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Abstract

Objectives: Excessive alcohol consumption is a persistent problem in Northern European cultures. Across a two week period we tested the effect of varying message frames, message types, and response measures, in reducing alcohol consumption.

Design: Three hundred and twenty-three respondents were allocated to a 2 (message frame: gain vs. loss) x 2 (message type: health vs. social) x 2 (response type: engaging vs. refraining) mixed design.

Method: Binge drinking and units consumed were measured at Time 1 and Time 2 (two weeks later). Participants read (following Time 1), a gain or loss framed message on bingeing emphasising either social or health consequences, and answered *engaging in* or *refraining from* drinking attitude measures.

Results: No main effects were identified. The key finding was that gain framed messages, when used in conjunction with engage response measures (an incongruous pairing), were highly effective in reducing alcohol consumption two weeks later compared to the other message frame/response measure combinations.

Conclusions: We suggest that for prevention behaviours gain framed messages, when paired with engage response measures, initiate an inconsistency resolution process. Together, our findings emphasize the importance of message frame and response type when seeking to reduce alcohol consumption using persuasive health messages.

KEYWORDS: binge drinking, message framing, intervention

Tackling Student Binge Drinking: Pairing Incongruent Messages and Measures Reduces Alcohol Consumption

In the US, 80% of college students drink alcohol and 40% engage in binge drinking (Goldman, Boyd & Faden, 2002). Binge drinking is defined in this paper as “drinking more than twice the recommended maximum number of units of alcohol per day in one single session”. With the recommended maximum number of units in the UK being 3-4 for men and 2-3 for women, drinking more than 8 or 6 units per session for men and women respectively constitutes a binge drinking session (Parliamentary Office of Science & Technology, 2005). A unit is a small (125ml) glass of low strength wine (ABV 9%) or half a pint of beer (ABV 3-4%).

Alcohol misuse (of which binge drinking is a large part) costs UK taxpayers around 20 billion pounds per year (Parliamentary Office of Science and Technology, 2005; Prime Minister’s Strategy Unit, 2004) and has serious long and short term health consequences. Consequences in the short term include: anxiety, temporary impotence, loss of consciousness, risk of accidents and injuries, unsafe sex, and alcohol poisoning. While the long term consequences include: greater risk of some forms of cancer; memory loss and brain damage, greater risk of heart disease and stroke, and liver disease (NHS, 2013).

Despite these health and societal problems, and the growing public concern (Kuntsche, Rehm, & Gmel, 2004; Prime Minister’s Strategy Unit, 2004; The Academy of Medical Sciences, 2004), binge drinking is a very common behaviour, especially among young people aged between 16 and 24 years and students (NHS, 2013), making it a significant social problem. Those engaged with public health have raised concerns that while regular drinking of small amounts of alcohol predominates in Southern Europe, in Northern European cultures (and in particular the UK) high consumption in single sessions is more common (Institute of Alcohol Studies, 2010). Therefore, attention has turned towards developing interventions to reduce excessive alcohol intake in a single session.

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Message framing

Prospect theory states that people prefer to take the safe option (avoid risk) when they are considering *gains*, but accept greater risk when making choices in situations to avoid *losses* (Kahneman & Tversky, 1979). Specifically, in framing studies, a loss framed message for a risk behaviour focuses on the disadvantages of *engaging* in the problem behaviour (e.g., engaging in binge drinking ruins your health). Therefore, people might show a greater tendency to take risks (i.e. continue to binge drink). On the other hand, when gain framed, the message focuses on the advantages of *refraining* from the problem behaviour (e.g., refraining from binge drinking is good for you), leading to a tendency towards the safe option (reduce binge drinking). Therefore, gain framed messages are more likely to result in risk avoidant behaviour, while loss framing tends towards risk seeking behaviour (e.g., Tversky & Kahneman, 1981).

However, the evidence for the effectiveness of message framing in the health behaviour setting has been inconsistent and Rothman and Salovey (1997) propose that this may be attributed to contextual factors (see also Abhyankar, O'Connor & Lawton, 2008; O'Connor, Ferguson & O'Connor, 2005). They divide health behaviours into two main categories: detection behaviours (such as breast self-examination) and prevention behaviours (such as using a condom). Detection behaviours can be seen as relatively risky, because they might cause one to discover an illness, while prevention behaviours are seen as relatively safe, because they only protect against aversive health outcomes (Rothman & Salovey, 1997, see also Gallagher & Updegraff, 2012).

