Environmental context influences visual attention to responsible drinking messages

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Word count (excluding abstract, tables and references): 4,814

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Conflict of interest statement: ACM and IA have received research funding from The Drinkaware Trust for a match-funded PhD studentship. ACM acts as an unpaid scientific advisor to The Drinkaware Trust. All other authors have no conflicts to declare.

*Abstract*

**Aims**: Responsible drinking messages (RDMs) are used as a key tool to reduce alcohol-related harms. A common form of RDM is a poster format displayed in places such as bars, bus stops and toilet cubicles. However, evidence for the effectiveness of RDMs remains limited. Moreover, it is not known how environmental contexts (e.g. the number of alcohol related cues in the environment) impact how such RDMs are interacted with, nor how this in turn affects their efficacy. **Methods**: One hundred participants completed a pseudo taste preference task in either in a bar laboratory (alcohol cue rich environmental context) or a traditional laboratory. The walls of the laboratory displayed either RDM or control posters during this task and eye tracking was used to assess participant attention to the posters. **Results**: Participants looked at the RDM posters less in the bar laboratory where the environmental context is rich in alcohol cues compared to a traditional laboratory where alcohol cues are sparse. Neither poster type or environmental context affected the amount of ‘alcohol’ consumed and the amount of visual attention given to RDMs was unrelated to the amount of ‘alcohol’ consumed. **Conclusions**: These findings provide experimental evidence that RDMs do not influence drinking behavior during active consumption. In addition, locating RDMs in alcohol-cue rich environments may result in sub-optimal behavioural responses to the RDM materials (e.g. visual attention to content). To maximize the potential impact of RDMs, the optimal location for RDMs is in environments where pre-existing alcohol cues are sparse to non-existent.

*Key words:* Alcohol, responsible drinking messages, context, visual attention, eyetracking, bar laboratory.

*Short Summary*

Responsible drinking messages (RDMs) aim to reduce alcohol consumption, however the findings of this study show that they may not influence in situ consumption. These findings also suggest that the optimal location for RDMs is in environments with few or no other alcohol-related cues.

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# Introduction

In an effort to reduce alcohol-related harm government agencies and public health bodies utilise a wide range of information dissemination strategies to improve public knowledge, change attitudes, and encourage more responsible and less harmful drinking. Such strategies can include fear-based campaigns highlighting the harms from the misuse of alcohol, to simple information regarding the unit content of beverages displayed on alcohol containers. In the current study we sought to evaluate the effectiveness of messaging which focuses solely on the promotion of responsible drinking behaviour.

Responsible drinking message (RDM) campaigns are those which focus on promoting drinking practices which are less likely to cause harm, rather than focusing on the health consequences of misusing alcohol. Such strategies might include eating food when drinking, alternating alcoholic drinks with soft drinks, and choosing lower-strength drinks. While RDMs have been delivered in a variety of formats such as public service announcements on television (Barber et al., 1989) and online (e.g. Pilling & Brannon, 2007), the most common delivery mode is via mass media poster and print advertisements (e.g. Glock et al., 2014). Of the limited number of experimental evaluations which have been conducted regarding RDMs, the evidence generally suggests that these may have some positive impact on a range of outcomes including prospective drinking (e.g. Barber et al., 1989; York et al., 2012). However, the evidence in this area is somewhat limited, with more recent findings suggesting that RDMs can also produce rebound or so-called boomerang effects, and increase drinking in alcohol-related environments (Moss et al., 2015).

It is important to note that RDMs have been criticized regarding the ways in which they have been implemented. Barry and Goodson (2010) have argued that there is a deep confusion, and inconsistency, in how the concept of responsible drinking is defined. Indeed, in the current issue, we (Moss & Albery, 2017) have highlighted further the problems associated with defining responsible drinking, and the lack of consistent research evaluating these messages and campaigns. The alcohol industry, in particular, has been criticized for encouraging the use of RDMs which are ‘strategically ambiguous’ (Smith, Atkin & Roznowski, 2006), such that consumers fail to receive a clear message regarding the negative consequences of failing to do so.

