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Reactions to being allocated to a waiting list control group in a digital alcohol intervention trial

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ABSTRACT

Objective: To study reactions of control group participants allocated to two different presentations of basic health information in a digital alcohol intervention trial.
Method: Control participants were randomised to wait with one of two different presentations of basic health information. Multiple choice questions and free-text comments assessed reactions, four months post randomisation. Effects of differential health information on responses were estimated, as were associations between responses, baseline characteristics and change in alcohol consumption.
Result: Of 1066 control group participants, 572 (54%) responded to the questionnaire. Contrasting two different presentations of basic health information revealed no statistically significant differences. Responses revealed that 38% were interested sufficiently to look at the information while 42% felt frustration, irritation, or disappointment about having to wait. Approximately 55% responded that they decided to reduce their drinking whilst 17% stated that they continued to drink as usual, and 11% gave up on the idea of reducing their drinking. The two latter groups reported markedly higher alcohol consumption at follow-up in comparison to the former (probability of association >99.9%).
Conclusion: Being made to wait may invite negative research participation effects.
Practice implication: Comparator guidance should be updated to reflect the potentially negative consequences which are under researched.

1. Introduction

Randomised control trials (RCTs) are acknowledged as the gold standard for estimating the effects of interventions [1]. By virtue of randomisation of large numbers of units, confounding is guaranteed to not exist between allocation and outcome, thus allowing for unconfounded estimates of effect. The effect of an intervention can thus be studied precisely as a contrast; a comparison of outcomes from two or more groups who were comparable before allocation. This means that it is the actions of participants in randomised groups over the trial period which will determine the magnitude of the estimated effect. However, while novel interventions usually are carefully designed, resulting in the intervention side of the contrast being capable of close study, a small fraction of the attention is usually given to the control side of the contrast [2,3]. So, while effects estimated in RCTs are unconfounded, it is not always clear exactly which contrast the reported estimates represent. Everything is relative in a trial, and control groups are not routinely given the attention they deserve in order to attain secure valid interpretations of reported effects.

There is guidance in the literature with respect to the design of control groups [2,4], which highlights the advantages and disadvantages of different types of controls, and emphasizes trade-offs between study aims and statistical power. One type of control group which is featured in the frameworks, and frequently in practice, is delayed access to the treatment under study, i.e., placing control group participants on a waiting list. It has been proposed as a good candidate when the primary goal is to decide if an intervention works at all, and suggested to be more ethically defensible than no-treatment [4,5]. It can function well in situations when treatments are rationed, and there is nevertheless uncertainty about treatment effectiveness, as a fair means of allocation that permits rigorous study. However, allocating participants to a waiting list may have unintended consequences since it may not be congruent with participants' expectations and intentions for enrolling in the trial; there is particular concern that it may be interpreted as an implicit instruction

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not to do anything, including changing one's behaviour until access to treatment is given [6–9]. There is a small, coherent, and illustrative body of evidence providing grounds for concern that major, but not well understood, problems may be linked to the use of waiting list groups in RCTs. More research is clearly needed and should not be difficult to nest within existing studies.

In behavioural intervention trials, in particular in studies of alcohol interventions [10,11], it is common to present basic alcohol and health information to those allocated to a waiting list group. Typically, this information is widely available to individuals online. Individuals who sign up for behavioural intervention trials have likely searched, or will in the future search, for information online, and much information is available of variable quality. Alcohol industry actors have been heavily involved in providing such information across the world, and this has generated much concern about the ways the content subtly advances business rather than health interests [12–16]. There is, however, a paucity of evaluation studies of the effects of using such contents in research contexts. This means that not only are the effects of being allocated to a waiting list group understudied, but so are the effects of the specific information typically given to participants at the time of allocation.

1.1. Objectives

This study concerns the reactions of participants randomly allocated to two control groups which received different forms of basic health information within a randomised control trial estimating the effectiveness of a digital alcohol intervention. Specific aims of the study were to:

Estimate the effects of being exposed to two contrasting approaches to the presentation of basic health information on self-reported reactions.

Explore participants self-reported reactions of being allocated to the waiting list control group.

Investigate associations between participant self-reported reactions, baseline characteristics and change in alcohol consumption.

2. Method

2.1. Trial design

The study was a two-arm, parallel groups, randomised trial among control group participants of an effectiveness trial of a digital alcohol intervention. The trial was prospectively registered (ISRCTN48317451) and a trial protocol including a statistical analysis plan was made available prior to trial commencement [17]. Ethical approval for the study was received on 2018–06–11 by the Regional Ethical Committee in Linköping, Sweden (Dnr 2018/417–31). Findings regarding the effectiveness of the digital alcohol intervention have been reported elsewhere [18]. A participant flowchart is presented in Fig. 1. The CONSORT guidelines were followed in the reporting of the study [1].

2.2. Participants

The target population was Swedish adults seeking help online to reduce their alcohol consumption. Individuals were required to be at least 18 years of age, have access to a mobile phone, and be classified as risky drinkers according to Swedish guidelines [19]. Participants were recruited to the trial using online advertisements and signed up by sending a text message. A response was sent back with a hyperlink to the informed consent material. Those who consented were asked to respond to a baseline questionnaire (which also assessed eligibility). Please see Appendix A for full details of questions asked at baseline.

2.3. Interventions

The informed consent materials explicitly informed participants that some were going to receive information in advance of access to the new support tool, and thus they would have to wait for it, and the other group would do things in reverse. They were not explicitly told that one group was the control group in a trial designed primarily to investigate the support tool, but rather that there were two ways in which participants would be receiving support. They were told that different types of information would be tested, but not how many types of information or anything about their content. The relevant paragraph from the informed consent materials is quoted directly as follows:

In order to investigate the effects of the intervention we need to compare two groups of individuals. Therefore, all individuals that agree to participate in the study will randomly be allocated into one of two groups. One group will begin the trial by being given information that will motivate them to reduce their alcohol consumption for four months, and then have access to the new support tool for four months. The study will also investigate if different types of information lead to individuals requesting more information. The other group will have these two phases reversed, thus being given immediate access to the new support tool.

In the parent trial, eligible participants were randomised after consenting and responding to the baseline questionnaire to either receive the digital alcohol intervention or to the control group. Control group participants were randomised once more into two groups. Participants in both control groups received a single text message with basic health information regarding short- and long-term effects of alcohol consumption. However, we incorporated a contrast between two very brief types of information; one which provided a clear and straightforward public health messaging style (while being appropriately evidence informed, the PH group) and another which emphasised possible complexities associated with the short- and long-term effects of alcohol (such as is widely available from alcohol industry sources, the IND group). Each message included the same link to a website with information about alcohol. Please see Appendix B for full details of the messages.

