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To cite this article: Fiona C. Walker & Richard O. de Visser (2022): Messages focused on the effect of alcohol on the immune system boosted intention to adhere to alcohol intake guidelines during Covid-19 lockdown, Psychology & Health, DOI: 10.1080/08870446.2022.2145606

To link to this article: https://doi.org/10.1080/08870446.2022.2145606
Messages focused on the effect of alcohol on the immune system boosted intention to adhere to alcohol intake guidelines during Covid-19 lockdown

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ABSTRACT

Objective: Research shows that personal relevance may affect the impact of alcohol-related health information. This study explored alcohol consumption during the UK Covid-19 lockdown, and whether a message emphasising the effect of alcohol on the immune system was more effective in altering intentions to follow low-risk drinking guidelines than other messages about the effects of alcohol on health.

Methods & Measures: From April to June 2020, 953 drinkers completed an online questionnaire, and were randomly allocated to exposure to a control condition or one of three messages emphasising the impact of alcohol on: the immune system; mental health; or physical health. Outcome variables were: concern about alcohol intake, and intention to adhere to low-risk drinking guidelines.

Results: Pre-post ANCOVAs revealed that participants in the immunity message group had significantly stronger intention to adhere to low-risk guidelines than the control group (after controlling for initial intention). Concern for the effect of alcohol on health was not significantly affected.

Conclusion: During Covid-19 lockdown, a message emphasising the impact of alcohol on the immune-system had a greater effect on intention to observe low-risk drinking guidelines than other messages. Contextually relevant messages could be used for alcohol health campaigns and for improving alcohol labelling.

Alcohol is a causal factor in more than 200 diseases and injuries (Hammer, Parent, Spiker, & World Health Organization, 2018). More than 10 million adults in England drink in excess of the UK low-risk drinking guidelines, with an estimated cost to the NHS alone of more than £3.5 billion annually (Burton et al., 2016). It has been estimated that, every day in the UK, 80 people die from an alcohol related cause (Alcohol Health Alliance, 2022). During the first nine months of 2020, coinciding with the global Covid-19 pandemic, deaths due to alcohol-specific causes reached an all-time high, with 5460 deaths registered, a 16.4% increase on the same period in 2019 (Limb, 2021).

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Despite the risks to health from drinking alcohol, when making purchasing choices, consumers are provided with little information about alcoholic beverages on product labels; less ‘than they do about a glass of milk, a bowl of cereal or a soft drink’ (Martin-Moreno et al., 2013, p. 1082). The UK government imposes no legal requirements for health information on alcoholic drinks labelling but, as part of the 2011 Public Health Responsibility Deal with alcohol producers, best practice guidelines were established recommending that industry voluntarily display alcohol content in units, the Chief Medical Officers’ (CMO) low-risk drinking guidelines and a pregnancy warning as minimum information on at least 80% of alcoholic drinks labels by 2013 (Cramer, 2018). However, the Alcohol Health Alliance (2020) found that fewer than 30% of alcohol labels included the CMO guidelines.

Without clear communication of alcohol-related health harm on product labels, consumers may not be aware of the risks of alcohol consumption. Indeed, public awareness of the CMO guidelines is low, with research showing that only 16% of people know the recommended upper limit for consumption of 14 units and only 13% identified cancer as a health consequence of alcohol (Bates et al., 2018; Cramer, 2018).

Although it is widely recognised that policy changes, such as minimum unit pricing, would be the most effective means of changing alcohol consumption at a population level (Anderson et al., 2009; Babor, 2010; Burton et al., 2016), enabling individual informed choice has wide public support (Blackwell et al., 2018; Cramer, 2018; Martin-Moreno et al., 2013; Stautz & Marteau, 2016). Despite there being scant evidence for the provision of information being sufficient for altering drinking behaviour, these findings are likely to have been affected by the way in which health messages have been implemented (Cramer, 2018; Pettigrew et al., 2014). Clear and accurate information provides a foundation for the development of effective interventions aimed at reducing alcohol-related harm (Knai et al., 2015). It can also influence public acceptability and support for new legislation which could, in turn, have an impact on behaviour (Wakefield et al., 2010). Health warnings on cigarette packets were not only effective at deterring smoking, but also paved the way for legislative change that generated substantive reductions in smoking (Borland et al., 2009; Dimova & Mitchell, 2020; Marteau, 2016). Therefore, clear health warnings on alcohol labelling, or delivered at the point of alcohol consumption, could influence public awareness of the effect of alcohol on health and provide a stronger foundation for legislative change that may, in turn, lead to more sustained changes in drinking behaviour.