Despite the limited evidence of the efficacy of individual RDM messages, and campaigns in general, RDMs still remain a key strategy employed by governments and charities hoping to reduce alcohol-related harms. Similarly, the alcohol industry actively encourages the use of responsible drinking messages as a key component of their corporate social responsibility efforts. Why this should be the case is beyond the scope of this paper, but RDMs do benefit from a compellingly simple face validity – advertisements educating the proposed audience *should* increase their knowledge, and that increased knowledge *should* influence behaviour. Given the continued use and prevalence of RDMs and the cost of implementing them (often via national multimedia channels), developing the evidence base around RDMs is important to help maximize their potential for impact, and also to identify those conditions where they might not represent an appropriate approach to alcohol harm reduction.

As RDMs are viewed ‘in the field’, one important focus for research should be on the role of the environmental context in how people interact with RDMs in addition to how effective they are in influencing drinking behaviour. The role of context in the operation of alcohol-related cognitions has been highlighted previously. For instance, participants who completed questionnaires in a lecture hall or a real bar (Monk & Heim, 2013), showed more positive alcohol expectancies and decreased perceived control in bar conditions. A meta-analysis of similar paradigms confirms this pattern of effects in most, but not all, studies (McKay & Schare, 1999). How such contexts effects may influence attention to RDMs, or how they mitigate or amplify their efficacy is, however, unknown. The current study will investigate this question by looking at how much visual attention is given to RDM posters (compared to control posters) in an alcohol-cue rich environment (a bar laboratory) compared to an alcohol-cue sparse environment (a normal laboratory).

How individuals allocate visual attention to different objects in their environment can be measured using eye movements. Eye movements can tell us where the eye is directed at any moment. Where the eye is directed and the ‘attention’ the cognitive system prescribes to that area/object have been shown to be strongly coupled (e.g. Kowler, *et al*., 1995). In sum, objects the eye is directed at receive enhanced sensory and cognitive processing compared to objects where the eye is not directed (see Findlay & Gilchrist, 2003 and Kowler, 2011 for reviews). When completing tasks in naturalistic situations there are a variety of measurements that can be made from analyzing eye movements. In this paper we focused on two broad measures: the number of glances an object receives over the course of the experiment and the total glance duration (how long, in seconds, an object is attended to). These measures of visual attention are likely, to some extent, to be dependent on the environmental context in which the viewing takes place. In relation to alcohol consumption, Schoenmakers and Wiers (2010) suggest that when a person has started to consume alcohol, the need to search out alcohol-related cues in the environment diminishes, but the desire to drink is maintained or exacerbated. The precise extent to which the environment affects the amount of visual attention directed at RDMs and whether these factors interact to influence actual drinking behaviour is unclear. Nevertheless, any empirical evidence in this respect could lead to important recommendations for the targeted placement of RDMs in environments in order to maximize their potential impact, and in turn maximize the reduction in alcohol consumption and alcohol-related harms.

The current study explores how much visual attention (number of glances an object receives and total glance duration) is given to RDM posters compared to control posters in an alcohol-cue rich environment (a bar laboratory) compared to an alcohol-cue sparse environment (a normal laboratory). Because the ultimate aim of RDMs is to influence drinking behaviour, the study also investigated the impact the above factors have on in situ drinking behavior using a taste preference task. Based on the findings of Schoenmakers and Wiers (2010), it was hypothesised that the type of environmental context would significantly affect the amount of visual attention (both measures) paid to the different posters, with more attention directed to the RDM poster (compared to the control poster) in the environment that is sparse in alcohol cues (the traditional laboratory) compared to the environment that is rich is alcohol cues (the bar laboratory). Following the logic of using RDM posters with the aim to reduce alcohol consumption, it was predicted that greater attention to the RDM would result in a reduction in drinking behaviour. Specifically, there would be significantly less consumption after viewing the RDM poster compared to the control poster, but this effect would not be influenced by the environmental context.