2.4. Outcomes

Reactions were measured by asking three questions as part of the main trial's four-month follow-up. Participants were also invited to leave comments after the first and second questions. The information and questions presented to participants is shown in Text Box 1. There were two alcohol consumption outcomes, which were co-primary in the parent trial: total weekly alcohol consumption measured by asking participants the number of standard drinks consumed in the past week; and frequency of heavy episodic drinking assessed by asking participants how many times they consumed 4 (women) / 5 (men) or more standard drinks on one occasion the past month.

2.5. Sample size, Randomisation, and blinding

Since the current study was an experiment nested within a larger effectiveness trial, there was no power calculation made to decide on the sample size required to detect a pre-specified effect size.

We used simple randomisation which was done automatically by the backend server. Neither participants nor research personnel were able to discover or in any way manipulate the randomisation sequence.

Participants and research personnel were blind to allocation between the two contrasting control group messages, however, participants were aware if they were given immediate or delayed access to the digital alcohol intervention.

2.6. Statistical methods

All analyses were done by including all control group participants, keeping them in the groups to which they were randomised, i.e., intention to treat. Pre-registered and unplanned ancillary analyses were conducted, as well as a qualitative analysis of free-text comments. All quantitative analysis were conducted using R (version 3.6.0) [20] and STAN (version 2.18) [21].

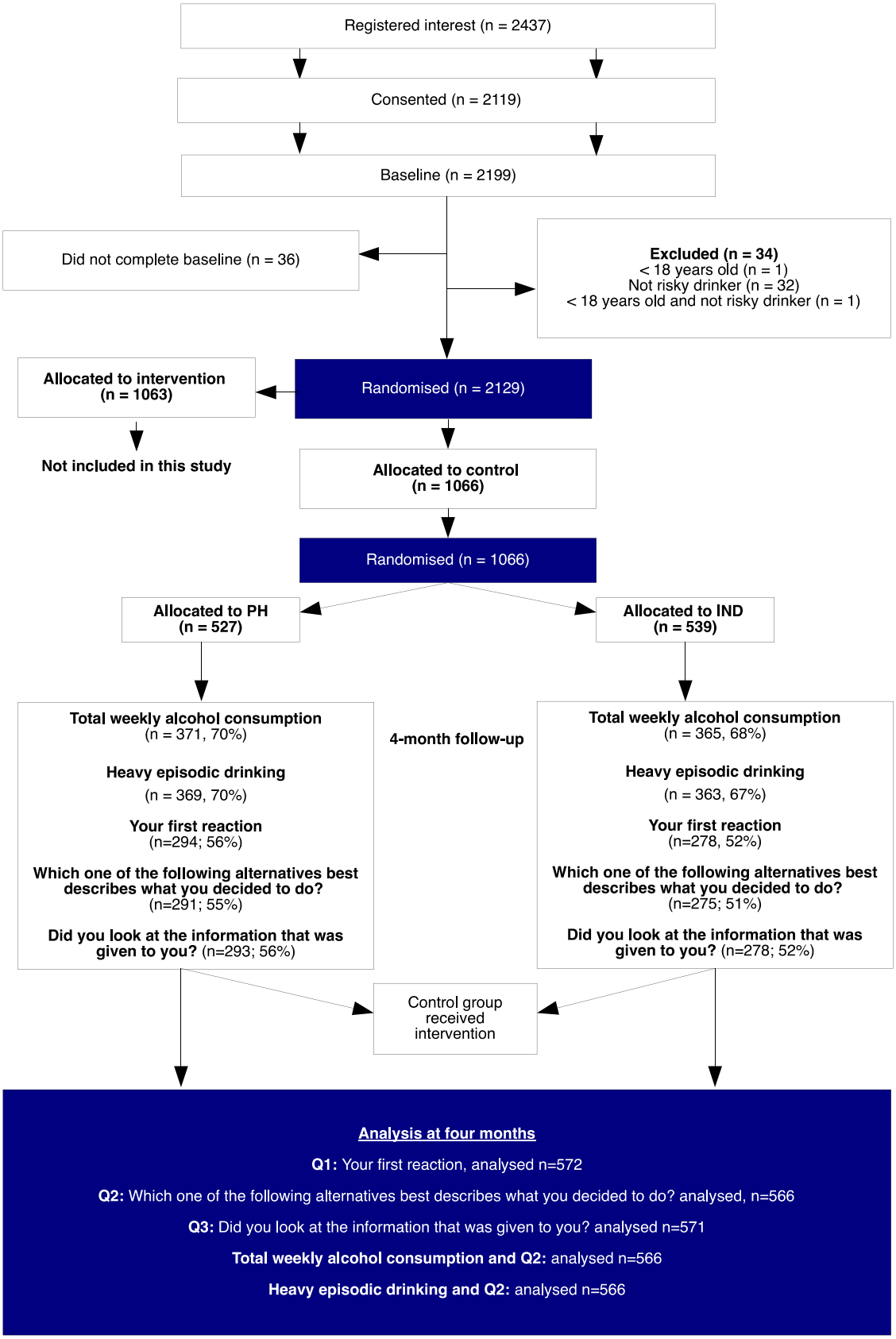

Fig. 1. Participant flow presented in a CONSORT flow diagram.

Text Box 1
Reaction questions.

You were among those who were first given information and time to motivate yourself before being given access to the new support tool. We would like to ask three questions about how you reacted and what you did when you were told about this.

a) Interested to look at the information.
b) Frustration, irritation, or disappointment. I was ready for extra support to reduce my drinking.
c) Neither positive nor negative. It did not matter for me.
d) I do not know.

Your first reaction:

a) I decided to motivate myself and reduce my drinking.
b) I decided to continue drinking as usual and to start reducing my drinking later when I was given access to the support tool.
c) I found other support that I used to reduce my drinking.
d) I gave up on the idea of reducing my drinking.

Which one of the following alternatives best describes what you decided to do?

a) I looked at the information and found it useful to reflect on my drinking.
b) I looked at the information and did not find it useful.
c) I did not look at the information.
d) I do not know.

Did you look at the information that was given to you?

2.6.1. Pre-registered analyses

Differences between the two groups on responses to the reaction questionnaire were investigated using chi-squared tests for comparison of proportions, with statistical significance assessed at the 0.05 significance level.

Table 1
Baseline characteristics of control group participants and responders to the follow-up questionnaire.

