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Assessing if motives-based vignettes influence plans for drinking and alcohol cues: protocol for a randomised controlled trial

Joel Crawford ,[1] Elizabeth Collier,[1] Richard Cooke,[2] Katarina Ulfsdotter Gunnarsson,[1] Gillian Shorter ,[3] Marcus Bendtsen [1]

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[1]Department of Health, Medicine and Caring Services, Linköping University, Linkoping, Sweden
[2]Education, Staffordshire University, Stoke-on-Trent, UK
[3]Drug and Alcohol Research Network, Queen's University Belfast, Belfast, UK

Correspondence to
Dr Joel Crawford;
joel.crawford@liu.se

ABSTRACT

Introduction In Sweden and the UK, there is a high prevalence of risky drinking, a pattern of drinking associated with adverse consequences. Drinking motives are a proximal predictor of risky drinking and subsequent consequences, suggesting it may be an apt intervention target. Currently, there is a lack of evidence regarding the applicability of motives for intervention efforts. The current study aims to test if motives-based materials are effective in impacting plans for future drinking and reactivity to alcohol-related cues. A secondary aim is to assess individuals' perceptions of risky drinking as outlined by health authorities. The results of the study will inform the design of a motives-based digital alcohol intervention.

Methods and analysis The study is a three-arm, parallel group, randomised controlled trial. Vignettes will be used to present health information, framed in terms of gains from limiting drinking and losses from excess drinking. Control vignettes will present general health information framed in terms of gains or losses. Proxies for behaviour (intentions and self-efficacy) will be assessed with questionnaire items. A Stroop task will be used to assess reactivity to alcohol cues, and an open-ended item will be used to record perceptions of risky drinking. Outcomes will be contrasted with regression models and estimated using Bayesian inference, while qualitative data will be analysed using thematic analysis within a framework analysis.

Ethics and dissemination Ethical approval for the study was waived by the Swedish Ethical Review Authority on 16 December 2023 based on participants being anonymous (Dnr. 2023-06474-01). The results of the study will be disseminated in an academic journal and research conferences while also informing the design of a national digital alcohol intervention.

Trial registration number ISRCTN12456514.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Study design enables estimating effects for reasoned and reactive systems, both of which underpin behavioural decision making.
⇒ A flexible framework design ensures that perceptions and beliefs are fully explored.
⇒ The hypothetical scenarios cannot fully capture the dynamics of real-world decision making.
⇒ Participation in the substudy is non-mandatory, hence research participation effects may influence the responses and introduce self-selection bias.

INTRODUCTION

Alcohol consumption is prevalent in Sweden and the UK, with approx. 23%–30% of the adult populations engaging in risky drinking (ie, consuming more than national guidelines).[1 2] There is no safe amount of alcohol consumption[3]; however, drinking at these levels severely increases the risk of adverse health and social consequences, including liver diseases, cancers, cardiovascular diseases, accidents, injuries and violence.[4]

Alcohol consumption is driven by a dual process in which both reasoned or planned behaviour and spontaneous responses to environmental or situational stimuli can result in drinking. In other words, engagement with alcohol can be a planned, conscious decision, or it can occur as a reaction to external cues that result in unplanned drinking.[5] Drinking motives, that is, the reasons why a person consumes alcohol have, nonetheless, been linked to both planned and unplanned drinking.[6 7] Drinking motives are underpinned by the motivational model of alcohol use,[8] which posits that motivation to engage with alcohol is driven by the prospective outcomes of drinking in terms of valence (positive or negative) and source (internal or external). For example, a person could drink to achieve a positive outcome or avoid a negative one and receive an internal or external reward. Further, drinking motives cross the dimensions of valence and source, and include enhancement (positive and internal), for example, drinking to enhance mood, social (positive and external), for example, drinking to facilitate social interactions,

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coping (negative and internal), for example, drinking to alleviate negative affect and conformity (negative and external), for example, drinking to avoid social alienation.[9] Evidence highlights that all motives, enhancement, social, coping and conformity predict engagement with risky drinking,[6 10 11] and that motives are a proximal driver of alcohol consumption that acts as a gateway for other distal drivers such as alcohol expectancies,[12–14] hence motives may be an apt target for intervention.