Studies that have focused on smoking cessation often find gain frame advantages (e.g., Schneider et al. 2001; Steward, Schneider, Pizarro & Salovey, 2003), although in neither study was there a significant direct effect on behaviour (see also, Toll et al., 2007). Indeed, Steward et al., found gain framed advantages only for individuals lower in need for cognition (NFC). There are few studies that have applied framing to reducing binge drinking behaviour, probably

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because, more broadly, binge drinking is well researched. For example, Gill (2002) reviewed binge drinking studies across a 25 year period, noting that while several studies had been carried out during this time they were methodologically inconsistent. Similarly, Courtney and Polich (2009) assert that although binge drinking research is becoming increasingly important, empirical cohesion and definitional precision are problematic in the area. However, none of the articles reviewed focussed on message framing. To our knowledge, there is only one published study of framing in the context of drinking behaviour (Gerend & Cullen, 2008). This study of college students did not find a main effect for frame, but did find an interaction between frame and temporal context (i.e. short term versus long term consequences), so that students who were exposed to a message focusing on the short term consequences of binge drinking were likely to reduce their drinking more if this message was gain-framed (Gerend & Cullen, 2008). For messages focusing on long term consequences there was no difference between gain and loss framed messages. However, testing short and long term consequences together could be important because awareness about short term consequences (e.g., hangovers, vomiting, blackouts, unsafe sex & car accidents) are inextricably linked to long term consequences. For example, long term consequences (e.g., brain damage) are often associated with short term consequences, like blackouts (White, 2003).

Affective content is another important aspect of message framing and this is supported by a growing body of research highlighting its role in predicting risky health behaviours. For example, Lawton, Conner and Parker (2007) demonstrated that affective beliefs were the best predictors of health risk behaviour across two different studies/behaviours (i.e., speeding behaviour & smoking). More recently, Lawton, Conner and McEachan (2009) highlighted the importance of affect in the performance of 14 health-related behaviours and concluded that interventions should usefully target the affective consequences of engaging in these behaviours.

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Health vs. Social Risks

Public health campaigns tend to be focused on the health risks of binge drinking, but amongst young people, and for this behaviour performed in a *social context*, communicating social risks may prove to have more effect on subsequent behaviour. Qualitative research suggests that young people are sensitive to social pressure and are influenced by their peers to engage in binge drinking (Engineer, Phillips, Thompson, & Nicholls, 2003). Indeed social factors like peer pressure may be the most important determinants of health risk behaviour for these young people (Institute of Alcohol Studies, 2010; Newcomb & Bentler, 1989). One study found that while smokers were evaluated negatively, young people evaluated binge drinkers positively (Rivis, Sheeran, & Armitage, 2006).

The distinction between health and social risk comes from a study investigating the effects of message framing on condom use (Kiene, Barta, Zelenski, & Cothran, 2005). In this study, loss framed relational/social messages (messages emphasising the possible negative relational consequences) and gain framed health messages (messages emphasising the possible positive health consequences) were seen as most important and most convincing in efforts to stimulate condom use: The loss framed relational/social messages included “Not knowing how to convince a partner to use a condom fails to protect both of you from STDs and HIV”, while the gain framed health messages included “If you avoid having sex when you are drunk or using other drugs, you are more likely to practice safer sex and therefore you are at less risk of getting an STD or HIV”. One explanation is that when using condoms is presented as a health-behaviour, it is seen as low risk, because it protects one’s health and does not cause any apparent health harm. However, when using condoms is presented as an interpersonal behaviour, it is seen as a high risk behaviour because their use requires discussion with partners. Based on this research, it is clear that avoiding binge drinking may be seen as either high or low risk depending on which elements of the behaviour (health vs. social) are emphasised.

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Congruence Effects

A further goal of this research was to assess the effects of congruence of message and measurement. In studies of the impact of message framing, participants very often receive the message together with a set of items that are deployed to measure changes in intervening variables (e.g., attitudes and intentions). Therefore, depending on the wording of the post – message items there can either be congruence or incongruence of message and measurement. Thus, a person might be given a loss framed message and either approach (engaging in) or avoid (refraining from) measurement items. When an engage measure (e.g., do you intend to binge drink) is encountered following a loss framed message (e.g., binge drinking increases your chance of liver disease and cancer), this results in a congruous pairing. However, when an engage measure follows a gain message (e.g., refraining from binge drinking is good for your health) this creates an incongruous pairing.

Incongruent pairings of social categories have been found to increase the cognitive effort required to process them (e.g., ‘Female Mechanic’, Hutter & Crisp, 2006). Normally people seek to conserve their cognitive resources and humans are therefore *cognitive misers* (Fiske & Taylor, 1981). However, incongruent pairings present perceivers with a dilemma – conflicting information about a target does not allow a cognitive representation to be formed adequately without recourse to more effortful processing (Hutter, Wood, & Dodd, 2012). Furthermore, the elaboration likelihood model (Petty & Cacioppo, 1986) highlights increased processing (a central route to persuasion), as a factor influencing the persuasiveness of any message; in other words, the more a message is elaborated upon, the more impact it has on attitudes. We suggest that similar mechanisms when processing incongruent social categories *may* occur when behaviours highlighted in message frames are incongruous with behaviours assessed in measures. Specifically, incongruous pairings may serve to make the message more persuasive as they may require deeper, more elaborated processing.