	Control group participants n = 1066	Responders from PH n = 294	Responders from IND n = 278
Age, median (IQR)	46 (36;54)	47 (38;54)	49 (39;56)
Sex:			
Woman	625 (59%)	177 (60%)	154 (55%)
Man	441 (41%)	117 (40%)	124 (45%)
Total weekly consumption past week, median (IQR)	16 (10;25)	17 (10;25)	18 (12;25)
Episodes of heavy drinking past month, median (IQR)	6 (4;12)	6 (3;10)	6 (3.25;12)
Civil status:			
Not living alone with kids	373 (35%)	106 (36%)	98 (35%)
Not living alone no kids	277 (26%)	72 (24%)	84 (30%)
Living alone with no kids	224 (21%)	55 (19%)	57 (21%)
Living alone with kids	101 (9%)	32 (11%)	20 (7%)
Partner but not living together	91 (9%)	29 (10%)	19 (7%)
Confidence[a], median (IQR)	6 (5;8)	6 (5;8)	6 (5;8)
Importance[b], median (IQR)	10 (9;10)	10 (9;10)	10 (9;10)
Knowledge[c], median (IQR)	5 (2;6)	5 (3;7)	4 (3;7)

IQR = Interquartile range
[a] How confident are you that you will be able to reduce your alcohol consumption? (10-point scale ranging from 1 = "Not at all" to 10 = "Very confident") [b] How important is it for you to reduce your alcohol consumption? (10-point scale ranging from 1 = "Not important" to 10 = "Very important") [c] How well do you know how to reduce your alcohol consumption? (10-point scale ranging from 1 = "Not well at all" to 10 = "Very well")

2.6.2. Unplanned ancillary analyses

Since a chi-square test only offers a crude test of independence

Table 2
Responses to questions regarding reactions.

	Total	PH	IND
	n (%)	n (%)	n (%)
Your first reaction:			
Interested to look at the information.	216 (38%)	112 (38%)	104 (37%)
Frustration, irritation, or disappointment. I was ready for extra support to reduce my drinking.	238 (42%)	124 (42%)	114 (41%)
Neither positive nor negative. It did not matter for me.	71 (12%)	28 (10%)	43 (15%)
I do not know.	47 (8%)	30 (10%)	17 (6%)
		P-value = 0.07 (χ^2 = 7.04, df = 3)	
Which one of the following alternatives best describes what you decided to do?			
I decided to motivate myself and reduce my drinking.	312 (55%)	158 (54%)	154 (56%)
I found other support that I used to reduce my drinking.	93 (16%)	48 (16%)	45 (16%)
I decided to continue drinking as usual and to start reducing my drinking later when I was given access to the support tool.	96 (17%)	48 (16%)	48 (17%)
I gave up on the idea of reducing my drinking.	65 (11%)	37 (13%)	28 (10%)
		P-value = 0.82 (χ^2 = 0.94, df = 3)	
Did you look at the information that was given to you?			
I looked at the information and found it useful to reflect on my drinking.	333 (58%)	171 (58%)	162 (58%)
I looked at the information and did not find it useful.	96 (17%)	46 (16%)	50 (18%)
I did not look at the information.	50 (9%)	26 (9%)	24 (8%)
I do not know.	92 (16%)	50 (17%)	42 (15%)
		P-value = 0.85 (χ^2 = 0.79, df = 3)	

between allocation and responses to questions as a whole, it cannot provide evidence of effects of allocation on specific response options, nor does it allow for adjusting for baseline characteristics. Therefore, multinomial regression models were estimated to further investigate both the causal effect of randomisation on responses to the reaction questions, as well as associations between responses and baseline characteristics. One regression model per question was estimated, with allocation and baseline characteristics as covariates. Bayesian inference [22] was used with Cauchy priors (location = 0, scale = 1), which promote conservative estimates.

To estimate associations between alcohol consumption at follow-up and responses to the second reaction question, one negative binomial regression model was estimated for each alcohol measure. The models were adjusted for baseline characteristics and each alcohol measure at baseline respectively. Bayesian inference was used with standard normal priors.

The findings from these ancillary analyses, should of course, be regarded as fundamentally exploratory in nature as the analyses were not pre-planned.

2.6.3. Qualitative analysis

An inductive approach to analysis of the content of the free-text comments on the first two questions was used [23]. Free-text comments for both questions were read and analysed as a whole. First, the data was read by two of the authors (KUG and MB) to obtain a sense of the whole and identify words or phrases describing participants' experiences of being allocated to the control group. Second, open coding of the words and phrases in relation to the objective of the study was performed by KUG. Codes were further condensed and divided into sub-categories and categories through an abstraction process in discussions between KUG and MB until consensus was reached.

3. Results

Between 2019–04–25 and 2020–11–26, 2129 individuals consented and were randomised in the main trial: 1063 to the intervention group and 1066 to the control group. The 1066 control group participants were then further randomised: 527 to PH and 539 to IND. Both groups were equally likely to follow the provided link in the health information [18].

At four-months post-randomisation, 572 of the 1066 control group participants (54%) responded to the three reactions questions, 294 (56%) in the PH arm and 278 (52%) in the IND arm. A chi-square test suggested that the difference in attrition between the two arms was not statistically significant (P-value = 0.19). Characteristics of control group participants and those from PH and IND responding to the follow-up questionnaire are presented in Table 1. Apart from sex, there were few meaningful differences between the PH and IND groups. The difference in sex was not statistically significant following a chi-square test (P-value = 0.28).

3.1. Comparing proportions of responses

Responses to the reaction questions are presented in Table 2. Chi-square tests comparing proportions of responses did not reveal any statistically significant differences between the PH and IND groups.

3.2. Multinomial regression analyses

Table 3, accompanied by Fig. 2, presents the marginal posterior distributions of the covariate coefficients of the multinomial regression model for the first reaction question. The response option "*Interested to look at the information*" was used as reference category. The contrast between the IND and PH groups should be interpreted as the effect of allocation on responses to this question. All other coefficient estimates should be interpreted as conditional associations between baseline characteristics and responses to the question. For instance, the posterior median odds ratio for responding "*Neither positive nor negative. It did not matter for me*" compared to "*Interested to look at the information*" was 1.85 when comparing the IND group to the PH group, suggesting that allocation to IND a little under doubled the odds of responding that the allocation did not matter compared to being interested in the supplied information. The probability that this effect was greater than the null (OR = 1) was 99%, suggesting strong evidence of this effect in the observed data.

All else being equal, men were more than twice as likely than women to be interested in the information rather than expressing frustration, irritation, or disappointment The posterior median odds ratio of this association being 0.45, and the probability was > 99.9% that this odds ratio was less than the null (OR = 1). Similarly, men were more likely than women to respond with the "don't know" option (OR = 0.44, probability of association 99%). There was also a marked association between age and responses, with older participants more likely to respond having been interested in the material than the other options. Finally, those scoring themselves higher on the confidence question at baseline were more likely to respond interested compared to frustration and not knowing.

Table 3
Estimates of coefficients of the multinomial regression model for the first reaction question ("Your first reaction"). The response option "*Interested to look at the information*" was used as reference category. Odds ratios (OR) above 1 indicate that the response option was more likely than the reference category. For instance, the IND group were more likely to respond that allocation did not matter to them rather than being interested to look at the information (in comparison to the PH group). The probability that this OR was greater than 1 was 99%.