Interventions that have focused on providing information about alcohol unit guidelines and the health risks of drinking alcohol have been effective in increasing knowledge and awareness of the unit guidelines (Blackwell et al., 2018; de Visser et al., 2017; Knai et al., 2015; Martin-Moreno et al., 2013). Additionally, research suggests that alcohol health messages can alter attitudes and intentions towards drinking alcohol (Glock et al., 2015; Miller et al., 2016; Moss et al., 2017; Wakefield et al., 2018). For instance, underage drinkers exposed to a variety of responsible drinking messages have been found to develop more negative attitudes and intentions towards drinking alcohol than those exposed to general wellbeing messages (Moss et al., 2017). While recognising that intentions do not always translate into behaviour change, there are calls for further research to ascertain the most effective content and framing required for alcohol health information (Davies et al., 2019).
The design and content of alcohol health information can affect its impact. People pay more attention to new information. When the CMO drinking guidelines were changed to include information about the link between alcohol consumption and cancer in 2016, Google trends showed an increase in searches for ‘alcohol and cancer’ (Marteau, 2016). Research into the impact of health warnings on alcohol and cigarette labels suggests that new information is required to counteract the problem of message ‘wear-out’, whereby the effectiveness of the message increases with initial and repeated early exposures but gradually decreases over a longer period of time (Pettigrew et al., 2014; Strahan et al., 2002). Providing novel information has been found to be associated with potential changes in drinking behaviour (Winstock et al., 2020).

Health information that is featured widely in the public domain and accepted as familiar can also enhance and reinforce health messages by setting an agenda for behaviour change within social networks (Wakefield et al., 2010). This may seem at odds with the idea that novelty is critical, but the two concepts could be seen as complementary. It seems reasonable to suggest, for example, that if there has been increased media focus on mental health in general media at the same time as a specific and novel health message about the link between alcohol and mental health is disseminated, there is potential for the public to pay more attention because of the combination of novel information and socio-cultural context. In a similar way, if there is a lot of media discussion of ‘vulnerability’ to Covid-19 at the same time as a new message about the effect of alcohol on the immune system is disseminated, then this combination of novel information and cultural context may lead to increased attention to the message.

Additionally, the notion of personal relevance is prominent in message targeting and tailoring. While the exact definitions of targeting and tailoring have been subject to some dispute (Kreuter & Skinner, 2000; Pasick, 2001), when compared with generic messaging, messages that are differentiated for groups or individuals are more effective at changing health behaviour (Noar et al., 2007). One explanation for this finding is that some form of message customisation for a group or an individual can lead to an increased perception that the message is personally relevant, increasing the motivation of the recipient to attend to and process the information more fully which, in turn, enhances message receptivity and, potentially, behaviour change (Rimer & Kreuter, 2006). Two aspects of message tailoring that are considered necessary for enhancing personal relevance are the appropriate matching of message content to the target recipients’ needs and interests, and the framing of the health information in a meaningful context (Rimer & Kreuter, 2006).

Pasick (2001) argues that tailoring messages works not only at an individual level, but at a group level, because it engages with shared characteristics or experiences of a group. It therefore makes sense to extend this idea to the shared experiences of populations at particular moments in time, driven by environment and social context or national and global events. Messages released at moments of shared public experience (such as during a pandemic) can be viewed in a similar way to messages targeted at or tailored for particular groups or individuals, because of their potential to be perceived as personally relevant.

This ties in with the idea of ‘teachable moments’: events or circumstances that may lead individuals to positive behavior change (Lawson & Flocke, 2009). Teachable
moments are supported by conceptual models of health behaviour, such as The Health Belief Model (Janz & Becker, 1984), which emphasise the importance of cues to action. Such cues to action include media coverage of an event, or a reminder communication from a doctor. Conceptualising the teachable moment in this way defines it as a cognitive experience for an individual whereby interpretation of the cue determines whether it will prompt subsequent behaviour change (McBride et al., 2003). In this way, both media coverage of a pandemic, and viewing a health message about the effects of alcohol on the immune system, could be interpreted as a cue to action, creating a teachable moment.