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Hypotheses. Our aims were twofold, first, to test the effect of frame (loss vs. gain) and message type (health vs. social) on reported binge drinking and units consumed. We hypothesised that there would be a gain framed advantage, but that this would be moderated by message type so that there would be a gain frame advantage for health messages and a loss frame advantage for the social message. A second aim was to establish whether the type of measurement items used to assess social cognitions would serve to enhance or weaken the impact of message frame on behaviour. Here, we suggest that where message and measurement items are incongruent (i.e. loss/refrain or gain/engage), the greatest reduction in alcohol use would occur relative to where they are congruent (i.e. loss/engage or gain/refrain). This is because previous work has found incongruent pairings require greater cognitive effort and explanation, (e.g., Hutter & Crisp, 2006). This in turn suggests that the more a message is elaborated upon the more persuasive it becomes (Petty & Cacioppo, 1986).

Method.

Participants and design. A total of 666 UK students were recruited to take part in a web-based questionnaire. Of these participants 305 (45.8%) were male and 361 (54.2%) were female. Ages ranged between 18 and 55 years ($M=20.77$, $SD=3.33$). The median year of study was second year at university. Participants were recruited in two ways. First, posters were sent out to all student union buildings in England via email, with a request to the sabbatical officers to put them up in their union buildings. These posters gave details of the web-page that contained the questionnaire. Second, to boost the numbers of participants, secretaries from several departments at a large University were requested to send out a bulk-email to all the students in their departments, which contained the link to the website.

Two weeks after the first wave of data collection participants were sent an email asking them to participate in a follow-up study. Three hundred and ninety-two people responded to the second mailing. Of these, 323 provided full data sets. One hundred and twenty-four (38.39%) were male, and 199 (61.61%) were female. Chi-square analysis showed that respondents were

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more likely to be female at follow-up, $\chi^2(1) = 17.42, p < .001$. Ninety-four (29.10%) were sampled using the first recruitment method (student union buildings in England via email), and 229 (70.90%) via the second method (several departments at a large University). No other demographic differences were found between respondents and non-respondents.

The present study used a 2 (message frame: gain vs. loss) x 2 (message type: health vs. social) x 2 (response type: engaging vs. refraining) mixed design. Participants were randomly assigned to one of six conditions when they opened the questionnaire website. Ethical approval for the study was obtained from the Department of Psychology Ethics Committee.

Measures. Age, gender, year of study, and email address were recorded. Each questionnaire also included ten standard Theory of Planned Behaviour measures (Ajzen, 1991), following the guidelines in Norman and Conner (2006). Measures included four attitude items, two subjective norm items, two perceived behavioural control items, and two intention items. These were worded as either 'engaging in' or 'refraining from' binge drinking over the next two weeks depending on response type condition to which the participant was assigned (Appendix A). The ten items were each comprised of 7-point scales and high values accorded high levels on each variable.

Dependent measures. Current binge drinking behaviour was measured at both Time 1 and Time 2. Participants were asked how often they had participated in binge drinking sessions in the past two weeks (dependent measure 1), and how many units of beer, shorts, and wine they had consumed over the past two weeks (dependent measure 2). These dependent measures closely resembled and were based on those implemented by Norman, Bennett, and Lewis (1998) and Norman and Conner (2006). Self-report measures have been shown to be generally valid measures of alcohol consumption for light to moderate drinking. For example, Northcote and Livingston (2011) asked 81 young adults (18-25 years) at nightclub venues to self report the number of alcoholic drinks consumed 1-2 days later. In addition participants were observed by peer based researchers at the time of consumption. It was found that self reports were accurate

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when engaging in light to moderate drinking (up to eight drinks in a session), but consumption was underestimated as drinking became heavier (eight drinks in a session). Participants in the present research were given some brief advice about typical drinks that constituted one unit of alcohol.

Framed messages. Each of the messages contained two sections, a background information section followed by a framed message section (see below). The background information read as follows: “*Studies are starting to reveal that drinking a large amount of alcohol over a short period of time may be significantly worse for your health than frequently drinking small quantities. In the UK, binge drinking is becoming a big problem. Teenagers as young as 16, admit to binge-drinking, and around 40% of patients admitted to A&E are diagnosed with alcohol-related injuries or illnesses.*” Following the background information, participants then read a gain (emphasizing the benefits of not binge drinking) or loss (emphasizing the disadvantages of binge drinking) framed message on social or health consequences of binge drinking, depending on the condition they were assigned to (Appendix B). These measures were based on Norman, Bennett, and Lewis H. (1998) and Norman and Conner (2006). The factual content of the messages was taken from the UK National Health Service webpages relating to binge drinking (e.g., <http://www.nhs.uk/Livewell/alcohol/Pages/Effectsofalcohol.aspx>) and framed in terms of losses or gains and social or health consequences. In addition, each of the messages also included an affective component (e.g., you will be relieved/feel anxious...) in light of the growing body of research that has demonstrated the importance of behaviour change interventions to target the affective consequences of engaging/refraining in specific health behaviours (Lawton, Conner & Parker, 2007; Lawton, Conner, & McEachen, 2009). The messages were subsequently piloted in two small samples of college students (pilot study 1, n=10; pilot study 2, n=20) before being included in the final intervention¹.