As a precursor to developing a tailored intervention based on drinking motives, there is a need to first ascertain if motives-based intervention content can support changes in drinking behaviour. The current study proposes to estimate the effectiveness of motives-based content on planned and unplanned drinking, using a series of vignettes containing health persuasion messages. Vignettes are short, precisely composed descriptions of a person, object or situation that simulate a real-life scenario.[15] Vignette studies are a hybrid of experimental and survey methods, in which participants are presented with simulated scenarios and asked to provide judgement to elicit their beliefs, attitudes or intentions.[16] Health persuasion messages provide information on the outcomes of performing a behaviour or beliefs about consequences[17] in terms of either gains (eg, limiting alcohol consumption helps keep your liver healthy) or losses (eg, drinking alcohol increases the risk of liver disease),[18] and have been linked to a reduction of alcohol consumption and higher intentions to reduce drinking.[16 19 20]

To estimate the effect of the vignettes on planned drinking, the study proposes to assess how viewing the vignettes impacts proximal predictors of planned drinking, namely drinking intentions and self-efficacy, against a control.[21] Drinking intentions or plans for future drinking have been demonstrated to be the primary predictor of planned drinking, while intentions to reduce consumption predict drinking less alcohol.[21–23] To target intentions, the study will use health persuasion messages, tailored to highlight the gains or losses for each specific motive, while also focusing on the shorter-term consequences of drinking. Messages focusing on the longer-term consequences are often overlooked by individuals from either ignoring them altogether or by planning to modify behaviour later to mitigate risk,[19] while short-term messages are more effective for reducing alcohol consumption.[20] Attitudes (ie, evaluations of engaging with a behaviour) have a strong relationship with intentions.[21] By targeting the gains or losses for each motive, the study proposes to influence intentions via attitudes regarding alcohol, that is, positive evaluations of drinking less (gains) and negative evaluations of excess drinking (losses).

Second, the vignettes aim to target self-efficacy to reduce consumption (ie, the belief in personal capability for achieving an outcome).[24] Self-efficacy to engage with alcohol has been previously strongly associated with both risky drinking[25] and planned drinking.[21] Importantly, self-efficacy to reduce consumption is also positively associated with subsequent reductions in drinking.[26] Since all four drinking motives (ie, enhancement, social, coping and conformity) have been shown to have negative relationships with self-efficacy to moderate drinking,[13] it seems plausible that boosting self-efficacy to reduce consumption may ameliorate the influence of motives on planned drinking. To test this, the study will target two factors theorised to boost self-efficacy, namely persuasion and vicarious experience.[24] Persuasion will be targeted using the health persuasion messages, which will also provide a vicarious experience of a fictional person who has experienced gains or losses, and who is matched to participants' age group and gender. A vicarious experience of a person deemed as comparable to the self can boost self-efficacy via social comparison,[24] and vicarious experience has been demonstrated to increase self-efficacy to reduce consumption by increasing the behavioural beliefs (ie, attitudes) regarding the value of limited drinking.[26]

To estimate the effect on unplanned drinking, the study will assess how viewing the vignettes impacts reactivity to alcohol cues. Alcohol cues are stimuli associated with alcohol use, including environmental (settings or place where alcohol is consumed), social (eg, offers of alcohol), emotional, (eg, stress, anxiety, happiness, celebration) and physical (visual, smell and taste).[7 27] Alcohol cues can unconsciously trigger the desire to drink by impairing control, resulting in alcohol consumption.[28] One way to target reactive behaviour is to identify triggers,[29] and so the vignettes will provide information regarding how each motive leads to excess drinking and subsequent consequences. Increasing awareness and understanding of how excess drinking is triggered, in this case by a person's underlying motives, can increase motivation to change.[30] Furthermore, boosting self-efficacy may reduce cue reactivity, as increases in self-efficacy are linked to better decision-making and enhanced self-control, and those with higher self-efficacy will be more confident in their ability to resist the urge to drink.[31 32]

To further inform a motives-based intervention for risky drinking, the study also proposes to assess how the general population conceptualise risky alcohol use, and if these perceptions are related to drinking motives. Adults in the UK have previously reported limited knowledge of health authorities' recommendations,[30] while this topic is yet to be explored in Sweden. Understanding how individuals conceptualise drinking that puts them in a position of adverse risk will support understanding the perceived threat to health, and hence help to inform a user-driven intervention that can potentially address the congruence between public health guidelines and individuals' perceptions of risky drinking.