### Covid-19 and the specific conditions created for research

The global Covid-19 pandemic created particular conditions to conduct targeted alcohol health messaging research. Just prior to the first lockdown, which commenced on 23 March 2020 with a legal requirement to ‘stay at home’ (Science and Technology Committee, & Health and Social Care Committee, 2021), alcohol sales grew by 67%. This was interpreted to be due to people stocking up for the anticipated lockdown (Finlay & Gilmore, 2020). Furthermore, research during the first lockdown, which lasted until June 2020, concluded that more than one in six adults had increased their consumption of alcohol (Jacob et al., 2021). Media coverage of the Covid-19 pandemic and the specifics of what was allowed during government-imposed lockdowns was high, with a daily government briefing broadcast on the BBC. Research revealed that almost everyone in the UK was accessing some form of news about Covid-19 daily in the first week of the national lockdown (Office of Communications (Ofcom)), 2020). This created a unique context for testing specific alcohol health messages. Excessive consumption of alcohol can affect the body’s immune response and ability to fight viruses and, in particular, can increase the risk of respiratory distress (WHO, 2020). Although it is not possible to be certain that this was new information, it is likely that this information was new for many people, as this was not a widely disseminated message. There was, therefore, an opportunity to generate a different alcohol health message. It was also likely that this information may be deemed personally relevant by those who drink alcohol because of the pandemic context, and that both the pandemic and the message could combine as cue to action that might generate a teachable moment.

This study, therefore, aimed to examine the impact of a specific alcohol health message about alcohol and the immune system versus messages containing more widely disseminated alcohol health information about long-term health conditions and mental health (in 2018, Maynard, Blackwell, Munafo & Attwood found that 82% of people were aware of the link between alcohol and liver disease and 64% were aware of the link between alcohol and poorer mental health). It was hypothesised that a health message, presented alongside the CMO low-risk drinking guidelines, would be more effective than the guidelines alone (the control) at changing intentions to adhere to the guidelines, and that a message about alcohol and the immune-system would be the most effective of all. In order to contextualise responses to the health messages, it was important to explore prior knowledge of the CMO unit guidelines. A secondary aim was to explore people’s lockdown alcohol consumption to expand understanding of how alcohol intake may have changed during lockdown.
Method

Sample

The sample consisted of 952 adult drinkers (688 female, 263 male, 6 other, 1 unspecified) aged 18-79 (mean = 40.6, SD = 14.5) who completed the questionnaire voluntarily and were assigned to one of four conditions, using Qualtrics randomised assignment. Incomplete data from an additional 67 people were excluded.

Study design

This was a randomised controlled trial of a brief message intervention, with participants completing an online questionnaire-based study. The questionnaire was designed to measure dependent variables before and after exposure to the health message.

Procedure

Ethical approval was granted by the authors’ university Research Ethics Committee. Participants were recruited from social media, predominately Facebook (33%), links from press coverage (31%), from a UK-wide Drinkaware participant panel (23%) and from a pool of university students (13%). A link to the online questionnaire was shared on social media multiple times between April and June 2020. At this time, the UK was in a national, government mandated lockdown. On 23 March 2020, the government announced a ‘Stay at Home’ order with people told to remain at home unless they were an essential worker. Many people were expected to work at home, or they were furloughed from their jobs as workplaces closed down. Only essential shops were allowed to remain open (this included food retailers, pharmacies, and alcohol vendors). People were allowed to leave their houses only for essential shopping and for one hour of outdoor exercise a day. They were not able to meet up with people outside of their household. Pubs, restaurants and cafes were closed, although some establishments were able to convert their business to carry out home deliveries. Pubs did not re-open until July 2020. A paid advertisement on a specially set up Facebook ‘Alcohol Research’ page was used to increase reach, alongside Twitter and Instagram shares. The study received online press coverage in Mirage News in April 2020 and The Independent in May 2020. The questionnaire was shared on a participant panel of visitors to the Drinkaware website who had volunteered to participate in research, and on a student research participation site at the authors’ university. Participants were eligible to enter a draw to win one of two £50 vouchers.