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Procedure. After a short introduction to the project via the first page of the online questionnaire, some personal details (including email address) were requested and all participants were provided with a definition of what constituted a binge drinking session. This was followed by a request for participants to indicate their own binge drinking behaviour for the past two weeks and an indication of their concerns about their own binge drinking behaviour. Thereafter, students were provided with some basic background information on the scale of the binge drinking problem in the UK, as an introduction to the framed message and then the framed message.

After reading the messages participants had an opportunity to write down their thoughts and feelings about the message, and went on to answer the ten Behaviour attitude measures worded as either “engaging in” or “refraining from” binge drinking. Two weeks after the first measurement, participants were sent an email asking them to participate in the follow-up study. At this point participants were reminded of what constitutes a binge drinking session, and again asked about their binge drinking behaviour and number of units of alcohol consumed during the last two weeks.

Results.

Data analysis. Of the 666 participants that completed the Time 1 questionnaire 15 had not consumed any units at either Time 1 or Time 2 and so were excluded from the analysis. A further 51 cases were outliers on one or more of the following variables: binges Time 1 (over nine binges), units consumed Time 1 (over 72 units), binges Time 2 (over eight binges), and units consumed Time 2 (over 64 units)². This resulted in 600 participants remaining, of which 277 did not complete the Time 2 questionnaire, leaving 323 participants³. Descriptive statistics for study variables are presented in Table 1. Participants reported engaging in an average of 2.30 binges and consuming 22.33 units of alcohol in the past 2 weeks at Time 1. At Time 2, this had fallen to 1.70 binges and 17.81 units of alcohol. T-tests revealed that at Time 1 males tended to report consuming more units of alcohol ($M=27.39$ units) than females ($M=19.18$ units), $t(321)=-1.75$,

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$p < .05$, $d = .52$, and males ($M=2.52$), were more likely to engage in binge drinking than females ($M= 2.16$), $t(321)= 4.66$, $p < .001$, $d = .20$. At Time 2 males reported consumption had dropped ($M=22.21$ units), as had females, ($M=15.06$ units), but again males tended to report consuming more $t(321)= 4.77$, $p < .001$, $d = .53$. A trend towards having a binge drinking session was found for males ($M=1.83$) relative to females ($M=1.60$), at Time 2, $t(321)= 1.30$, $p = .098$, $d = .15$. To ensure that alcohol consumption was equivalent at baseline (Time 1) across conditions, a 2 (message frame) x 2 (message type) x 2 (response type) ANOVA with Time 1 binges as the dependent variable was conducted. A significant effect for response type was found only, $F[1, 323] = 4.75$, $p < .05$, $\eta_p^2 = .02$, in which alcohol consumption was lower for those in the engage responses condition ($M=2.08$ binges) relative to refrain responses condition ($M=2.53$ binges). No significant effects were found when the same ANOVA was repeated for Time 1 alcohol units consumed.

Table 1 about here

Framing effects on drinking behaviour. Effects of framing on binge frequency at Time 2 were investigated in a 2 (message frame) x 2 (message type) x 2 (response type) ANCOVA with Time 1 binges as the covariate. The results showed a significant effect for the covariate, binges at Time 1, $F[1, 319] = 171.61$, $p < .001$, $\eta_p^2 = .36$, indicating that Time 1 binges were strongly related to Time 2 binges. No other effects were observed.

The same analysis was used to investigate the effects of framing on the number of alcohol units consumed at Time 2. An effect for the covariate, units consumed at Time 1 was found, $F[1, 323] = 145.68$, $p < .001$, $\eta_p^2 = .32$. A trend was observed for response type, $F[1, 323] = 3.53$, $p = .061$, $\eta_p^2 = .01$, in which alcohol consumption for engage responses ($M=16.61$ units) was lower relative to refrain responses ($M=18.95$ units). No other main effects were observed. However, the results showed a significant interaction of message frame and response type, $F[1, 328] = 6.10$, $p < .05$, $\eta_p^2 = .02$. To investigate this interactive effect we conducted two post-hoc independent samples t-tests. When the message was loss framed there was no significant difference in the

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units of alcohol consumed between the engage and refrain response conditions, $t(156)=-.41$, $p>.05$. However, when the message was framed as gain a significant difference was found between engage (incongruent, $M=14.28$ units) and refrain (congruent $M=21.14$ units) response conditions, $t(163)=-.3.45$, $p<.0001$, $d=-.54$.