In sum, the study aims to estimate the effects of motives-based vignettes on planned (assessed by drinking intentions and self-efficacy to reduce consumption) and unplanned (assessed by reactivity to alcohol cues) drinking, while also exploring how members of the Swedish and British public conceptualise risky drinking.

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METHOD AND ANALYSIS

Design

The study is a three-arm, parallel group, randomised controlled trial. The first intervention group (gain-intervention) will receive a gain-framed vignette that highlights the benefits of limiting consumption; the second intervention group (loss-intervention) will receive a loss-framed vignette that highlights the costs of excess consumption and the control groups will receive either a gained-framed vignette (gain-control) or a loss-framed vignette (loss-control) relating to an alternate behaviour (ie, not alcohol). Those in the intervention conditions will be assigned a vignette that matches their drinking motives.

Participants

Participants will be recruited from social media and online advertising (eg, Facebook, Instagram and Google ads). The adverts will target Swedish and English-speaking individuals in Sweden and the UK, respectively. All participants will be informed that they are enrolling in a study conducted at Linköping University in Sweden. Inclusion criteria for the study are being 18 or older and consuming at least one standard drink of alcohol in the past week or having one episode of heavy drinking in the past month (ie, drinking four or more standard drinks of alcohol on one occasion). Here, a standard drink is defined as 12 grams of pure alcohol, and a heavy drinking episode equates to consumption of 6 UK alcohol units (1 UK unit equals 8 grams of pure alcohol).[33]

Setting and procedure

The study will be conducted online, and participants who click on the adverts will be shown informed consent materials (see online supplemental appendix A). Once consent is obtained, participants will be asked to complete a baseline survey (which will be used to assess eligibility). The baseline survey (approx. 5 min) will include items on demographics (eg, age, sex, socioeconomic status), current alcohol consumption, drinking motives and a single item regarding their preferred drink of choice.

As depicted in the CONSORT flow diagram in figure 1, eligible participants will be randomised to receive either a gain-framed intervention vignette, a loss-framed intervention vignette or a control vignette (see Interventions section). After viewing the vignette, participants will be asked to complete a questionnaire assessing their self-efficacy and intentions to limit alcohol consumption. Next, they will be asked to complete an alcohol- and neutral Stroop task, both parts of the experiment will take approximately 10 min to complete. Finally, participants will be presented with an open-ended question asking what risky drinking means to them. After responding to this item, participants will be given links to websites regarding alcohol and health, where they can find support for change. No reimbursement will be offered, and no follow-ups to experiment and open-ended questions will be scheduled. See online supplemental Appendix B and C for details of all of the items.

Interventions

Ten vignettes will be used. There will be eight experimental vignettes, framed either in terms of gains or losses. These will be further adapted to one of four drinking motives (enhancement, social, coping and conformity) based on participants' responses to the baseline questionnaire (ie, intervention group participants will receive a vignette which matches their drinking motives). In each experimental vignette, participants will read a scenario regarding a fictional character that has experienced gains from limiting consumption or losses from excess consumption and then imagine the scenario happening to them. Since evidence suggests health information deemed salient to the self effectively elicits behaviour change,[34] the vignette scenarios are based on findings regarding drinking motives[35] and are adapted for sex and age. Additionally, there will be two control vignettes framed in gains or losses. The content of these vignettes presents fictional characters that have either experienced gains or losses from engaging with other behaviours unrelated to drinking (eg, engaging with physical activity). The images used in the vignettes were generated by OpenAI's DALL E 3. See online supplemental Appendix B and C for the vignettes.