	Posterior distribution: median, 2.5 and 97.5 percentiles probability of OR > /< 1		
	Frustration vs. Interested	Did not matter vs. Interested	Do not knowvs. Interested
Effect of allocation to industry vs. public health information			
IND vs. PH	1.08 (0.74; 1.58) 66%	1.85 (1.09; 3.22) 99%	0.64 (0.33; 1.18) 92%
Conditional associations with baseline characteristics			
Age	0.96 (0.95; 0.98) >99.9%	0.93 (0.91; 0.96) >99.9%	0.97 (0.94; 1.00) 98%
Total weekly consumption	1.00 (0.98; 1.03) 66%	1.03 (1.00; 1.07) 97%	1.00 (0.96; 1.04) 53%
Episodes of heavy drinking	1.02 (0.98; 1.05) 84%	0.98 (0.93; 1.03) 76%	1.02 (0.96; 1.07) 75%
Man vs. Woman	0.45 (0.30; 0.68) >99.9%	0.60 (0.34; 1.05) 96%	0.44 (0.21; 0.85) 99%
Not living alone no kids vs. not alone with kids	1.00 (0.62; 1.60) 50%	1.06 (0.56; 1.97) 57%	1.10 (0.53; 2.26) 60%
Living alone no kids vs. not alone with kids	1.05 (0.63; 1.74) 58%	0.67 (0.31; 1.36) 86%	1.17 (0.55; 2.48) 66%
Living alone with kids vs. not alone with kids	1.75 (0.91; 3.52) 95%	1.60 (0.66; 3.99) 85%	1.18 (0.39; 3.32) 62%
Partner but not living togethervs. not alone with kids	0.99 (0.51; 1.92) 51%	0.59 (0.18; 1.47) 87%	0.74 (0.20; 1.98) 73%
Confidence	0.89 (0.81; 0.97) >99.9%	0.99 (0.88; 1.13) 55%	0.85 (0.73; 0.97) 99%
Importance	0.97 (0.83; 1.13) 67%	0.85 (0.70; 1.04) 94%	1.12 (0.87; 1.51) 80%
Knowledge	0.96 (0.89; 1.04) 84%	1.07 (0.95; 1.20) 88%	0.98 (0.86; 1.11) 64%

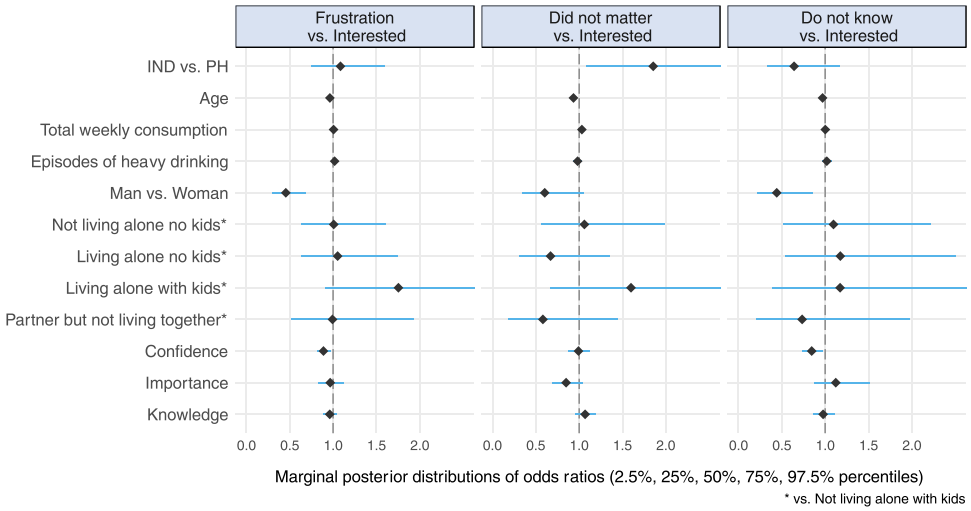

Fig. 2. Marginal posterior distributions of coefficients of the multinomial regression model for the first reaction question ("Your first reaction"). The response option "*Interested to look at the information*" was used as reference category. Odds ratios (OR) above 1 indicate that the response option was more likely than the reference category.

Table 4 accompanied by Fig. 3, and Table 5 accompanied by Fig. 4, present the marginal posterior distributions of the covariate coefficients of the multinomial regression models for the subsequent two questions respectively. Interpretation of the estimates follows from the description of Table 3 and Fig. 1. For the question regarding what participants decided to do (Table 4 and Fig. 3), the option "*I decided to motivate myself and reduce my drinking*" was set as reference category. Those with a higher weekly alcohol consumption at baseline were less likely to report that they decided to motivate themselves and attempt to reduce their drinking on their own. On the other hand, those with a higher confidence in their ability to reduce their drinking at baseline were more likely to report doing so. Older participants were also more likely to report having motivated themselves, and there was some evidence suggesting that men were more likely than women to report motivating themselves, while women were more likely to report that they continued to drink and attempt to reduce their consumption later wh they were given access to the new support tool.

For the question regarding whether participants looked at the information (Table 5 and Fig. 4), the option "*I looked at the information and found it useful to reflect on my drinking*" was set as the reference category in light of the observed data. Men were more likely than women to report that they looked at the information and found it useful, with

Table 4
Estimates of coefficients of the multinomial regression model for the second reaction question ("Which one of the following alternatives best describes what you decided to do?"). The response option "*I decided to motivate myself and reduce my drinking*" was used as reference category. Odds ratios (OR) less than 1 indicate that the reference category was more likely than the response option. For instance, the IND group were more likely to respond that they motivated them self and reduced their drinking rather than giving up on the idea of reducing their drinking (in comparison to the PH group). The probability that this OR was smaller than 1 was 89%.