The home page of the questionnaire described the study purpose and outlined consent and data protection procedures. Participants completed the questionnaires in their own time, at their own convenience. They answered questions gathering baseline data, then read one of the messages about the effect of alcohol on an aspect of health, before answering the post-message questions. Responses were not forced to any questions. They were prevented from returning to previous questions to alter responses to prevent alteration of unit-guideline knowledge items once the unit-guidelines had been provided. All participants received contact information for information and advice about alcohol use.
Measures and materials

Participants completed an online questionnaire that was developed to measure prior knowledge of the CMO guidelines, alcohol consumption, the effect of alcohol health messages on levels of concern about the impact of alcohol, and intention to adhere to the low-risk guidelines.

Demographic variables

Participants provided their age, gender, location of residence in the UK, number of people in household, occupational status, ‘keyworker’ status and whether they were able to continue with work or study during lockdown. Demographic and occupational data were used to ensure comparability of groups and to explore links between demographics and drinking behaviour.

Unit knowledge and attitude towards unit guidelines

To measure pre-message knowledge of the CMO guidelines, participants indicated the weekly maximum number of units that men and women are advised to consume. Answers were then considered correct if the participant was able to answer correctly for their own gender and incorrect if they were not. Knowledge of the unit content of drinks was assessed with 10 items (de Visser et al., 2017; De Visser, 2015). Colour images of each drink were accompanied by brief descriptions: pint (568 ml) of regular strength beer; pint (568 ml) of cider; large glass (250 ml) of wine; bottle (750 ml) of wine; glass (150 ml) of sparkling wine; single measure (25 ml) of a spirit; single measure mixed drink; bottle of alcopop (275 ml); single cream liqueur (50 ml); and a cocktail. Estimates were considered correct of they were within ±15% of the actual unit content (de Visser et al., 2017; De Visser & Birch, 2012), and summed to give scores between 0 and 10.

Three questions adapted from de Visser et al. (2017), treated as separate items, were used to assess beliefs about how useful and how realistic the guidelines were, and how familiar the participants were with them. Participants rated these aspects on a 10-point scale (1 = ‘not at all’ to 10 = ‘extremely’). Participants also indicated how frequently they counted alcohol units on a 10-point scale (1 = ‘never’ to 10 = ‘always’).

Alcohol consumption

Participants estimated the number of units they had consumed on each day in the previous week, using a pictorial guide to the unit content of drinks as an aide (de Visser et al., 2017). It was not possible to return to the previous presentation of unit knowledge questions and use this guide to assist with the assessment of guideline-related knowledge. Weekly alcohol consumption in units was calculated from these responses. Participants were asked to state whether their consumption was typical, compared to pre-lockdown, choosing from a list of five options (‘I usually drink significantly less than this’; ‘I usually drink less than this’; ‘I usually drink about the same as this’; ‘I usually drink more than this’ and ‘I usually drink significantly more than this’).

Main outcome measures

Participants answered three questions relating to outcome measures both pre and post message intervention. The first, on concern about the impact of alcohol on
health and wellbeing was adapted from questions used by de Visser et al. (2017). To measure overall concern, participants rated their levels of concern about the impact of alcohol consumption on six aspects of their health and wellbeing (sleep, weight, mental health, physical health, energy and immunity) using a 10-point scale (1 = 'not at all' and 10 = 'extremely'). Internal validity of the concern sub-scale items in the questionnaire was good (Cronbach α was .92 for pre-intervention concern, and .93 for post-intervention concern). To measure overall intention to adhere to the low-risk drinking guidelines, participants indicated how motivated they were to adhere to the guidelines (adapted from a question used by de Visser et al. (2017)) using a 10 point scale (1 = 'not at all' and 10 = 'extremely'). Participants also indicated their intentions to adhere to the CMO guidelines, using a novel item and a 10-point scale with anchors ‘not at all strong’ to ‘extremely strong’. The motivation and intention questions were then combined to generate the outcome measure for overall intention. The correlation coefficient for these two items was .78 (pre message) and .88 (post message). Although measuring intention is not equivalent to measuring behavioural response to the messages, the link between intention and behaviour is well established (Webb & Sheeran, 2006). Analysis therefore focused on two outcome measures: concern for the effect of alcohol on health, and intention to adhere to the CMO low-risk drinking guidelines.