Figure 1 about here

Discussion

The current study demonstrates that persuasive messages have the potential to encourage a reduction in binge drinking amongst students. In this study we did not find evidence for a main effect of frame alone. However, across the sample it was clear that the effects of gain framed messages were moderated by measurement items that asked participants to reflect on their attitudes and beliefs about ‘engaging in’ binge drinking. This is the first time that the interaction of the frame of the persuasive message with the framing of the measurement items themselves has been assessed. This is important, because research often uses measures of this kind to test the impact of the frame on intermediate variables (potential mediators), but these measures are not normally considered as part of the intervention. In this study we found that when the gain framed message was followed by response items phrased as ‘engaging in’ – an incongruent pairing - this produced the largest reductions in alcohol consumption. However, there were no observed incongruence effects for loss framed messages paired with ‘refraining from’ items. The current findings are consistent with our predictions that incongruence (but only when using gain frames and engage responses), produces a reduction in units consumed by participants.

One possible explanation for the greater reduction in alcohol consumption amongst participants in the gain frame and engage response items condition, may be the incongruence that lies in considering the engage/gain pairing. This could lead to greater cognitive demands as participants switch between considering the positives of refraining from binge drinking and the negatives of engaging in binge drinking. This might serve to increase elaboration of the content of the message, rendering it more effective. In other words, the incongruence that lies between

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encountering gain message frames followed by engage response measures could activate a cognitively effortful *inconsistency resolution* process (encountering any perceptual incongruence which perceivers seek to make coherent initiates inconsistency resolution, Hastie, 1981; Srull & Wyer, 1989). However, the predicted incongruence interactive effect was absent in the loss framed condition (i.e. loss/refrain). The lack of a positive result requires further explanation. It is possible that while the pairing was incongruent, it required less cognitive demand (than the engage/gain pairing). For example, the initial loss frame message (i.e. “....*you risk experiencing the negative side of binge drinking in the short term...*”) was *negative*. When people expect information about a topic to be negatively framed (e.g., alcohol consumption), they are less likely to apply elaborative thought (Smith & Petty, 1996). Indeed, people tend towards risk seeking behaviour when messages are loss framed (e.g., Tversky & Kahneman, 1981). Furthermore, deeper processing is key in the persuasiveness of messages and behaviour change (Petty & Cacioppo, 1986). This highlights the need for future work to directly measure cognitive effort.

In the impression formation literature inconsistency resolution following encounters with inconsistent person traits has a history stretching back many decades (e.g., Asch, 1946; Asch & Zukier, 1984; Hamilton, Katz, & Leirer, 1980; Hastie & Kumar, 1979, Hemsley & Marmurek, 1982). Similar effects have been observed in the resolution of incongruent social categories, for example when forming impressions of a ‘Female mechanic’ (e.g., Hastie, Schroeder, & Weber, 1990; Hutter & Crisp, 2005; Kunda, Miller, & Claire, 1990). However, inconsistency resolution when responding to incongruent message frames and response type measures is new to the message framing health based literature. In order to establish if the process at work in the current study involves inconsistency resolution, a random number generation cognitive load manipulation could be undertaken concurrently with response measures. For example, Hutter and Crisp (2006) found that impression formation for incongruent (but not congruent) social category conjunctions were affected while undertaking a concurrent verbal random number generation task. Because only incongruent conjunctions were affected this suggested that random number

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generation interfered with the process required to form adequate impressions for these conjunctions (i.e. inconsistency resolution). Therefore, when the message frame and response measures are hypothetically cognitively demanding, due to activation of inconsistency resolution (i.e. when gain framed and engaging in a behaviour simultaneously), then cognitive load should cause greater disruption relative to when resolution is not required (e.g., when loss framed and engaging in a behaviour simultaneously).

An alternative explanation for the observed effects are that they result from changes in the response measures wording (i.e., “engaging in” or “refraining from” binge drinking). It is likely that this did generate different thoughts (i.e., thinking about performing a behaviour in one case and not in another). Furthermore, previous approach and avoid measures have used a similar method to ours. For example, Elliot and Church’s (1997) achievement motivation questionnaire was tested in a college classroom and used performance approach measures including: ‘It is important for me to do better than the other students’ (performance approach); and performance avoidance measures, including ‘I just want to avoid doing poorly in this class’. However, given that Elliot and Church changed their wording to a greater degree across approach and avoid measures relative to ours, we believe that inconsistency resolution is a more likely explanation for the present results.