# Method

## Participants

One hundred participants (80% female) were recruited from a university student population and via subsequent snowball and opportunity sampling[[1]](#footnote-2). The mean age of the sample was 23.73 years (SD = 6.58). Eight participants’ data were lost due to technical failures resulting in usable eye-tracking data from 92 participants. ANOVA on AUDIT scores between conditions revealed that there were higher mean AUDIT scores in the bar (*M* = 12.81, *SD* = 6.04) than lab condition (*M*=10.11, *SD* = 4.86), *F* (1,95) = 6.73, *p* = .011, *p*η2= .07 and when the exercise poster (M = 12.63, SD = 6.04) was shown relative to when the RDM was shown (*M* = 10.32, *SD* = 4.78, p = 0.03), *F*(1,95) = 4.88, *p* = .03, *p*η2= 0.49. No interactive effect was present, *F* (1,95) = 1.29, *p* =.27, *p*η2 = .01. For gender, Chi square tests showed no difference in gender distribution between bar/lab conditions, *x*2(1) = 0.64, *p* = .80. The gender distribution varied from random between the poster and RDM condition, *x*2(1) = 4.64, *p* = .031 (see *Results* for further discussion).

*Design*

A 2 (Context: Bar laboratory vs. Traditional Laboratory) x 2 (Poster: RDM vs. Control) between participants design was employed. Participants were randomly allocated to a condition (Bar/RDM *n* = 22, Lab/RDM *n* = 25, Bar/Control *n* = 21, Lab/Control *n* = 22). Context was operationalised by having participants complete the main phase of the study in either an alcohol-cue spare environment (a traditional laboratory – i.e. office desk, chair, and desktop PC) or a purpose built bar laboratory which simulates a British public house and where alcohol cues are abundant. For example, in addition to authentic public house décor, a 3.6m long bar has been installed and dressed with beer taps, stools, a fruit machine, optics, etc. In both conditions the relative positioning of the participant, the posters and the drinks to be consumed were kept the same. The poster variable was operationalised as the display of an RDM or a control poster to the upper right of the participant’s visual field when seated at the bar/desk. The amount of visual attention directed to the RDM and control posters was measured (the number of glances and the total glance duration - how long, in seconds, an object is attended to). Additionally, the quantity of the beverages consumed during the TPT was measured.[[2]](#footnote-3)

## Materials

Alcohol self-report measure: The AUDIT (Alcohol Use Disorders Identification Test) is a standard measure of alcohol consumption and alcohol-related harm (Saunders, *et al*., 1993). Scores range from 0 to 40, with scores above 8 (for men, 7 for women) indicating potentially hazardous drinking levels, and a score of 20 or more indicating potential alcohol dependence. In line with other research involving UK undergraduate student populations (e.g. Frings, *et al*., 2008) mean scores observed in the sample were quite high (*M* = 11.51, *SD* = 5.51).

Posters. Two posters were created. Both posters were based on the ‘Keep Calm and Carry On’ motif commonly used in World War II propaganda, variations of which are now a common social meme in the UK. In the RDM condition, the text read *keep calm and drink responsibly*. In the control condition, the text read *keep calm and exercise regularly*. This ensured the posters were matched on number and length of words and ensured no additional primes were present in the poster (a potential confound in some research – e.g. Moss *et al*., 2015). Both posters can be seen in the appendix. The decision to use such basic-format posters in this study was to try and reduce the visual and semantic complexity of the RDM message to avoid this confound. We sought, therefore, to evaluate the effect of simply being told to ‘drink responsibly’.

Taste Preference Task (TPT): The participants were given 3 bottles of non-alcoholic beer, with the labels concealed. They were then given 10 minutes to drink as much or as little of the drinks as they liked, rating them on attributes such as taste, smell, quality and expense. Participants could move on from this phase of the study by calling investigator at any time. At the end of the study, the investigator measured the remaining fluid and calculated total consumption (no participants were excluded for explicit knowledge of the use of non-alcoholic beverages - see procedure below).