Outcomes

Primary

- Self-efficacy for reducing alcohol consumption.
- Intentions for reducing alcohol consumption.
- Reactivity to alcohol-related cues.

Secondary

- Perceptions of risky alcohol use.
- Information and support interest.

Self-efficacy will be measured using four items that reflect self-belief in being able to reduce one's drinking (eg, 'For me, reducing my drinking in the next week would be easy/difficult').[36] Intentions will be measured using three items to record plans for future drinking within a specific period (eg, 'I plan to reduce my drinking in the next week').[37] For both self-efficacy and intentions, respondents score each item on a 5-point Likert scale (eg, '1— strongly agree, 5—strongly disagree'). Individual items are summed to create an overall score for self-efficacy and intentions, respectively.

To test reactivity to alcohol cues, a Stroop task will be used to assess attentional bias in response to stimuli.[38] The words used will reflect neutral words (eg, table) or an individual's preferred drink (eg, Zinfandel). Reaction times (in ms) to the Stroop task will be recorded and compared between stimuli (ie, alcohol vs neutral) and between preferred drinks (eg, beer vs wine).

Assessment of how participants conceptualise risky drinking will be completed with an open-ended questionnaire that prompts them to write a few lines on what

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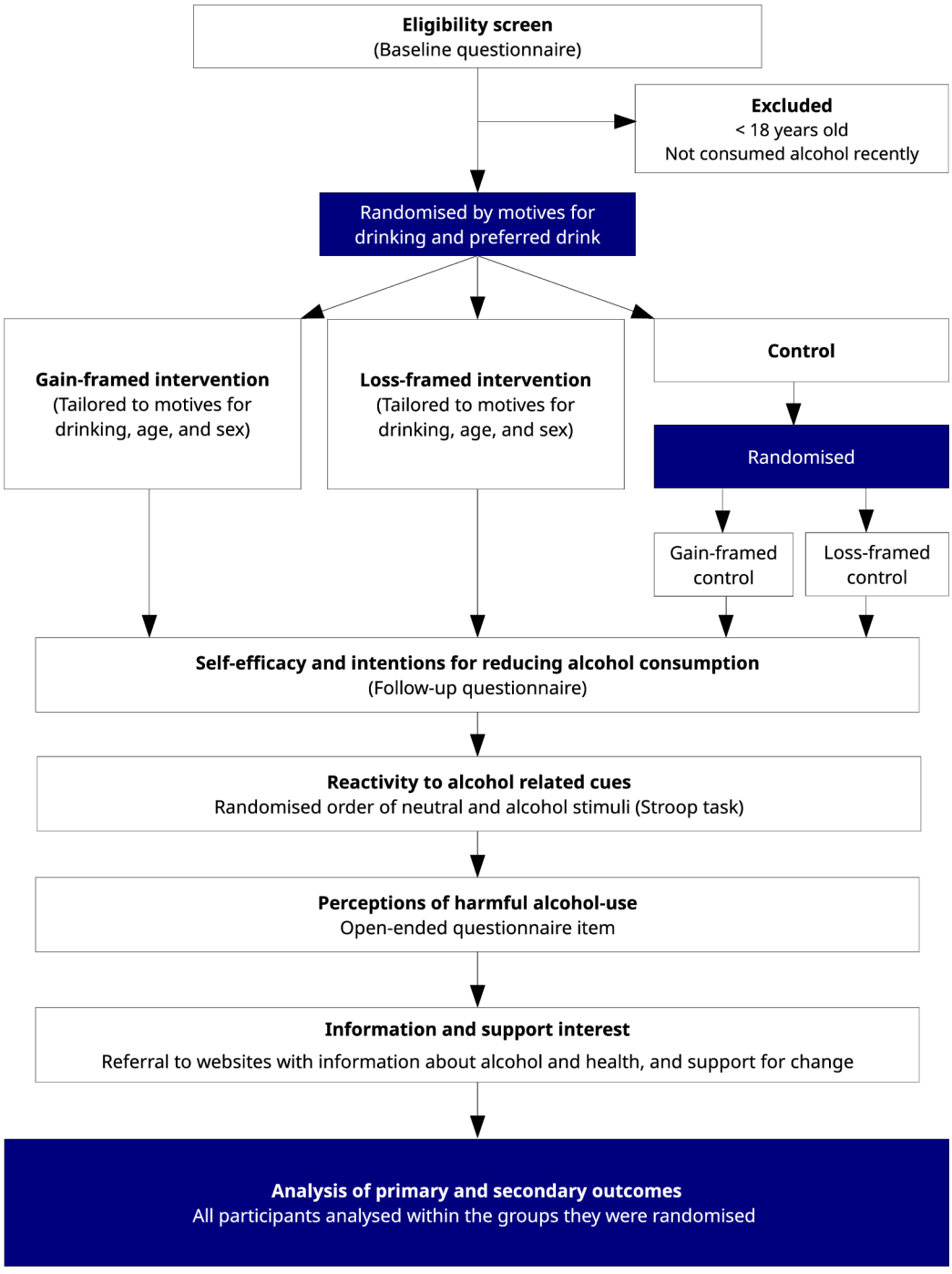