The absence of a main effect for message frame might be due to the robustness of gain frame advantage for health behaviours, which has been questioned (see O’Connor et al., 2009; Rothman & Salovey, 1997). Our results appear similar to the one other study testing binge drinking behaviour: Gerend and Cullen (2008) observed an interactive effect for frame x temporal context, but no main effect for frame alone. Gerend and Cullen found this effect for messages focussing on the short term, but not long term consequences of binge drinking. However, it should be noted that in contrast to Gerend and Cullen, we did not manipulate temporal context, instead opting to emphasise both short and long term consequences. It is likely that the present results are driven by the short term consequences of the messages. However,

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short and long term consequences are associated (White, 2003), and therefore our results show that combining short and long term consequences within message does produce interactive effects with response type.

Limitations

There were some limitations in the present work. First, it should be acknowledged that power was below the desirable .80.³ However, because this is the first time a message frame x response measure interaction has been assessed, power was calculated *post hoc* and is thus driven by our present effect size and sample size. Second, future research should test the message frame x response measure interactive effect observed in the present work using messages describing *long vs. short term consequences*. Third, the anticipated advantage for gain *health* messages, and loss *social* messages, based on Kiene et al. (2005), did not result in the greatest decrease in drinking behaviour. *Message type* had no interactive effect with message frame whether using engage or refrain measures. Kiene et al.'s results are apparently at odds with ours, as we did not observe a message frame x message type interaction. This may be because, as outlined earlier both engaging in and refraining from drinking have social risks. Fourth, self-report measures tend to be valid for light to moderate drinking but less so for heavier drinking – when consumption is above eight drinks (e.g. Northcote & Livingston, 2011). Participants in the present research engaged in on average of 2.30 binges and consumed 22.33 units of alcohol in the previous 2 weeks at Time 1 and at Time 2, this reduced to 1.70 binges and 17.81 units. While, our self-report measures did not record the number of drinks consumed per session it is possible, because drinking over 8 units (men) or 6 units (women) is considered bingeing (Parliamentary Office of Science & Technology, 2005), that some of participants did consume more than eight drinks. Therefore, for those drinking more than eight drinks, in the present work, self-reported consumption may be less accurate. Fifth, we implemented two sampling methods (a poster highlighting a weblink to a questionnaire sent to all student unions in England and the same weblink sent to all departments at a large university). This approach means that participants from

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the large university are overrepresented. However, it is unlikely that the participants drawn from the large university differ in terms of drinking culture from other English universities: Binge drinking culture is well established across UK undergraduate students and this group in general consume more alcohol than non-students (Gill, 2002). Sixth, of 666 originally sampled at Time 1 only 323 remained in the Time 2 analyses. Therefore, the dropout rate (48%) was high and potentially limits what can be inferred from the present findings. Also, the removal of 51 outliers due to heavy drinking potentially limits our findings. However, this may reflect the particularly high level of alcohol consumed by some undergraduates in the UK. Our methodology included the opportunity for participants feed back their thoughts and feelings following the Time 1 messages. This provides a potentially useful additional source of information regarding those who at Time 1 had previously indulged in over nine binges or consumed over 72 units in the previous two weeks. Thoughts and feelings listed for these participants included: “I know, but it’s part of student life and even though the risks are high it is still fun”; “The information seems fair and accurate, but it's not something I'm particularly worried about currently as I know my limit and don't drink beyond it”; “I don’t worry about the short term effects of drinking, I never drive when I’ve had a few drinks and hangovers are just something you have to deal with if you do drink a lot. I do think about future long term damage, but still enjoy drinking with friends.”; “I felt slightly unhappy reading this as I enjoy drinking large amounts of alcohol with the intention of getting very drunk.” These comments are consistent with the idea that those having consumed large amounts of alcohol are particularly resistant to changes in their drinking habits and may form a distinct group that are less open to framed messages. We believe that the removal of outliers based on high number of binges and units consumed in the present work is therefore justifiable. Finally, the health gain frame message ostensibly included a double negative 'you won't regret not having taken care of yourself' (Appendix B), making for a linguistically complex message. Nevertheless, our pilot work showed that participants still rated these messages as more positive and containing more ‘gains’ (versus losses), than the health loss messages¹. In addition,

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while it has been acknowledged that linguistic complexity resulting from the use of double negatives can be problematic in message framing research; this is much more of an issue for loss than gain framed messages (e.g., Jones, 2005).

Implications for practice

These results have two potential implications for practice. First they offer initial evidence for the efficacy of a brief and inexpensive health intervention that could be employed in university, college and primary care settings in order to potentially reduce binge drinking behaviours in young and vulnerable populations. There is growing evidence that merely *asking* about intentions to engage in a behaviour can have an effect on that behaviour (Levav & Fitzsimons, 2006). For example, in a study by Godin, Sheeran, Conner, and Germain (2008) the measurement of social-cognitions (attitudes, subjective norms, intentions and perceived control) of people on a blood donation register increased their attendance at a blood donation clinic compared to those who only received a reminder. Therefore, given university tutorial sessions are held regularly, gain framed-engage response type questionnaires could be administered easily and cost effectively. Second, these findings suggest health communication experts may need to give due consideration to response type as well as message frame when seeking to reduce alcohol consumption using persuasive health messages. However, future work should attempt to replicate the current findings using more direct measures of alcohol consumption.