### Eye-tracking

Eye movements were collected using a Diakablis monocular eye tracker driven by D-Lab software (D-Lab, V3). Areas of interests were defined around the poster displayed and were allocated using the Dikablis infrared marker library. Eye movements were recorded from the moment participants entered the laboratory (bar or traditional) to the point they finished the TPT. The precise measures used in this study were: number of glances (the number of times a participant’s direction of gaze *entered* *and* *made a fixation* - i.e. their attention rested - within an area of interest) and total glance duration (the total length of time people spent attending to each area of interest – measured in seconds). This system is based on detection of small target symbols placed around the areas of interest. These were pre-tested to ensure they were of sufficient size to be detected reliably by the system, and other dummy targets placed around the testing space to camouflage the studies intent.

After data was collected, software was used to eliminate blinks and fly through (situations where a participant’s gaze entered the area of interest and swept through the area without making a fixation). Pupil detection rates were maximised by manually marking the pupil where this data was missing from the given frame. Areas of interest were checked for each participant individually, and then an automated calculation of each of the indices were generated by the software.

## Procedure

Upon arrival, participants were taken to a plain laboratory where they gave informed consent and completed the AUDIT questionnaire. The participant information sheet included a cover story stating that the aim of this study was ‘to look at how people attend to the world whilst completing a number of psychology tasks, and also to evaluate a number of beverages’.

Following this, they were escorted (with their eyes closed) to either the bar laboratory (bar condition) or a second traditional laboratory (lab condition). Participants were then seated at the bar (or behind a desk) still with their eyes closed. The eye-tracking headset was then placed on their head. They were asked to look down at the desk and undertake a calibration procedure for the eye-tracking software. Only after this calibration phase were participants told they could look up. In both environmental contexts, a set of bottles and glasses for the TPT were positioned on the desk to the participants left. To the upper right of the visual field (assuming they were looking straight ahead) the RDM or control poster was displayed. On the desk in front of the participant was a wordsearch filler task turned face down. Participants completed this filler task, and then the TPT. During this entire period, visual measures were taken via the eye-tracking device. Once the TPT was completed, recording stopped.

A funnelled debriefing procedure (Bargh & Chartrand, 2000) was utilized. Specifically, participants were asked: “How did you find the study?”, “What did you think the study was about?”, “Did you notice anything odd or unusual about the study?”, and ”Did you notice anything odd about the drinks you asked to rate?”. No participants were excluded on the basis of any explicitly stated awareness of the hypotheses of the study or placebo use. Finally, an experimental debriefing was given to participants who were then paid for their time, thanked again, and escorted from the laboratory. The research protocol was approved by the London South Bank University Ethics Committee.

# Results

Session time: On average, the wordsearch filler task and drinking phases took at total of 590.53 seconds. ANOVA revealed that the sessions took less time in the bar lab (*M* = 549.47, SD = 80.41) than in the traditional lab (*M*= 626.56, SD = 150.69), *F*(1, 88) = 9.53, *p* =.003, *p*η2= .10. There was no significant main effect of poster type. There was a significant interaction *F*(1,88) = 4.50, *p* =.037. *p*η2 = .04. Simple effects analysis revealed a simple effect of context when the control poster was displayed, *F*(1 88) = 13.26, *p* <.001, *p*η2 = .13, with the task taking longer in the lab condition (*M* = 651.20 SD = 140.90) than the bar condition (*M* = 519.18, SD = 57.67). No other simple effects were present. As session length varied between conditions, each value for the duration and number of glance variables was divided by the participant’s total session time. These means were used in the ANOVAs reported below. However, as the resultant indexes are difficult to interpret, both the resultant glances per second and also the unadjusted means are reported in the following tables.