Figure 1 CONSORT flow diagram.

it means for them and how they view health authorities' definitions for example, 'In the box below, please describe your personal definition of 'risky drinking?" and 'The National Board of Health and Welfare define risky drinking as consuming 10 standard glasses or more per week, or 4 standard glasses or more in a single session'. Finally, all participants will be given links to websites offering information about alcohol and health. Whether participants clicked on the links to indicate their interest in more information or immediate support will be recorded.

Randomisation and blinding

Participants will be randomised to a gain-framed experimental vignette, loss-framed experimental vignette or control vignette (1:1:1). A fully computerised stratified block randomisation with random block sizes of 3 and 6 will be used. The randomisation will be stratified by favourite drink and drinking motives to ensure these are balanced among groups. Those allocated to the control condition will be randomised again to gain or loss-framed control vignettes (simple randomisation) to support secondary analyses. Participants will be blinded since they

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will not be made aware of the possible conditions to which they could be randomised; instead, they will be informed that the study concerns alcohol and drinking motives and aims to test how they respond to vignette messages. Research personnel will also be blinded throughout the study. Allocation to each arm of the trial will be done automatically by the backend server; hence, neither researchers nor participants will be able to interfere with or discover the randomisation sequence.

Since no identifiers are collected for individuals, we will use web browser cookies and HTML5 storage to store allocation information on the participants' web browsers (see Discussion for limitations of this method). Participants who have not completed the baseline questionnaire and return to the trial website will be presented with the baseline questionnaire again. Those who have completed the baseline questionnaire but not the follow-up questionnaire will be shown the same vignette as earlier visits. Those who have completed the follow-up questionnaire and returned to the website will be thanked for participating but not offered an opportunity to participate again.

Data analysis

All randomised participants will be included in the analysis (intention-to-treat). Both available data analyses and analyses with missing data imputed will be conducted. Missing data will be imputed using multiple imputation with chained equations (generating 200 data sets with predictive mean matching).[39] All regression models will be estimated using Bayesian inference with medians of posterior distributions used as point estimates, reported alongside 95% compatibility intervals defined by the 2.5% and 97.5% percentiles of posterior distributions.[40] Coefficients for regression covariates will be given Student's t priors centred at 0 with 3 degrees of freedom and a scale of 2.5. Error terms will be given half-Student's t priors with the same parameterisation.

The primary contrasts in this study are the experimental gain-framed vignette group versus the control group (as a whole) and the loss-framed vignette group versus the control group (as a whole). Secondary contrasts are the experimental gain-framed vignette group versus the loss-framed vignette group, as well as the primary contrasts against each gain-framed and loss-framed control group rather than the control group as a whole.

Primary analysis

Self-efficacy and intentions will be analysed using linear regression with the measures standardised. The models will be adjusted for age, sex, current alcohol consumption (weekly consumption and heavy drinking episodes), access to funds and the two stratifying covariates (favourite drink and drinking motives). The same analytic approach will be taken for reactivity to alcohol-related cues. Information and support interest will be modelled as a binary variable (clicked or did not click), and the effect will be estimated using logistic regression, adjusted for the same variables as for primary outcomes.