Message intervention
Three health messages were developed, containing a call to action and a specific benefit of adhering to the CMO guidelines. Each message included a reminder of the CMO’s maximum weekly unit guideline, ‘to keep health risks from alcohol to a low level it is safest not to drink more than 14 units a week’, in addition to the health message. The immune system message read ‘Protect your respiratory system: Drinking less alcohol enables your immune system to function more effectively’, followed by the CMO unit guidelines. The mental health message read ‘Protect your mental health: Drinking less alcohol reduces feelings of stress and anxiety’, followed by the unit guidelines. The long-term health message read ‘Protect your future health: Drinking less alcohol reduces your risk of heart disease, liver damage and cancer’, followed by the unit guidelines. Participants were randomly assigned to view either one of these three messages or the control message which contained a very generic headline, ‘Protect your health’ (but with no specific health message), and the CMO’s maximum unit guideline. All messages were accompanied by an image of a hand holding a glass of wine. (Figure 1).

A manipulation check was conducted within the questionnaire to ascertain engagement with the messages. Participants wrote what they could remember of the message they had seen and commented on its content. From this, participants were rated as ‘engaged’ (passed manipulation check), ‘somewhat engaged’ (some evidence they had read the message) or ‘engagement not evident’ (failed manipulation check). For example, for the control group ‘engaged’ was recorded if ‘14 units’ was included in the comment. If participants wrote ‘drink less’ or another vague reference to reducing or managing alcohol intake they were classified as ‘somewhat engaged’. If no comment was made or something irrelevant (such as ‘wash hands’) then the ‘engagement not evident’ classification was applied. Similarly, for the mental health message, participants
were ‘engaged’ if there was a mention of mental health, stress or anxiety, ‘somewhat engaged’ if there was a reference to drinking less or ‘14 units’ and if no comment or an inaccurate message such as ‘stay safe’ the classification of ‘not engaged’ was given. Independent checking of 272 of the 958 responses revealed 98.2% agreement. Most of the disagreements were for the ‘engagement not evident’ and ‘somewhat engaged’ allocation so these were double-checked by both authors and only two groups were agreed upon and subsequently used in analysis—‘engaged’ and ‘not engaged’.

**Analytic plan**

Power analyses using G*Power version 3.1.9.6 (Erdfelder et al., 2009) indicated that 273 participants per group would provide 80% power to detect small effects at p < .05. Control and intervention groups were compared at baseline to identify any baseline differences to be accounted for in further analysis. To assess the impact of the message intervention, between-participant ANCOVAs were planned for each outcome variable with the corresponding baseline measure used as a covariate and the condition as the independent variable.

**Results**

Control and intervention groups had comparable age and gender composition at baseline, and comparable patterns of knowledge of and attitudes towards unit guidelines and alcohol consumption (Table 1). The majority (75%) of participants maintained usual work/study practices during lockdown. Groups were comparable at baseline for pre-message exposure levels of concern for the impact of alcohol on health and intention to consume alcohol according to the CMO guidelines.

![Figure 1. Questionnaire health messages.](image-url)
Attitudes towards and knowledge of unit guidelines

Correct knowledge of the 14 unit guideline for their own gender was reported by 33% of all participants.

The mean scores for knowledge about the unit content of alcoholic drinks, perceived usefulness of units, perception of how realistic units were, and frequency of counting units were all at or below the mid-point of the 10-point scale. Overall familiarity with alcohol units as a concept was higher with an average score of 6.2 out of ten.

Lockdown alcohol consumption

Eleven percent of participants had not drunk alcohol at all in the previous week. Of the remaining participants, around half (49.8%) drank within the guidelines, and the other half exceeded them. The mean number of units consumed by drinkers in the week prior to completing the questionnaire was 19.37 (SD = 22.78), and the median was 12. When comparing this to typical consumption amounts, 12.7% of participants said that they usually drank significantly less than this, 36.1% that they usually drank less than this, 32.4% that they usually drank about the same amount and 18.5% that they usually drank more. No participants stated that they usually drank significantly more.

Response to alcohol health messages

According to the manipulation check, 863 (90.1%) participants engaged with the alcohol health messages in some way. Although this was a high level of engagement, analyses were conducted on both an intention to treat basis and per protocol (excluding those who were not classified as engaged).

Table 1. Baseline descriptive data and comparisons between groups.