### Visual attention to posters

To explore the effects of environmental context (Traditional Laboratory – alcohol cue sparse; Bar Laboratory – alcohol cue rich) and type of poster (Control poster; RDM poster) upon visual attention directed to the posters a series of ANOVAs were undertaken. In each ANOVA, context and poster were included as between participant factors. Means for each condition can be seen in Table 1. To ensure that differences in AUDIT and gender between condition did not account for effects described above, we conducted additional ANCOVAs with the same IVs and DVs as reported below, but also including AUDIT and gender as covariates. As neither covariate approached significance in any of these analyses (*p*s > .20), an ANOVA approach was maintained.

Table 1: *Mean visual attention directed at the poster across condition (Standard Deviation in brackets).*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Context condition | Poster condition | Glances per second | Total glance duration at area per second | Absolute number of glances | Total glance duration (seconds) |
| Traditional Lab | Control | 0.02 (0.03) | 0.02 (0.02) | 16.67 (21.89) | 12.21 (13.61) |
|  | RDM | 0.04 (0.03) | 0.03 (0.04) | 23.72 (20.35) | 16.40 (21.11) |
| Bar Lab | Control | 0.05 (0.03) | 0.02 (0.02) | 23.54 (13.05) | 12.39 (5.86) |
|  | RDM | 0.02 (0.03) | 0.01 (0.01) | 14.00 (18.24) | 5.89 (6.61) |

Number of glances per second. Neither context nor poster type had a main effect on number of glances at the poster per second (*p*s >.39). There was a significant interaction between the two factors, *F*(1, 87) = 11.80, p < .001, *p*η2 = .12. Simple effects analysis revealed that in the bar condition, RDM posters received fewer glances than did control posters, *F*(1,86) = 8.57, p= .004, *p*η2 =.09). In the lab condition, the opposite pattern was observed, though this effect was not significant at the *p* <.05 level, *F*(1,87) =3.59, *p* = .061, *p*η2 = .04. In the control poster condition, fewer glances were directed at the poster in the lab relative to bar condition, *F*(1, 87) = 7.87, *p* = .006, *p*η2 = .08. In the RDM condition, this pattern was reversed with fewer glances being directed at the poster in the bar relative to the lab, *F*(1, 87)= 4.20, *p* = .043, *p*η2= .05.

Total glance duration. Neither context nor poster condition had a significant main effect on the total duration of glances, ps >.19. This was qualified by a significant interaction, *F*(1,86) = 5.04, *p*= .027, *p*η2 = .06. Simple effects analysis revealed that total glance duration was lower for the RDM message relative to control poster in the bar condition with marginal significance, *F*(1,86)=3.05, *p* = .084, *p*η2= .034. RDMs were attended to less in the bar condition than in the lab condition, *F*(1,86) = 6.35, *p* = .014, *p*η2 = .07. No other simple effects were significance, *p*s > .16.

In summary, it appears that RDM posters (compared to control posters) were visually attended to less in the alcohol cue rich environmental context (the bar laboratory) compared to the alcohol cue sparse environmental context (the traditional laboratory).

## Effects of context and poster type upon consumption.

In order to investigate whether environmental context (Traditional Laboratory – alcohol cue sparse; Bar Laboratory – alcohol cue rich) and type of poster (Control poster; RDM poster) affected the amount of beverage consumed an ANOVA was run. Neither environmental context nor poster type affected actual consumption, *F*s < 0.66, *p*s > .42.

## Relationships between visual attention and consumption

To test for the association between beverage consumption and visual attention, zero-order correlations were conducted between beverage consumption in the TPT and the various visual attention measures. Both correlations between beverage consumption and the visual attention measures were weak (*r*s <- .20) and non-significant (*p*s > .07) showing that there was no statistically significant relationship between the amount of visual attention given to the posters and consumption behaviour in situ. Breaking the sample down by poster condition led to no significant correlations between consumption and visual indexes being observed in either poster condition (*r*s < 0.24, *p*s > .16). A similar lack of significant results was observed when breaking down the sample by context condition (*r*s < -.22, *p*s > .37). Patterns of significance did not vary in the correlations reported when partial correlations using AUDIT and gender covariates were computed.

