-term harm (LTH) Conditions.

STH Conditions		Model 1a		Model 1b		Model 1c	
Condition	% Yes	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value
ALC control	13.9	Referent					
NON ALC control	16.5	1.23 (0.90-1.67)	0.201	Referent			
STH	22.7	1.82 (1.35-2.45)	<0.001	1.49 (1.12-1.97)	0.006	Referent	
STH+G	22.8	1.83 (1.36-2.46)	<0.001	1.49 (1.13-1.98)	0.006	1.01 (0.77-1.31)	0.967
LTH Conditions		Model 2a		Model 2b		Model 2c	
Condition	% Yes	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value
ALC control	13.9	Referent					
NON ALC control	16.5	1.22 (0.90-1.67)	0.206	Referent			
LTH	22.9	1.81 (1.35-2.44)	<0.001	1.48 (1.12-1.97)	0.006	Referent	
LTH+G	23.8	1.95 (1.45-2.61)	<0.001	1.59 (1.20-2.11)	0.001	1.07 (0.82-1.40)	0.605

Note. ALC control, alcohol product advertisements; NON ALC control, advertisements unrelated to alcohol; STH, advertisements featuring short-term harms of alcohol; STH+G, advertisements featuring short-term harms of alcohol and guidelines; LTH, advertisements featuring the long-term harms of alcohol; LTH+G, advertisements featuring the long-term harms of alcohol and guidelines.

Table 4. Odds ratios (and 95% CIs) from logistic regression models predicting intentions to reduce alcohol consumption for short-term harm (STH) Conditions and long-term harm (LTH) Conditions.

STH Conditions		Model 1a		Model 1b		Model 1c	
Condition	% Yes	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value
ALC control	38.0	Referent		Referent		Referent	
NON ALC control	43.0	1.25 (0.99-1.57)	0.063	Referent		Referent	
STH	53.1	1.84 (1.46-2.32)	<0.001	1.48 (1.18-1.86)	0.001	Referent	
STH+G	56.4	2.17 (1.72-2.73)	<0.001	1.74 (1.39-2.19)	<0.001	1.18 (0.94-1.48)	0.162
LTH Conditions		Model 2a		Model 2b		Model 2c	
Condition	% Yes	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value
ALC control	38.0	Referent		Referent		Referent	
NON ALC control	43.0	1.24 (0.99-1.56)	0.066	Referent		Referent	
LTH	56.3	2.23 (1.77-2.81)	<0.001	1.79 (1.43-2.25)	<0.001	Referent	
LTH+G	63.8	2.92 (2.31-3.68)	<0.001	2.35 (1.86-2.96)	<0.001	1.31 (1.04-1.65)	0.022

Note. ALC control, alcohol product advertisements; NON ALC control, advertisements unrelated to alcohol; STH, advertisements featuring short-term harms of alcohol; STH+G, advertisements featuring short-term harms of alcohol and guidelines; LTH, advertisements featuring the long-term harms of alcohol; LTH+G, advertisements featuring the long-term harms of alcohol and guidelines.