	Posterior distribution: median, 2.5 and 97.5 percentiles probability of OR > /< 1		
	Continued and reduced later vs. Motivate and reduce	Other support vs. Motivate and reduce	Gave-up vs. Motivate and reduce
Effect of allocation to industry vs. public health information			
IND vs. PH	1.07 (0.66;1.71) 62%	0.93 (0.58;1.47) 63%	0.71 (0.41;1.22) 89%
Conditional associations with baseline characteristics			
Age	0.99 (0.97;1.01) 79%	0.97 (0.95;0.99) > 99.9%	0.96 (0.94;0.98) > 99.9%
Total weekly consumption	1.05 (1.02;1.07) 99%	1.03 (1.01;1.06) 99%	1.04 (1.01;1.08) 99%
Episodes of heavy drinking	1.03 (0.99;1.07) 99%	1.03 (0.99;1.07) 90%	1.07 (1.03;1.12) 89%
Man vs. Woman	0.61 (0.35;1.02) 97%	1.19 (0.74;1.92) 76%	0.64 (0.36;1.13) 93%
Not living alone no kids vs. not alone with kids	0.64 (0.33;1.16) 93%	1.14 (0.66;1.98) 69%	1.19 (0.62;2.37) 70%
Living alone no kids vs. not alone with kids	1.02 (0.55;1.87) 53%	0.96 (0.51;1.79) 55%	1.74 (0.88;3.57) 94%
Living alone with kids vs. not alone with kids	0.88 (0.37;1.88) 63%	1.02 (0.44;2.18) 52%	1.30 (0.53;3.13) 73%
Partner but not living togethervs. not alone with kids	2.02 (0.99;4.30) 97%	0.55 (0.17;1.35) 90%	0.81 (0.26;2.14) 67%
Confidence	0.82 (0.74;0.91) > 99.9%	0.85 (0.76;0.94) > 99.9%	0.99 (0.87;1.12) 58%
Importance	0.89 (0.75;1.07) 89%	1.04 (0.86;1.28) 65%	0.83 (0.68;1.02) 96%
Knowledge	1.01 (0.91;1.11) 55%	1.02 (0.92;1.12) 64%	0.90 (0.79;1.01) 96%

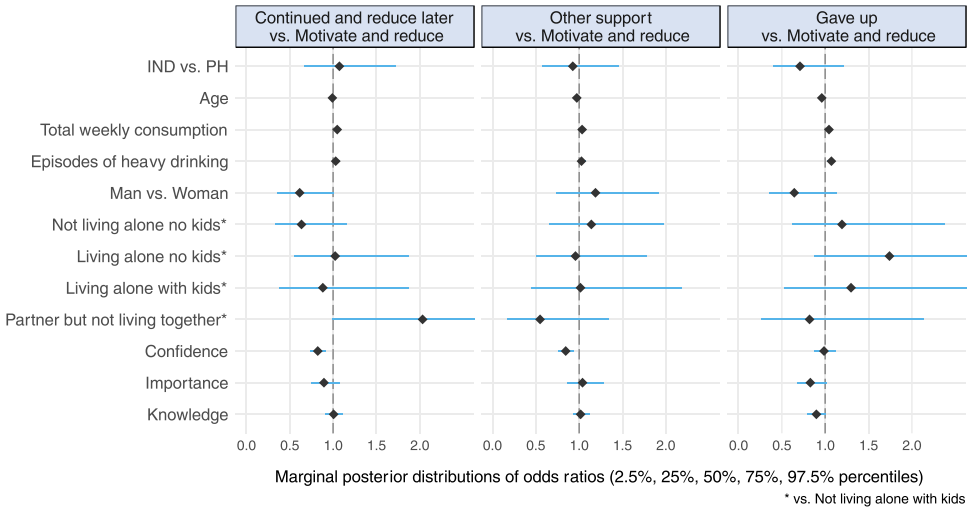

Fig. 3. Marginal posterior distributions of the covariate coefficients of the multinomial regression model for second reaction question ("Which one of the following alternatives best describes what you decided to do?"). The response option "*I decided to motivate myself and reduce my drinking*" was used as a reference category. Odds ratios (OR) above 1 indicate that the response option was more likely than the reference category.

women being more likely to report the information as not useful and that they did not look at the information. Older participants were also more likely to report having looked at the information and found it useful.

3.3. Reaction and alcohol consumption

Data on total weekly consumption and heavy episodic drinking within the groups defined by responses to the second reaction question are presented in Table 6. The median consumption at follow-up was markedly higher among those reported having decided to continue drinking as usual and those who gave up on the idea of reducing drinking in comparison to those who decided to motivate themselves and reduce their drinking and those who found other support. Table 7 presents estimates of adjusted incidence rate ratios (IRRs), with those who decided to motive themselves and reduce their drinking as reference. Using the posterior median as a point estimate of association: those responding that they decided to continue to drink as usual reported at follow-up a 67% higher weekly consumption and 82% higher frequency of heavy episodic drinking, with both estimates adjusted for the relevant baseline consumption measure. Similarly, those who gave up on the idea of reducing their drinking reported at follow-up a 74% higher weekly consumption and 58% higher frequency of heavy episodic drinking,

Table 5
Estimates of coefficients of the multinomial regression model for the third reaction question ("Did you look at the information that was given to you?"). The response option "I looked at the information and found it useful to reflect on my drinking" was used as reference category. Odds ratios (OR) above 1 indicate that the reference category was more likely than the response option. For instance, the IND group were more likely to respond that they did not find the information useful rather than they did not find it useful (in comparison to the PH group). The probability that this OR was greater than 1 was 74%.

	Posterior distribution: median, 2.5 and 97.5 percentiles probability of coefficient OR > /< 1		
	Not useful vs. Useful	Did not look vs. Useful	Do not know Vs. Useful
Effect of allocation to industry vs. public health information			
IND vs. PH	1.16 (0.74;1.82) 74%	1.00 (0.56;1.77) 51%	0.91 (0.57;1.44) 66%
Conditional associations with baseline characteristics			
Age	0.97 (0.95;0.99) > 99.9%	0.97 (0.94;0.99) > 99.9%	0.97 (0.95;0.99) > 99.9%
Total weekly consumption	1.03 (1.00;1.06) 99%	1.00 (0.97;1.04) 58%	1.00 (0.97;1.03) 59%
Episodes of heavy drinking	0.99 (0.96;1.03) 60%	1.02 (0.97;1.08) 83%	1.00 (0.95;1.04) 66%
Man vs. Woman	0.56 (0.33;0.91) > 99.9%	0.46 (0.23;0.88) > 99.9%	0.64 (0.39;1.05) 96%
Not living alone no kids vs. not alone with kids	0.69 (0.38;1.21) 90%	0.54 (0.23;1.12) 95%	0.89 (0.50;1.56) 66%
Living alone no kids vs. not alone with kids	1.04 (0.57;1.86) 55%	0.96 (0.45;1.94) 54%	1.34 (0.74;2.46) 83%
Living alone with kids vs. not alone with kids	1.41 (0.68;2.94) 82%	1.19 (0.47;2.86) 65%	1.29 (0.59;2.79) 75%
Partner but not living togethervs. not alone with kids	0.29 (0.07;0.80) > 99.9%	0.52 (0.14;1.35) 90%	0.89 (0.39;1.91)61%
Confidence	0.92 (0.83;1.02) 95%	0.91 (0.80;1.05) 90%	0.95 (0.86;1.06) 81%
Importance	0.90 (0.75;1.10) 85%	0.83 (0.67;1.04) 95%	0.79 (0.67;0.94) > 99.9%
Knowledge	0.95 (0.86;1.04) 87%	0.94 (0.83;1.06) 58%	0.88 (0.80;0.98) > 99.9%

