PROTOCOL

Health4Her-Automated: A novel scalable brief intervention to address alcohol intentions and consumption among women attending breast screening services

ClinicalTrials.gov Registration Number: NCT06019442
Protocol Version # and date: **Version 4, 11th August 2023**

Revision Chronology:

Date of change	Summary of changes
8th November 2022	Version 1: original document
1st February 2023	Version 2: further elaboration in line with HREC pre-review regarding limited disclosure and how this will be addressed in the summary report available to trial participants at study end.
16th March 2023	Version 3: Addition of a small pilot group (n~20) unable to participate on the day of screening, who are willing to complete a modified version of the active intervention offsite, thereby addressing potential issues with implementation identified in the previous phase of this research. New exclusion criterion: women who participated in the previous Health4Her study will be excluded from participating in H4H-A.
11th August 2023	Version 4: Update intervention description based on breast screening service consumer feedback. Addition of electronic summary information sent after intervention delivery. Update data security information. Addition of two secondary outcomes to assess change in the *proportion* of participants intending to reduce their alcohol consumption, and amendment to one literacy outcome in line with new intervention content.

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Statement of Compliance

This document is a protocol for a research project. This study will be conducted in compliance with all stipulation of this protocol, the conditions of the ethics committee approval, the NHMRC National Statement on Ethical Conduct in Human Research (2007) and the Note for Guidance on Good Clinical Practice (CPMP/ICH-135/95).

CONTENTS

1 ADMINISTRATIVE INFORMATION

1.1. TRIAL REGISTRATION

Trial to be registered with ClinicalTrials.gov, registration number: NCT06019442

1.2. EXPECTED DURATION OF STUDY

This study is expected to take 12-months to complete (6-months to complete collaborative design and automation of the Health4Her platform; 6-months to conduct the effectiveness-implementation trial, and analyse the results)

2 INTRODUCTION AND BACKGROUND

Alcohol is a major modifiable risk factor for breast cancer in women (4.4% breast cancer cases globally and 5.8% breast cancer cases in Australia are attributable to alcohol consumption) (1, 2), even in low amounts (3). Yet, population awareness of this risk remains low (<20%) (4, 5).

In Australia, per capita alcohol consumption is declining, yet risky drinking including daily drinking has remained stable among women aged 40+ years, and has even increased among those aged 50-69 years (6). While consumption earlier in life is also relevant to breast cancer development, recent intake is a determinant of breast cancer risk (7, 8), particularly after age 40 where consumption is strongly associated with breast cancer risk (7). Further, among women with a breast cancer history, alcohol intake of <1 standard drink per day is associated with an increased risk of breast cancer recurrence (9). Despite this, mid-older age women's drinking remains largely under-recognised (10) and has not been a target of breast cancer prevention efforts.

Alcohol brief interventions are recommended in the recently updated Australian guidelines for the treatment of alcohol use problems (11), and there is an expansive literature demonstrating their effectiveness in improving alcohol literacy and reducing consumption when delivered in general practice settings (12, 13). However, multiple barriers to their implementation remain (e.g. longer consultations are not adequately remunerated, training is suboptimal, and treatment services are not readily available when advice or referral is required), and there has been a call for other health profession involvement in responding to harmful alcohol consumption and leading clinical practice change to reduce alcohol-related harms (14). Population-based breast screening programs are uniquely positioned to provide timely and targeted health information and behaviour change strategies to improve women's alcohol literacy and reduce consumption; the screening appointment can act as a window of opportunity to increase engagement with breast cancer risk reduction information. With approximately 43 million women participating in breast screening each year in Australia, the US and UK alone, this setting has potential for extensive reach.

We recently completed a world-first trial (N=558), funded by VicHealth and the Eastern Health Foundation, supported by Maroondah BreastScreen (trial site) and BreastScreen Victoria, and approved by the Eastern Health Human Research Ethics Committee (LR19/011/50551), to test the effectiveness of a prototype of an electronic alcohol brief intervention (Health4Her; researcher-

administered screening alcohol questions, intervention activated by the researcher for the participant to view on an iPad alone). The electronic alcohol brief intervention model was chosen to minimise disruption to service workflow and need for human resource to implement within the busy breast screening environment. In this trial, participants reported poor alcohol literacy (4 in 5 did not have knowledge of the alcohol-breast cancer link) and a desire for more information. The Health4Her intervention was found to be highly acceptable to breast screening service consumers. For the primary outcome, there were significant increases in the proportion of participants accurately identifying alcohol as a clear breast cancer risk factor from baseline to 4-weeks in intervention (OR=41.82, 95% CI=17.76, 98.49, p<0.001) and control (OR=4.92, 95% CI=2.75, 8.79, p<0.001) arms, with a significantly greater increase in the intervention arm ($p_{armXtime}$<0.001) (Findings are currently under peer-review for publication). BreastScreen staff were highly supportive of the Health4Her intervention as part of routine care, however, the manually delivered intervention, dependent on dedicated human resource to administer, was considered unviable to implement in practice.

As such, the overall aim of this study is to i) collaboratively design an automated alcohol brief intervention with women who participate in breast screening, ii) examine its effects on drinking intentions and alcohol consumption among women attending breast screening service for routine mammography and iii) understand the factors affecting intervention implementation using mixed-methods program evaluation.