# Discussion

Responsible drinking messages (RDMs) are widely used as part of campaigns with the ultimate goal of reducing alcohol consumption and, in turn, alcohol related harms. However, little evidence has investigated how people interact with RDMs in alcohol-cue rich environmental contexts (e.g. in a bar) vs. alcohol cue sparse environmental contexts, and how such messages affect resultant drinking behaviour. The current study found that RDMs (but not control posters) were visually attended to less in the bar environmental context than the traditional laboratory context. In the bar (relative to the lab) people made fewer glances and for less time towards an RDM designed to minimise the likelihood of people drinking to excess.

This finding could be interpreted in terms of a dynamic interaction between incongruent behavioural cues. When RDMs were displayed in the bar, drinkers were in an environment saturated with drinking-related *facilitative* cues (i.e. the bar landscape and the drinks for the TPT) except for one particularly salient *inhibitory* cue (i.e. the RDM exposure). In this context it may be that drinkers attempted to avoid (attend away from) any perceptual information that conflicted with thought and behaviours *expected* in the bar context (i.e. drinking). This interpretation would be consistent with Schoenmakers and Wiers’ (2010) argument that once the need to search out alcohol-related cues in the environment diminishes, the desire to drink is maintained or exacerbated. In other words, we provide evidence that environmental context itself may result in the saturation of alcohol-related cues which may occur prior to the consumption of alcohol (see Moss & Albery, 2009).

These findings could also reflect difficulty disengaging with alcohol cues. Drinkers may have found it difficult to disengage from such stimuli under conditions of *alcohol cue saturation* (i.e. when the number of cues in the environment become so great that one no longer attempts to distinguish effectively between them). Under such circumstances, we argue, there may well be no cognitive resource available for the required processing of possible inhibitory cues to be undertaken with the result that they are less likely to be engaged with (Baumister & Vonasch, 2015).

An alternative (but related) explanation to these findings may be that under conditions when inhibitory and facilitative cues require conflict resolution to guide behavioural choice, certain cues may be preferentially processed such as under conditions of threat-relatedness (e.g. Moss & Albery, 2009; Morris & Albery, 2001). This threat-relatedness is more likely when cues present in a context (i.e. alcohol cues in the bar) that generates a behavioural goal (i.e. drinking alcohol) that is the opposite of that espoused by any inhibitory cues (i.e. RDMs). In the current study, it may be that the threat experience embodied by the RDM needs to be avoided to a) remove the negative arousal created by the threat exposure and b) provide the basis for one’s goal/motivation to behave in line with one’s predominant current experience. As such, it is likely that one’s attention is likely to be less attuned to the RDM and more so to goal-related cues (i.e. the drink itself).

From an applied perspective, these findings suggest that RDMs will be attended to more by drinkers when they are placed in environmental contexts where there are few alcohol cues. This could seem counterintuitive from a simple advertising perspective. However, this study has found that RDMs will be looked at less in alcohol-cue rich environments. It may be that public spaces such as toilet cubicles, bus shelters, and roadside advertising placards, characterized as not being rich with alcohol cues, are more appropriate for displaying RDM posters than in the bar environment. Research by Thomsen and Fulton (2007) supports this finding, to the extent that participants in their study failed to pay significant attention to the ‘please drink responsibly’ messages embedded within alcohol advertising posters. Similarly, albeit focusing on alcohol warning labels rather than responsible drinking messages per se, more recent research has continued to highlight equivocal results with regards to the salience and impact of alcohol warnings. For example, Kersbergen and Field (2017) demonstrated that visual attention to warning information on alcohol containers was minimal, even amongst participants who reported motives to reduce their drinking. Moreover, other recent studies have shown limited effects of alcohol warnings even when they are processed by the target audience (Stautz & Marteau, 2016; Stautz et al., 2016). Taken together, our findings contribute towards an increasing evidence base which suggests that techniques for both creating effective messages to reduce alcohol-related harms, and ensuring that drinkers are motivated to attend to such messages, are at present very limited and in need of further development.