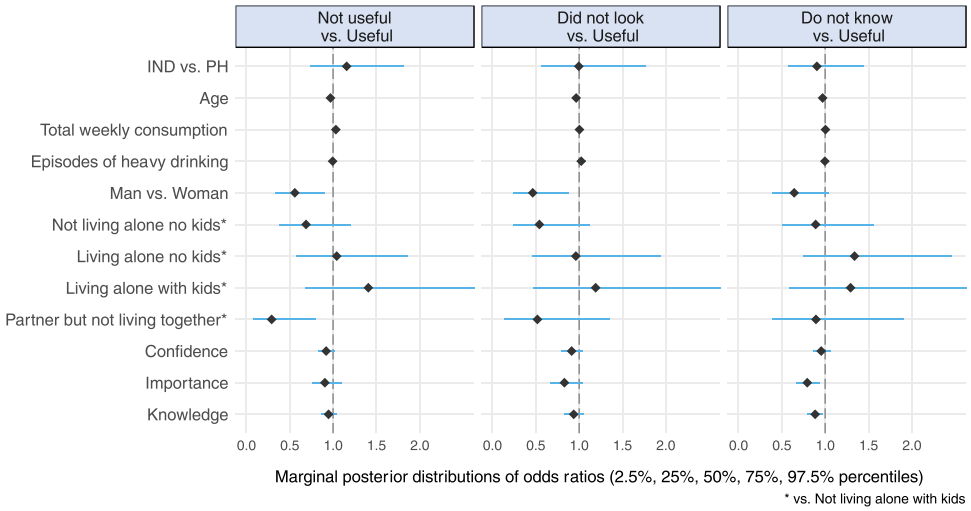

Fig. 4. Marginal posterior distributions of the covariate coefficients of the multinomial regression model for the third reaction question ("Did you look at the information that was given to you?"). The response option "I looked at the information and found it useful to reflect on my drinking" was used as a reference category. Odds ratios (OR) above 1 indicate that the response option was more likely than the reference category.

adjusted for the relevant baseline consumption measure. The probability of these IRRs being greater than 1 was more than 99.9%.

3.4. Qualitative analyses of comments

The findings on participants' experiences in the control group from the content analysis of free -text comments are presented in Table 8. We decided against analysing the two control groups (PH and IND) separately due to the sparse nature of the data after checking there were no major differences between them. The average comment was 13 words long, ranging from a minimum of 1 word and a maximum of 55 words. A total of 196 comments were collected from 164 participants.

3.5. Negative experiences of being allocated to waiting list

Participants articulated that the main reason why they joined the study was to get help to reduce their alcohol consumption. Having to wait for the new support was experienced as disappointment, and in some cases the participants felt deceived. Participants who did not think it was clear that they would be allocated to either the intervention or control group reacted with frustration or anger, as it induced feelings of being denied help.

Table 6
Total weekly consumption and heavy episodic drinking at four months post baseline comparing groups defined by responses to the second reaction question ("Which one of the following alternatives best describes what you decided to do?").

	Total weekly consumption (standard drinks past week)	Heavy episodic drinking (frequency past month)
	Median (IQR)	Median (IQR)
I decided to motivate myself and reduce my drinking.	7.5 (4; 12)	2 (1; 4)
I found other support that I used to reduce my drinking.	8 (0; 12)	3 (1; 5)
I decided to continue drinking as usual and to start reducing my drinking later when I was given access to the support tool.	16 (10; 24)	5.5 (4; 10)
I gave up on the idea of reducing my drinking.	18 (10; 24)	6 (3; 12)

3.6. Positive experiences of being allocated to waiting list

Having to wait for the intervention could also be considered as a positive, giving time to reflect on their own situation. Signing up for the study could also be considered the most important thing for one's own motivation for behaviour change, and which group they ended up in was not as important. Some participants stated that information about allocation was made clear and, therefore, did not express any negative experience and were instead interested in the provided material.

3.7. Motivated to decrease alcohol consumption

When the participants did not get access to the support immediately, some chose to search for help elsewhere. Some managed to reduce their alcohol consumption during the waiting time using, for example, therapy, websites, mobile applications, medication, or other drugs and

Table 7
Estimates of incidence rate ratios of total weekly consumption and heavy episodic drinking at four months post baseline comparing groups defined by responses to the second reaction question ("Which one of the following alternatives best describes what you decided to do?").

	Total weekly consumption (standard drinks past week)		Heavy episodic drinking (frequency past month)	
	Posterior distribution			
	Median, 2.5 and 97.5 percentiles	Probability IRR[a] > /< 1	Median, 2.5 and 97.5 percentiles	Probability IRR[a] > /< 1
Other support vs. Motivate and reduce	0.90 (0.73; 1.11)	83.7%	1.05 (0.84; 1.33)	66.3%
Continued and reduce later vs. Motivate and reduce	1.67 (1.36; 2.06)	> 99.9%	1.82 (1.47; 2.27)	> 99.9%
Gave-up vs. Motivate and reduce	1.74 (1.38; 2.20)	> 99.9%	1.58 (1.22; 2.04)	> 99.9%

[a] Incidence rate ratios (IRRs) estimated using negative binomial regression, adjusted for age, sex, marital status, confidence, importance, knowledge, and the alcohol measure at baseline.

Table 8
Sub-categories and categories formed from content analysis of free-text comments.

Sub-category (occurrences of codes)	Category (occurrences of codes)
Feelings of being deceived by allocation (3)	Negative experience of being allocated to waiting list (56)
Disappointed at not getting access to support tool immediately (27)	
Frustration at not receiving anything (26)	
Inspired and motivated just to participate in a study (9)	Positive experience of being allocated to waiting list (22)
Interested in the received information (5)	
Did not care about allocation (8)	
Found support elsewhere (51)	Motivated to decrease alcohol consumption (105)
Decreased on one's own (54)	
Did not find help elsewhere (9)	Demotivated and did not find help elsewhere (24)
Gave up because of lack of support (3)	
Was not able to motivate oneself (12)	

substances. Some participants decided to change their behaviour without support. Economic reasons, family and health were the main sources of motivation reported.

3.8. Demotivated and did not find help elsewhere

Among those who continue to consume alcohol without reducing consumption, not being given access to the support was demotivating. These participants expressed difficulties in trying to quit on their own, as the support that is already available was not always felt to be sufficient.