<table>
<thead>
<tr>
<th>Message type</th>
<th>Whole sample (n = 958)</th>
<th>Control (n = 323)</th>
<th>Immune system (n = 215)</th>
<th>Mental health (n = 217)</th>
<th>Future health (n = 203)</th>
<th>Difference</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>71.8%</td>
<td>73.1%</td>
<td>69.3%</td>
<td>70.5%</td>
<td>73.9%</td>
<td>χ²(9) = 4.45</td>
<td>p = .879</td>
</tr>
<tr>
<td>Male</td>
<td>27.5%</td>
<td>26.0%</td>
<td>30.2%</td>
<td>29.0%</td>
<td>25.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.6%</td>
<td>0.9%</td>
<td>0.5%</td>
<td>0.5%</td>
<td>1.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>40.6 (14.52)</td>
<td>40.3 (14.95)</td>
<td>40.1 (14.08)</td>
<td>40.5 (14.41)</td>
<td>41.9 (14.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy of estimated unit content of drinks</td>
<td>4.31 (2.13)</td>
<td>4.24 (2.16)</td>
<td>4.38 (2.03)</td>
<td>4.22 (2.15)</td>
<td>4.43 (2.18)</td>
<td>F(3,948) = 0.72</td>
<td>p = .543</td>
</tr>
<tr>
<td>Perceived utility of units</td>
<td>5.16 (2.78)</td>
<td>5.29 (2.85)</td>
<td>5.12 (2.64)</td>
<td>4.86 (2.84)</td>
<td>5.32 (2.74)</td>
<td>F(3,948) = 1.30</td>
<td>p = .627</td>
</tr>
<tr>
<td>Familiarity with units</td>
<td>6.21 (2.54)</td>
<td>6.02 (2.63)</td>
<td>6.30 (2.32)</td>
<td>6.24 (2.57)</td>
<td>6.38 (2.57)</td>
<td>F(3,956) = 1.02</td>
<td>p = .383</td>
</tr>
<tr>
<td>Perception of realism of CMO guidelines</td>
<td>5.08 (2.39)</td>
<td>5.18 (2.42)</td>
<td>5.28 (2.34)</td>
<td>4.97 (2.51)</td>
<td>4.84 (2.24)</td>
<td>F(3,942) = 1.55</td>
<td>p = .199</td>
</tr>
<tr>
<td>Frequency of counting units</td>
<td>3.09 (2.66)</td>
<td>3.03 (2.59)</td>
<td>3.14 (2.62)</td>
<td>3.0 (2.64)</td>
<td>3.23 (2.82)</td>
<td>F(3,955) = 0.34</td>
<td>p = .799</td>
</tr>
<tr>
<td>Units consumed in last week</td>
<td>19.37 (22.78)</td>
<td>19.29 (22.64)</td>
<td>18.07 (25.23)</td>
<td>21.11 (22.37)</td>
<td>19.0 (20.65)</td>
<td>F(3,958) = 0.67</td>
<td>p = .568</td>
</tr>
<tr>
<td>Concern about health effects of alcohol</td>
<td>4.26 (2.36)</td>
<td>4.16 (2.37)</td>
<td>4.30 (2.47)</td>
<td>4.33 (2.34)</td>
<td>4.32 (2.27)</td>
<td>F(3,958) = 0.32</td>
<td>p = .811</td>
</tr>
<tr>
<td>Intention to adhere to CMO guidelines</td>
<td>5.41 (2.60)</td>
<td>5.59 (2.71)</td>
<td>5.72 (2.52)</td>
<td>5.03 (2.55)</td>
<td>5.26 (2.60)</td>
<td>F(3,956) = 3.43</td>
<td>p = .017</td>
</tr>
</tbody>
</table>
Intention to treat analysis
ANCOVA controlling for pre-message exposure levels of concern and intention revealed a significant effect of message type on intention to adhere to the CMO guidelines ($F(3, 946) = 3.88$, $p=.009$; partial $\eta^2 = .012$). Comparing the estimated marginal means showed that the significant difference was between the immune system group (mean = 6.13; 95% CI [5.88, 6.38]) and the control group (mean = 5.57; 95% CI [5.33, 5.80]), with no significant difference for the mental health or future health messages (mean = 5.73; 95% CI [5.45, 5.98] and mean = 5.94; 95% CI [5.67, 6.20] respectively). There was no significant effect of message type on concern for the effect of alcohol on health ($F(3, 957) = 0.59$, $p=.622$).