In summary, we tested the efficacy of message frames in reducing alcohol consumption over a two-week period. It was found that although no main effects were observed for message framing, gain messages were the most effective when used in conjunction with engage response measures – an incongruous pairing. It is possible that the reduction in alcohol consumption observed for gain framed messages, when paired with engage response measures, initiates an inconsistency resolution process leading to greater elaboration and consideration of people's own drinking behaviour. Future research should be directed towards understanding the mechanisms

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underpinning the effect and why it occurs for gain/engage pairings, but is absent for loss/refrain pairings.

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Figures

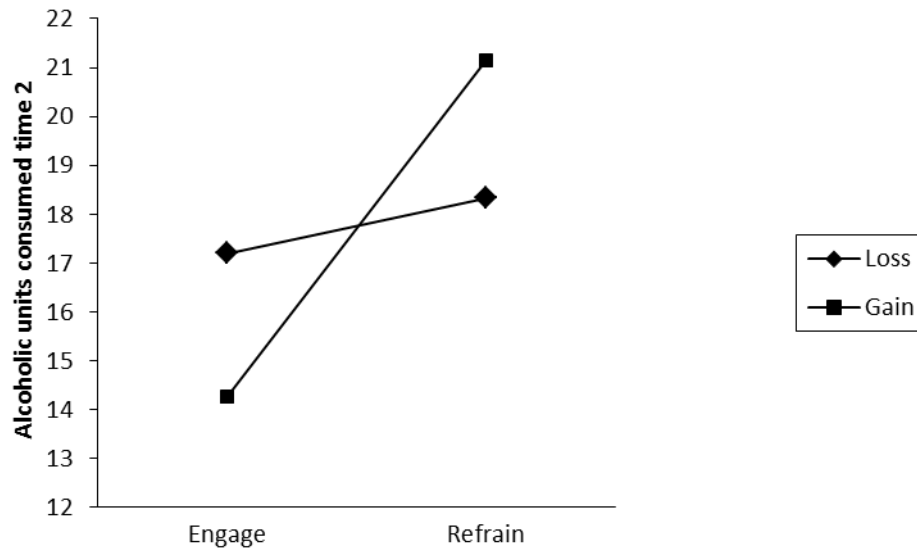


Figure 1. Message frame and response type interaction for alcoholic units.

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Tables

Table 1. Descriptive statistics for dependent measures across message frame and response type (duration 5% trimmed)

	Mean (SD)							
	Engage				Refrain			
	Gain		Loss		Gain		Loss	
Binges T1 (n=323)	2.16	(1.79)	2.00	(1.85)	2.42	(1.85)	2.66	(1.86)
Binges T2 (n=323)	1.40	(1.25)	1.52	(1.45)	1.95	(1.60)	1.92	(1.67)
Alcohol units consumed T1 (n=323)	21.88	(14.71)	19.48	(14.84)	24.95	(17.89)	22.13	(15.58)
Alcohol units consumed T2 (n=323)	14.28	(10.99)	17.42	(13.74)	21.14	(14.29)	18.33	(14.23)

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Appendix A (Measures)

- 1) Do you intend to engage in [refrain from] a binge drinking session over the next two weeks? (*1=Not at all, 7=Definitely*).
- 2) How likely is it that you will engage in [refrain from] a binge drinking session over the next two weeks? (*1=Highly unlikely, 7=Highly likely*).
- 3) For me engaging in [refraining from] a binge drinking session over the next two weeks would be... (*1=Foolish, 7=Wise; 1=Good, 7=Bad; 1=Harmful, 7=Beneficial; 1=Pleasant, 7=Unpleasant*). People important to me would... (*1=Approve, 7=Disapprove*) ...of me engaging in [refraining from] a binge drinking session over the next two weeks.
- 4) People important to me will engage in [refrain from] a binge drinking session over the next two weeks (*1=Highly unlikely, 7=Highly likely*).
- 5) For me, engaging in [refraining from] a binge drinking session over the next week would be... (*1=Easy, 7=Difficult*).
- 6) How confident are you that you could engage in [refraining from] a binge drinking session over the next week? (*1=Very much so, 7=Not at all*).
- 7) How much control do you have over whether or not you engage in [refrain from] a binge drinking session over the next week? (*1=Very much, 7=None at all*).
- 8) How much will factors outside your control influence whether or not you engage in [refrain from] a binge drinking session over the next week? (*1=Very much so, 7=Not at all*).