4. Discussion and conclusion

4.1. Discussion

Contrasting individuals randomly allocated to two different presentations of basic alcohol and health information revealed no statistically significant differences in self-reported reactions to being allocated to a waiting list control group. The lack of difference observed in the planned analysis suggests the detailed ways in which one is made to wait in a trial may matter much less than the fact of being made to wait. Post-hoc ancillary analyses did suggest that those receiving such information in the manner routinely provided by industry sources were subsequently more likely to be indifferent towards control group allocation rather than being interested in the provided information, in comparison to those who received a more straightforward public health message. The industry material emphasised possible complexities associated with the short- and long-term effects of alcohol [24], and both the industry and public health brief text messages were directly concerned with violence and cancer (see Appendix B). Please note that the differential interest in the materials in the post-hoc findings attests to the possibility of reactions undetected in the planned comparison. In this connection, do bear in mind that the main trial findings showed that both groups were equally likely to follow the provided link in the health information, and there were no marked differences in alcohol consumption measures at follow-up between the two groups [18].

While waiting list control groups have been proposed as a means to avoid the ethical dilemmas involved in withholding treatment from controls [5], in this study we found that it induces negative experiences that are difficult to overlook. These present both ethical and methodological issues that warrant deeper explorations [25]. Participants in our study expressed feeling frustrated when not being given access to the new support tool, the main reason for participation for many, and these reactions were not inert in respect of intentions to drink less, with which they were seeking help. The degree to which these negative experiences varied in exploratory analyses depending on participants' sex, age, baseline alcohol consumption, and confidence in their own ability to reduce their drinking. Furthermore, after adjusting for baseline, alcohol consumption at follow-up was markedly higher among those whose intentions to reduce drinking changed in reaction to being allocated to the waiting list, in comparison to those who decided to motivate themselves and reduce their drinking. N.B. the reactions data are retrospective in nature.

Our findings are in line with previous research which has shown that being allocated to a waiting list control group may evoke feelings of being denied support and disappointment [7,26], and that participants can decide to wait to attempt to change until receiving the support sought [7]. It has been suggested that participants on waiting lists are, to some extent, under the impression that they are expected to wait to change until receiving the intervention, resulting in participants putting less effort into change [27]. Direct evidence of this phenomenon was found in one exploratory trial [28], which showed that participants who rated themselves as ready to change their alcohol consumption, and who were allocated to a waiting list group, waited to reduce their drinking. This problematic nature of this issue may be exacerbated when waitlist participants are asked to refrain from involvement in other treatments, which may lessen people's natural help-seeking behaviours [29], and particularly for those whose health problems are more severe, and are more in need of help. Although care needs to be taken in interpretation of the reactions data, the present findings point towards harmful effects of being made to wait; 28% of participants had markedly higher consumption at follow-up relative the rest, after having joined the study hoping to reduce it. This study also provides further data to indicate that the potential for such reactions may also be contingent on the detailed content of the waiting list content. In any case, the use of alcohol industry originated material in health or research contexts is problematic in view of the ways business and political interests are quietly pursued [30–34]. The ways we do our research may involve accepted and indeed widespread practices that incorporate a wider range of overlooked biases [35–38].

4.1.1. Limitations

The data for this study was collected at the final follow-up of the trial four months post-randomisation. It is therefore to some extent likely that participants' recall of their experiences does not fully reflect their earlier experiences. Thus, while responses to the questions and free-text comments provide helpful insights into participants' reactions, they are subject to recall bias. This was a necessary design choice, as we had reason to believe that asking such questions before trial participation had ended may have inadvertently biased the main trial within which this study was nested. Please note that the items used to assess reactions have not been pilot tested or formally validated. Additionally, as data was only collected during the trial period, no outcomes were measured post-intervention delivery for the control group. Thus, any impacts of being allocated to the waitlist control group had on longer term outcomes were not measured. Negative consequences of waiting may be negated by later receiving the intervention. If so, and how far, could be addressed in future studies.

Ensuring high response rates in online trials is challenging, and this study also experienced high attrition. Responses to the questionnaires was collected from 52% of all control group participants, which implies a high risk of attrition bias. Responders were broadly representative of the entire control group with respect to baseline characteristics, however, this does not guarantee that responders and non-responders were unlike one another with respect to other unmeasured variables. Attrition was higher still for the free-text comments.

Finally, we suggest this study involves a weaker experimental contrast than could be performed. One could imagine a study in which participants were acutely aware that they were being made to wait for an intervention they highly valued and were eager to access. In such a situation, one may find that waiting list harmful effects are more pronounced. This is however to be studied in future trials, and there are obvious ethical issues to be considered in advance of the conduct of such studies.

4.2. Conclusion

We found no strong evidence indicating that differential presentation of basic health information affected reactions to waiting list control group allocation. We found strong evidence that being made to wait may invite negative research participation effects that are routinely ignored. Further study of these issues is important because this study adds to existing evidence demonstrating the possible nature and magnitude of harm arising out of being made to wait during research participation.

4.3. Practice implications

Guidance on the use of waiting list control groups in behavioural trials should be updated to reflect proof of concept and growing empirical evidence showing negative consequences of their use. The contrast between immediate access and waiting list may be inflated where participants allocated to the control group are made to wait to in ways that would not happen if they had not participated in the trial.

CRediT authorship contribution statement

Katarina Ulfsdotter Gunnarsson: Writing – original draft, Data curation, Investigation, Validation, Writing – review & editing. **Jim McCambridge:** Conceptualization, Methodology, Investigation, Writing – review & editing. **Marcus Bendtsen:** Conceptualization, Methodology, Data curation, Investigation, Supervision, Validation, Writing – review & editing.

Conflicts of interest

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. Services developed and maintained by Alexit AB were used for sending text messages and data collection. KUG and JM declare no competing interests.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.pec.2022.11.014.