To estimate to what degree drinking motives moderate the primary analysis, linear regression models with an interaction term between group allocation and drinking motives (including all covariates from the non-interaction model) will be used.

Ancillary analyses

A series of exploratory effect-modification analyses will be conducted, whereby the primary outcomes (ie, intentions, self-efficacy and cue reactivity) will be modelled according to the primary analysis specifications (ie, linear regression with standardised measures) with the addition of interaction terms between group allocation and each baseline variable respectively (eg, age, sex, current consumption, etc).

Individual-level prediction models of the primary and secondary outcomes conditional on allocation to the three groups will also be estimated. From these predictions, individual-level effects can be estimated, allowing an exploration of which individuals, defined by their baseline characteristics, are analyses more or less affected by the exposure to vignettes.

Sensitivity

To investigate systematic attrition to follow-up, logistic regression models will be estimated where the outcome is response or no-response to the primary outcomes. The models will include covariates for all baseline variables and group allocation and interaction terms between each baseline variable and group allocation. Cauchy priors centred at 0 with standard normal hyperpriors for the scale parameter that shrink coefficients towards the null will be used to account for the excessive number of parameters included in these models.

Qualitative analysis

Thematic analysis (TA)[41] within a framework analysis will be used.[42] Since the secondary aim of the study is to understand how participants conceptualise risky drinking, TA (which enables researchers to produce a descriptive and informative assessment of the data) was deemed an appropriate technique for generating themes that conceptualise the meaning of risky drinking. For the Swedish subsample, an inductive approach will be used, as the research question has not been addressed in this group before. Hence, this part of the substudy will be exploratory. For the UK subsample, this question has been previously addressed, and so a deductive approach will be used in this part of the analysis. A framework analysis will be used to create a matrix to facilitate comparing the subsamples. This will enable the creation of superordinate themes that illustrate similar experiences, perceptions and attitudes across samples but would also result in distinct themes specific to each sample.[42] The researchers completing the coding of both data sets (JC and GS) will engage with a reflexive account of how

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their preconceptions may impact the analysis. Finally, to help ensure scientific rigour a COREQ checklist will be completed.[43]

Sample size

A Bayesian sequential design will be used to monitor recruitment.[44] As data become available, the primary outcomes will be modelled according to the analysis plan, and the coefficients for group allocation will be assessed for effect, harm and futility. Letting $\beta_{k,j}$ represent the regression coefficient for group contrast k (gain-framed vs control and loss-framed vs control) for outcome j (self-efficacy, intentions and reactivity), and D represents the accumulated data, the target criteria are:

Effect: $p(\beta_{k,j} > 0 \mid D) > 95.0\%$

Harm: $p(\beta_{k,j} < 0 \mid D) > 95.0\%$

Futility: $p(-0.2 < \beta_{k,j} < 0.2 \mid D) > 95\%$ (outcomes standardised)

It should be noted that the criteria are targets; thus, at each interim analysis, criterion for each group contrast and outcome will be evaluated, and a decision to continue or stop recruitment based on an overall assessment will be made.

Patient and public involvement

This study did not include any patient or public involvement in the study design.

DISCUSSION

This study aims to set the groundwork for tailoring a future digital alcohol intervention using drinking motives. If a motives-based intervention is to be successful in reducing consumption, then individuals should understand how their motives inform their drinking behaviours, be motivated to change and develop behavioural skills to enable them to follow through with the new pattern of behaviour.[45] If the study demonstrates that motives-based content can influence plans to reduce consumption and reactivity to alcohol cues, then a trial of testing behavioural skills that target individuals based on their motives can begin, with the aim of helping participants resist temptation, and manage expectations, or pressures to drink. In addition, if interactions between motives and message framing are found, then this may enable matching health information regarding the gains or losses of drinking specifically to an individual's drinking motives.