Per protocol analysis
ANCOVA controlling for pre-message exposure levels of concern and intention revealed a significant effect of message type on intention to adhere to the CMO guidelines ($F(3, 946) = 4.53$, $p=.004$; partial $\eta^2 = .016$). Comparing the estimated marginal means showed that the significant difference was between the immune system group (mean = 6.24; 95% CI [5.98, 6.50]) and the control group (mean = 5.65; 95% CI [5.40, 5.90]), with no significant difference for the mental health or future health messages (mean = 5.78; 95% CI [5.52, 6.04] and mean = 6.13; 95% CI [5.86, 6.40] respectively). There was no significant effect of message type on concern for the effect of alcohol on health ($F(3, 957) = 0.66$, $p=.577$).

Discussion
This study aimed to explore responses to alcohol-related health messages that were presented alongside the current alcohol unit guidelines. Because the messages contained information about alcohol units, prior knowledge of the current CMO unit guidelines was ascertained. Results revealed that 33% of participants knew what the upper limit unit guideline was for their gender, higher than in earlier studies that revealed fewer than 20% of people had accurate knowledge of the guidelines (Bates et al., 2018; Cramer, 2018). Accuracy of estimates of the unit content of drinks, and mean scores for familiarity with units, perceived utility of units, and perception of how realistic the unit guidelines suggest that participants have fair knowledge of units as a concept, and find it moderately helpful, but that they are not counting units frequently. These findings are consistent with other UK studies (de Visser et al., 2017).

Whereas Jacob et al. (2021) found that one in six adults had increased their alcohol intake during Covid-19 lockdown, among this sample it was greater, with 48.8% of participants declaring that they were drinking more than usual. A summary of 18 surveys and polls conducted since the start of the pandemic found that 8-35% reported drinking more alcohol, with increases most marked between March and June 2020 (and aligning with sales and duty receipts data), and that 21-42% reported drinking less (Public Health England, 2021). Therefore, although it is not unexpected that some of the sample in the present study would report drinking more than usual, the proportion is higher than found in other surveys. Similarly, the Public Health
England (2021) summary of surveys recorded 25% of respondents drinking more than 14 units a week during the first national lockdown, as compared with 44.7% of participants in the present study. However, overall the trend for an increase in higher risk drinking was observed in Public Health England data (with a 58% increase in higher risk drinking observed in April 2020 versus April 2019) and our data reflect this trend.

Findings revealed that a brief exposure to a context-relevant message about the effect of alcohol on the immune system resulted in significantly higher intention to adhere to the CMO guidelines, although it was not found that accompanying the unit guidelines with any health message was more effective than the unit guidelines alone (the control). This could be explained in terms of message tailoring theory and the idea that the message was perceived as personally relevant (Rimer & Kreuter, 2006). Providing information about the effect of alcohol on immune function and respiratory health during a global pandemic of a respiratory virus would fulfil Rimer and Kreuter (2006) criteria for enhancing personal relevance: matching message content to target recipients’ needs and interests and framing health information in a meaningful context.

Although it was not measured within the present study, it is possible that this information was novel for many participants, which may have contributed to the impact. Additionally, the pandemic, alongside the relevant health message, could be considered as creating a ‘teachable moment’ that prompted the participants to reflect on their alcohol consumption and set a renewed intention to adhere to the guidelines.

Using the broader socio-cultural or environmental context as prompts to release alcohol health information and create a ‘teachable moment’ (Lawson & Flocke, 2009) is not reliant upon capturing data on individuals to inform customised messages, and is therefore a less laborious and low-cost health communication strategy that has the potential for broad public reach. Although global pandemics are not regular events, other events and shared public experiences could be reference points. For example, the ‘Jade Goody Effect’ refers to the increase in cervical screening uptake that took place after the death of the British television celebrity, Jade Goody, in 2009 (Casey et al., 2013). Similarly, referrals to breast clinics increased in Australia and in the UK when singer, Kylie Minogue was diagnosed with breast cancer (Casey et al., 2013). Dry January, an Alcohol Change UK initiative, capitalises on a generalized public desire for new year’s resolutions, and can be viewed as one example of a timing-based health campaign.

A strength of this study was the random allocation of participants to the different message groups. However, the study had a number of limitations. Like many studies of alcohol interventions, the present study used intention as a predictor of future behaviour, rather than measuring actual consumption before and after the intervention, which would be a stronger indicator of the impact of any message-based intervention.