In the current study, we observed no effects of RDM posters or context upon consumption in a taste preference task. This is in contrast with some of our own previous work (Moss *et al*., 2015) where the presence of an RDM poster actually increased consumption levels. Differences between the current experiment and that work primarily revolve around the content of the poster. In Moss et al., the poster was visually complex, containing images of people, featuring numerous colours, and a message from which the goal of responsible drinking needed to be inferred (e.g. ‘why let the good times go bad?’). The current study aimed to disentangle these effects by presenting a simpler poster, where only the text was manipulated and the message to drink responsibly was far more prominent. The lack of effects in this case may suggest that the effects of responsible drinking messages on actual behaviour are highly dependent on the content of the message themselves. From an applied perspective, this suggests that pilot work testing the efficacy of messages, and the direction of their effect, should be undertaken prior to them being distributed through a campaign.

There are some limitations to the present study, primarily in that this was an experimental design in which participants were consuming alcohol in a bar laboratory environment for a limited period. While the sample size was adequate, this included a large proportion of females, and all participants were relatively heavy drinkers. The latter point might, however, be seen as an advantage in the current context, given that RDMs are not, in general, intended for audiences who drink very little. Further, the message used may be seen as being overly simplistic, in that no specific advice was offered as to what responsible drinking might entail – and instead relied upon participants maintaining their own internal definition. Both of these are areas which warrant further investigation in future research, taking in to account our key finding which is that the context in which RDMs are displayed ought to consider the extent to which other cues in the same environment might significantly reduce the likelihood that individuals pay attention to these messages, let alone act upon their advice.

Finally, the current study tested people alone. As other research has shown that being in a group can affect rates of consumption (e.g. Dallas et al., 2014; Frings et al., 2016), and the effects of alcohol on confidence and performance in a variety of tasks (e.g. Abrams, Hopthrow, Hulbert and Frings, 2006; Sayette, Kircher Moreland, Levine and Travis, 2004) it is possible that the observed effects may differ in groups. The most likely effects of being in a group in this task is possible dilution of attention given to the posters (as more attention is focused on the group) and a polarization of behavioral responses towards the posters as a function of other group members expressed attitude towards them.

The use of the bar laboratory represents a strength over purely lab-based research, although this in combination with the use of the head-mounted eye-tracking equipment does of course mean that we are not able to firmly conclude that any effects observed would be replicated in a completely natural drinking setting. However, it is not unreasonable to speculate that if participants paid limited attention on their own, in a simulated bar to RDM posters, that they would be even less likely to do so in a busy, real bar environment while drinking with friends.

Our findings add to a small but growing body of research exploring the complex nature of RDMs and their delivery across a range of contexts. While we found no evidence suggesting that RDMs may be effective in reducing alcohol consumption, your findings do suggest that the placement of RDMs may be less effective in alcohol cue-rich environments such as bars and pubs, simply because drinkers appear less likely to attend to them at all.

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# Appendix

*Posters for RDM* (*left) and control* (*right) conditions – bright red background and white text.*



*Acknowledgements*

The research team would like to thank Ergoneers for advice on the D-lab software used to analyse eye-tracking data and, Acuity ETS for their support with the eye-tracking hardware involved. This report was funded by Alcohol Research UK, Grant SG14/15 199: 'Evaluating the Interactive effects of responsible drinking messages and attentional bias on actual drinking behaviours'. Alcohol Research UK is an independent charity working to reduce alcohol-related harm through ensuring policy and practice can be developed on the basis of reliable, research-based evidence ([www.alcoholresearchuk.org](http://www.alcoholresearchuk.org)).

1. This sample was calculated to be sufficient to detect interactions between conditions with effect sizes of medium size (f = .28) with a power of .08, and an α = 0.05, (calculated using GPower 3.1.9.2). [↑](#footnote-ref-2)
2. A number of other measures were taken alongside these (e.g. visual attention to the beverages in the TPT, visual attention to the wordsearch filler task, attention bias measures) however these were outside the scope of the present research question concerning RDMs. [↑](#footnote-ref-3)