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- 9) Please rate the following statements on the scale provided: Engaging in [refraining from] a binge drinking session in the next two weeks will make me feel good afterwards; Engaging in [refraining from] a binge drinking session in the next two weeks will make me feel proud afterwards; Engaging in [refraining from] a binge drinking session in the next two weeks will make me feel pleased afterwards; Engaging in [refraining from] a binge drinking session in the next two weeks will make me feel ashamed afterwards; Engaging in [refraining from] a binge drinking session in the next two weeks will make me feel anxious (about the consequences) afterwards; Engaging in [refraining from] a binge drinking session in the next two weeks will make me feel blue afterwards. (*1=Strongly agree, 7=Strongly disagree*).
- 10) If I would engage in [refrain from] a binge drinking session in the next two weeks, I would... (*1=definitely not regret it, 7=definitely regret it; 1=not be sorry, 7=be sorry; 1=be very proud of myself, 7=be very ashamed of myself*).

Appendix B (framed messages on social or health consequences)

Health risks

Gain frame.

If you refrain from binge drinking, you will be relieved because you won't experience the negative side of binge drinking in the short term, like hangovers, vomiting, blackouts, unsafe sex and car accidents. In the long term you will also benefit by reducing your risk of developing serious conditions such as liver and brain damage. In addition, if you refrain from binge drinking then you will feel healthier, you won't regret not having taken care of yourself and you will be proud for not putting yourself at risk.

Loss frame.

If you engage in binge drinking, you might feel anxious because you risk experiencing the negative side of binge drinking in the short term, like hangovers, vomiting, blackouts, unsafe sex and car accidents. In the long term you will also suffer by increasing your risk of developing serious conditions such as liver and brain damage. In addition, if you engage in binge drinking then you might feel unhealthy, you will regret not having taken care of yourself and you will not be proud of yourself, for you are putting yourself at risk.

Social risks

Gain frame.

If you refrain from binge drinking, you will feel relieved because you won't experience the negative side of binge drinking in the short term, like losing control and making a fool of yourself, saying or doing stupid things. In the long term you will also benefit by reducing your risk of getting a bad reputation and ruining relationships with family and friends. In addition, if you refrain from binge drinking you will feel pleased because you will be in control of your own behaviour, you won't get into situations you later regret and you will be proud for not putting yourself at risk.

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Loss frame.

If you engage in binge drinking, you might feel anxious because you risk experiencing the negative side of binge drinking in the short term, like losing control and making a fool of yourself, saying or doing stupid things. In the long term you will also suffer by increasing your risk of getting a bad reputation and ruining relationships with family and friends. In addition, if you engage in binge drinking you might feel sorry, because you will not be in control of your own behaviour, you might get into situations you later regret and you will not be proud of yourself, for you are putting yourself at risk.

Footnotes

¹ A 2 (message frame) x 2 (message type) ANOVA was conducted in pilot study 2 (n=20) to ensure that our message frames were perceived as either gain or loss framed respectively, for both health and social messages types. Twenty participants (Six were male and 14 were female, with ages ranging between 23 and 48 years $M=28.85$, $SD=7.04$), were required to rate one of the four messages in Appendix B on two dependent measures. Each measure comprised a 10-point scale: How *negative* or *positive* is the statement above? ($1=Very\ Negative$; $10=Very\ Positive$); Rate the extent to which the statement above contains ‘losses’ or ‘gains’ ($1=Losses$; $10=Gains$). The gain framed messages ($M=5.40$; $SE=0.63$) were rated as more positive than the loss framed messages ($M=2.50$; $SE=0.63$), $F[1, 16] = 10.47$, $p=.005$, $\eta_p^2 = .40$, and they were considered to be comprised of significantly more gains than losses compared to the loss framed messages ($M=5.90$; $SE=0.79$ vs $M=2.50$; $SE=0.79$), $F[1, 16] = 11.22$, $p=.004$, $\eta_p^2 = .41$. These findings demonstrate that, as anticipated, that the gain framed messages are perceived as more positive and considered to be comprised of more gains than losses.

² The data were subjected to analyses that included outliers: Of the 51 outliers 17 had not completed the Time 2 questionnaire, leaving 34 participants. The 34 outliers were analysed with the 323 non outlying participants (resulting in n=357). A 2 (message frame) x 2 (message type) x 2 (response type) ANCOVA with Time 1 binges as the covariate was conducted to investigate the effects of framing on binge frequency at Time 2. Therefore, this approach was identical to that conducted in our main analysis, but included outliers. No significant main effects or interactions were found. The effects of framing on number of alcohol units consumed at Time 2 were investigated using the same analysis. An effect for

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units consumed at Time 1 (the covariate) was found, $F[1, 348] = 305.40, p < .001, \eta_p^2 = .47$.

No other main effects or interactions were observed. It is possible that the outliers formed a distinct group that were less open to message framing, message type, and response type effects.

³A power analysis was calculated post hoc on the message frame x response type interaction for units consumed at Time 2 using the Observed power function in SPSS. This resulted in power in the region of .69.