The measure used to assess knowledge of alcohol units has been used before in other studies (de Visser et al., 2017; De Visser, 2015), however, in researching the idea of information being ‘personally relevant’, it makes sense to question why asking people about their knowledge of the alcohol content of drinks they may never consume is valid. An alternative could be to ask participants what they usually drink and then ask them questions about the unit content of these drinks only.
Self-reported alcohol consumption is subject to recall and social desirability biases, and under-sampling of heavy drinkers in surveys (Davis et al., 2010) could be viewed as a limitation, but baseline mean unit consumption levels were comparable between groups. Additionally, all of the messages were focused on various aspects of alcohol and health: future research could explore the differential impact of messages focused on physical appearance, sleep, or undesirable behaviour to provide an increased understanding of what sort of information is more effective at affecting people’s intentions to drink alcohol (Kingsbury et al., 2015). Furthermore, the control message was still an alcohol health message. It could be argued that a more effective control may be to have a condition with no message at all (de Visser et al., 2017), although it is important to note that the real-world comparison would be the alcohol/health messages that are currently deployed. Structure and composition of messages may have affected results. For example, the messages had different word lengths which may have affected attention to the messages. In addition, although all messages are gain-frame, the immune system message was more positively worded, because it emphasised that reducing alcohol intake would result in a positive change rather than reducing a risk of something negative happening. Ensuring comparability of message structure and composition would reduce this potentially confounding variable (Jarvis & Pettigrew, 2013).

The study was slightly underpowered, with only the control group meeting the threshold of 273 participants to detect a small effect. In addition, exposure to the alcohol health messages was very brief, with the information being presented only a single time to participants. This does not reflect the prolonged or repeated exposure that would occur if this information was incorporated onto alcohol labels, health promotion media or onto glassware, to engage the individual at the moment of alcohol consumption.

Finally, it is of note that the proportion of participants that reported drinking more than 14 units a week was higher in this study than in other studies conducted around the same period. Caution, therefore, needs to be applied when considering the generalisability of these results. However, despite overall alcohol consumption being higher than in other studied samples around the same time, levels of consumption were comparable across the conditions in the present study. People consuming more than 14 units a week would also be an appropriate target group for intervention.

Future research could focus on the impact of more prolonged exposure to alcohol health messages (dosing effect), or on exposure to the messages in real-life contexts such as in bars, using, for example, messages on glassware. Additionally, although the notions of personal relevance and novelty have been proposed as potential explanations for the observed effect, the present study did not specifically test messages on these dimensions. Designing a study that has the potential to demonstrate that the immune system message scored highly on these attributes would be a logical next step in ascertaining the importance of personal relevance and novelty. Finally, although it would be more complex to do, a follow-up study measuring participants’ actual consumption after being exposed to the message would be a useful extension of the present study.

In conclusion, providing alcohol health information is a relatively low-cost, population-level intervention. It is clear that levels of knowledge about the unit
guidelines and of the impact of alcohol on many aspects of health are low. Policy makers could consider the inclusion of clearer and more specific alcohol health information on alcohol labelling alongside the unit guidelines to enable consumers to exercise fully informed choice. Releasing alcohol health information at times of shared public consciousness of an event, occurrence or a context may have the potential to affect motivation to drink in accordance with recommended guidelines. Public health communication could focus on finding new information to present to the public as well as being flexible and responsive to moments of collective experience.

The data that support the findings of this study are openly available in figshare https://doi.org/10.6084/m9.figshare.17263382.v1

Disclosure statement

In accordance with Taylor & Francis policy and researchers’ ethical obligation, we report that the first author received partial funding for this research from Drinkaware. In the organisation’s own words ‘Drinkaware is an independent charity that aims to reduce alcohol-related harm by helping people make better choices about their drinking’. Drinkaware is funded by unrestricted voluntary donations from more than 130 organisations, including alcohol producers, retailers, venues, and sports associations. Drinkaware did not contribute in any way to the study design, analysis, or reporting.

Disclaimer

Views expressed are the author’s own and are not the official position of the University of Sussex or Drinkaware.

Funding

This paper is the result of research that was part-funded by University of Sussex Doctoral School and Drinkaware. Neither funder had any influence in research topic or contributed to the research or writing process.

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