Second, exploring how risky alcohol use is conceptualised and if/how motives are related to these perceptions may inform the design of future interventions. Evidence suggests that individuals are active managers in their alcohol intake, often aiming to reach a subjective state of intoxication, that is, the 'sweet spot' wherein the benefits of drinking are maximised, and the potential for detriments is minimised.[46] Ascertaining how individuals conceptualise risky alcohol use and how they reach this subjective limit/state could potentially enable targeting different groups with personalised intervention techniques. For example, those with enhancement motives may drink close to their subjective limit to get 'a buzz'.[47] In contrast, those with coping motives may drink further away from their subjective limit of risk, rationalising that lower amounts of alcohol are needed to 'take the edge off', that is, reduce feelings of anxiety[9]; alternatively, those with social motives may have a fluctuation in their subjective level of risk dependent on the consumption levels of peers.[48] Such findings may make it possible to identify groups of people that may be amenable to specific interventions and in turn reduce the incidence of risky alcohol use.

Limitations

The vignettes created for the study can only offer an artificial representation of real life: hypothetical scenarios cannot fully capture the dynamics of real-world decision-making processes and thus can only be answered hypothetically.[49] Nonetheless, the current study aims to measure proxies of behaviour (ie, self-efficacy and intentions) rather than actual behaviour, and tests if the vignettes impact how individuals react to alcohol-related cues typically present in real-world physical/social environment. In addition, as indicated by a meta-analysis (k=111) from Murphy *et al*,[50] behaviour reports in vignette experiments are often comparable to observations of real-life behaviour.

Since this trial does not require delayed follow-up, there is no reason to collect or verify unique identifiers or means of contact for each participant. Instead, we will use HTML5 storage and cookies in participants' web browsers to store group allocation information, such that when participants return to the study website, they will not be re-randomised. However, participants could be re-randomised if they join using a different computer or web browser. This is a limitation of this trial that we find necessary to retain interested individuals, as confirming email addresses and phone numbers could increase participant burden and reduce the participation rate. However, a record will be kept of the number of times each participant visits the website using the same device. A high rate of return from the same device would increase the likelihood that participants also visit from other devices and vice versa. Therefore, this measure can be used to help judge the risk of bias from double randomisation. In addition, the links to websites with alcohol information at the end of the survey aim to satisfy the need of participants to search for this material again, reducing the risk that they revisit the study website.

Ethics and dissemination

Ethical approval for the study was waived by the Swedish Ethical Review Authority on 16 December 2023 based on participants being anonymous (Dnr. 2023-06474-01). Using vignettes, that is, hypothetical scenarios, should present minimal ethical risk; a hypothetical scenario should not produce (or at least

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minimal amounts of) the associated negative effect that an individual can experience in the aftermath of drinking or abstaining from alcohol. Furthermore, asking participants to write about risky alcohol use could result in them experiencing worry over their current drinking behaviour. To account for this, participants will be referred to websites that offer advice regarding alcohol and links to digital alcohol support (Sweden, www.iq.se; UK, https://alcohol-change.org.uk/). The results from the study will be published in open-access peer-reviewed journals and presented at international conferences.

X Katarina Ulfsdotter Gunnarsson @kulfsdotter and Gillian Shorter @gwshorter

Contributors JC had the original idea for the study, which was expanded on by MB. JC created the study materials, assisted by KUG. OpenAI's DALL E 3 was used to generate the images in the vignettes. JC led the authoring of the protocol, to which all authors contributed (MB, EC, GS, RC, KUG). MB led the statistical analysis plan and programmed the software for running the trial with the assistance of JC. MB, EC and GS acquired funding for the trial. All authors read and approved the final manuscript. MB is the guarantor. OpenAI's DALL E 3 was used to create images for the research materials, to avoid any copyright issues. However, AI was not used in any other part of the research process, including design and writing.

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Disclaimer MB owns a private company (Alexit AB) that maintains and distributes evidence-based lifestyle interventions to be used by the public and in health care settings. Alexit AB played no role in developing the intervention, study design, data analysis, data interpretation, or writing of this report.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

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ORCID iDs
Joel Crawford http://orcid.org/0000-0002-5780-0848
Gillian Shorter http://orcid.org/0000-0001-5752-2297
Marcus Bendtsen http://orcid.org/0000-0002-8678-1164

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