References

[1] Moher D, Hopewell S, Schulz KF, Montori V, Gotzsche PC, Devereaux PJ, et al. CONSORT 2010 Explanation and Elaboration: updated guidelines for reporting parallel group randomised trials. BMJ 2010;340. c869–c869.
[2] Mohr DC, Spring B, Freedland KE, Beckner V, Arean P, Hollon SD, et al. The selection and design of control conditions for randomized controlled trials of psychological interventions. Psychother Psychosom 2009;78(5):275–84.
[3] McCambridge J, Bendtsen M, Karlsson N, White IR, Nilsen P, Bendtsen P. Alcohol assessment and feedback by email for university students: main findings from a randomised controlled trial. Br J Psychiatry J Ment Sci 2013;203(5):334–40.
[4] Freedland KE, King AC, Ambrosius WT, Mayo-Wilson E, Mohr DC, Czajkowski SM, et al. The selection of comparators for randomized controlled trials of health-related behavioral interventions: recommendations of an NIH expert panel. J Clin Epidemiol 2019;110:74–81.
[5] Elliott SA, Brown JSL. What are we doing to waiting list controls? Behav Res Ther 2002;40(9):1047–52.
[6] Lindström D, Sundberg-Petersson I, Adami J, Tönnesen H. Disappointment and drop-out rate after being allocated to control group in a smoking cessation trial. Conte Clin Trials 2010;31(1):22–6.
[7] Müssener U, Linderoth C, Bendtsen M. Exploring the experiences of individuals allocated to a control setting: findings from a mobile health smoking cessation trial. JMIR Hum Factors 2019;6(2).
[8] Grant JB, Mackinnon AJ, Christensen H, Walker J. Participants' perceptions of motivation, randomisation and withdrawal in a randomised controlled trial of interventions for prevention of depression. J Med Ethics 2009;35(12):768–73.
[9] Furukawa TA, Noma H, Caldwell DM, Honyashiki M, Shinohara K, Imai H, et al. Waiting list may be a nocebo condition in psychotherapy trials: a contribution from network meta-analysis. Acta Psychiatr Scand 2014;130(3):181–92.
[10] Kaner EF, Beyer FR, Muirhead C, Campbell F, Pienaar ED, Bertholet N, et al. Effectiveness of brief alcohol interventions in primary care populations. Cochrane Database Syst Rev 2018;2018(2).
[11] Bendtsen M. Text messaging interventions for reducing alcohol consumption among harmful and hazardous drinkers: protocol for a systematic review and meta-analysis. JMIR Res Protoc 2019;8(4):e12898.
[12] McCambridge J, Garry J, Room R. The origins and purposes of alcohol industry social aspects organizations: insights from the tobacco industry documents. J Stud Alcohol Drugs 2021;82(6):740–51.
[13] Petticrew M, Maani Hessari N, Knai C, Weiderpass E. The strategies of alcohol industry SAPROs: inaccurate information, misleading language and the use of confounders to downplay and misrepresent the risk of cancer. Drug Alcohol Rev 2018;37(3):313–5.
[14] Peake L, van Schalkwyk MCI, Maani N, Petticrew M. Analysis of the accuracy and completeness of cardiovascular health information on alcohol industry-funded websites. Eur J Public Health 2021;31(6):1197–204.
[15] Petticrew M, Maani N, Pettigrew L, Rutter H, Schalkwyk MC VAN. Dark nudges and sludge in big alcohol: behavioral economics, cognitive biases, and alcohol industry corporate social responsibility. Milbank Q 2020;98(4):1290–328.
[16] McCambridge J, Garry J, Kypri K, Hastings G. 'Using information to shape perception': tobacco industry documents study of the evolution of Corporate Affairs in the Miller Brewing Company. Glob Health 2022;18(1):52.
[17] Bendtsen M, McCambridge J. Reducing alcohol consumption among risky drinkers in the general population of Sweden using an interactive mobile health intervention: protocol for a randomized controlled trial. JMIR Res Protoc 2019;8(4):e13119.
[18] Bendtsen M, Åsberg K, McCambridge J. Effectiveness of a digital intervention versus alcohol information for online help-seekers in Sweden: a randomised controlled trial. BMC Med 2022;20(1):176.
[19] National Board of Health and Welfare. Stöd för samtal om alkohol [Internet]. Socialstyrelsen. [cited 2022 Sep 8]. Available from: https://www.socialstyrelsen.se/kunskapsstod-och-regler/regler-och-riktlinjer/nationella-riktlinjer/riktlinjer-och-utvarderingar/levnadsvanor/stod-i-arbetet/samtal-om-alkohol/.
[20] R: The R Project for Statistical Computing [Internet]. Available from: https://www.r-project.org/.
[21] Stan Development Team. Stan Modeling Language Users Guide and Reference Manual [Internet]. 2022. Available from: //mc-stan.org/.
[22] Bendtsen M. A gentle introduction to the comparison between null hypothesis testing and Bayesian analysis: reanalysis of two randomized controlled trials. J Med Internet Res 2018;20(10):e10873.
[23] Elo S, Kyngäs H. The qualitative content analysis process. J Adv Nurs 2008;62(1):107–15.
[24] Petticrew M, Katikireddi SV, Knai C, Cassidy R, Maani Hessari N, Thomas J, et al. 'Nothing can be done until everything is done': the use of complexity arguments by food, beverage, alcohol and gambling industries. J Epidemiol Community Health 2017;71(11):1078–83.
[25] McCambridge J, Kypri K, Bendtsen P, Porter J. The use of deception in public health behavioral intervention trials: a case study of three online alcohol trials. Am J Bioeth AJOB 2013;13(11):39–47.
[26] McCambridge J, Sorhaindo A, Quirk A, Nanchahal K. Patient preferences and performance bias in a weight loss trial with a usual care arm. Patient Educ Couns 2014;95(2):243–7.
[27] Gold SM, Enck P, Hasselmann H, Friede T, Hegerl U, Mohr DC, et al. Control conditions for randomised trials of behavioural interventions in psychiatry: a decision framework. Lancet Psychiatry 2017;4(9):725–32.
[28] Cunningham JA, Kypri K, McCambridge J. Exploratory randomized controlled trial evaluating the impact of a waiting list control design. BMC Med Res Method 2013;13(1):150.
[29] Patterson B, Boyle MH, Kivlenieks M, Van, Ameringen M. The use of waitlists as control conditions in anxiety disorders research. J Psychiatr Res 2016;83:112–20.
[30] McCambridge J, Coleman R, McEachern J. Public health surveillance studies of alcohol industry market and political strategies: a systematic review. J Stud Alcohol Drugs 2019;80(2):149–57.
[31] Bartlett A, McCambridge J. Appropriating the literature: alcohol industry actors' interventions in scientific journals. J Stud Alcohol Drugs 2021;82(5):595–601.
[32] Bartlett A., McCambridge J. Doing violence to evidence on violence? How the alcohol industry created doubt in order to influence policy. Drug Alcohol Rev. 41 (1):144–152.
[33] Madden M, McCambridge J. Alcohol marketing versus public health: David and Goliath? Glob Health 2021;17(1):45.
[34] McCambridge J, Kypri K, Drummond C, Strang J. Alcohol harm reduction: corporate capture of a key concept. PLoS Med 2014;11(12):e1001767.
[35] Felix L, Keating P, McCambridge J. Can obtaining informed consent alter self-reported drinking behaviour? A methodological experiment. BMC Med Res Method 2015;15:41.

[36] McCambridge J, Kypri K, Elbourne D. Research participation effects: a skeleton in the methodological cupboard. J Clin Epidemiol 2014;67(8):845–9.
[37] Kypri K, McCambridge J, Wilson A, Attia J, Sheeran P, Bowe S, et al. Effects of study design and allocation on participant behaviour - ESDA: study protocol for a randomized controlled trial. Trials 2011;12(1):42.
[38] McCambridge J, Kypri K, Elbourne D. In randomization we trust? There are overlooked problems in experimenting with people in behavioral intervention trials. J Clin Epidemiol 2014;67(3):247–53.