3 STUDY OBJECTIVES

Our specific objectives are as follows:

1. Collaboratively design an automated alcohol brief intervention (Health4Her-Automated; H4H-A) with women who participate in breast screening and, after development, test the prototype, seek feedback, and refine the final product.
2. Examine intervention effectiveness on drinking intentions, alcohol literacy and alcohol consumption among women attending a breast screening service for routine mammography.
3. Evaluate the intervention's reach, uptake, feasibility and acceptability.

3.1 RANDOMISED CONTROLLED TRIAL OUTCOMES/HYPOTHESES

Primary outcome/hypothesis:

a) *Change in next-month drinking intentions (primary outcome)*: we hypothesise that there will be a greater change in the extent to which participants intend to reduce the amount of alcohol they consume among intervention participants, relative to control, between baseline and immediately post-intervention (likert scale response item) (15).

Secondary outcomes / hypotheses:

b) *Change in next-month drinking intentions*: we hypothesise that there will be a greater change in the extent to which participants intend to reduce the amount of alcohol they consume

among intervention participants, relative to control, between baseline and 4-weeks post-intervention (likert scale response item) (15).

c) *Change in drinking intentions – standard drinks*: we hypothesise that there will be a greater reduction in the intended number of standard drinks consumed over the next month among intervention participants, relative to control, between baseline and 4-weeks (quantity/frequency response items) (16).
d) *Proportion of participants intending to reduce alcohol consumption*: we hypothesise that there will be a greater change in the *proportion* of intervention participants, relative to control, intending to reduce their next-month alcohol consumption between baseline and immediately post-intervention (15).
e) *Proportion of participants intending to reduce alcohol consumption:* we hypothesise that there will be a greater change in the *proportion* of intervention participants, relative to control, intending to reduce their next-month alcohol consumption between baseline and 4-weeks (15).
f) *Change in knowledge of alcohol as a breast cancer risk factor (alcohol-breast cancer literacy)*: we hypothesise that there will be a greater change in the proportion of intervention participants accurately identifying alcohol as a risk factor for breast cancer between baseline and 4-weeks, compared to control participants.
g) *Change in alcohol literacy*: we hypothesise that there will be a greater change in the proportion of intervention participants, relative to control participants, accurately identifying the i) the increased breast cancer risk associated with drinking one average restaurant serve of wine a day; ii) number of standard drinks in an average restaurant serve of red wine; iii) maximum number of standard drinks per week recommended by current Australian Alcohol Guidelines between baseline and 4-weeks.
h) *Change in alcohol consumption*: among women who have had an alcohol drink in the past month, we hypothesise that there will be a greater reduction in alcohol consumption among intervention participants relative to control participants, between baseline and 4- weeks.
i) *Change in knowledge of other breast cancer risk factors*: we hypothesise that, in both intervention and control arms, there will be a significant increase in the proportion of participants accurately identifying inactivity and excess weight as risk factors for breast cancer between baseline and 4-weeks. (This represents a potential value-add of the intervention among women in the control group, and those who do not drink alcohol).

4 STUDY DESIGN

This will be a hybrid type II effectiveness-implementation trial (17, 18) comprising a randomised controlled trial alongside a mixed-methods program evaluation, guided by applicable elements of the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework, Consolidated Framework for Implementation Research (CFIR) (19, 20) and Non-adoption, Abandonment, Scale-up, Spread, and Sustainability (NASSS) framework (21).

4.1 COLLABORATIVE DESIGN OF H4H-A

Study design: We will use an iterative, qualitative participatory design to co-produce and test the H4H-A intervention and research procedures with breast screening service consumers.

Setting: Researchers conducting collaborative design focus groups will be based at Turning Point, a national addiction treatment and research centre in Melbourne, Australia. Focus groups will be conducted onsite or online.

Participants: Also utilised to inform our pilot trial, breast screening service consumers will be recruited predominantly from the Lifepool breast screening cohort (N=54,000) using systematic, purposive sampling to achieve representation of consumers from health inequity groups (e.g. rural, remote and regional consumers, CALD consumers).

Data collection and analyses: Participatory co-design prioritises collaboration with target audiences to design successful products, systems, and services (22). A series of in-person and/or online collaborative design semi-structured workshops (incorporating ideas-generating and problem-solving activities) will be held with breast screen service consumers to identify issues related to automated alcohol brief intervention offered in the breast screening setting, and define what is needed to make a successful intervention. Ideas will be generated for intervention design, trial and dissemination in practice, to create and refine the intervention prototype and, after development, test the prototype, seek feedback, and refine the final product. Workshops will be audio-recorded, and transcribed verbatim. Workshop transcriptions, observations, and interactive data will be organised using NVivo, with data analysed using deductive thematic analysis. Interim data analyses and observations will feed-forward to subsequent workshops and inform intervention creation/testing.

4.2 RANDOMISED CONTROLLED TRIAL OF H4H-A

Study design: A single site, double-blind, parallel-group randomised controlled trial, comprising baseline and 4-week follow-up assessments.

Setting and participants: This trial will aim to recruit at least 78 participants (39 per trial arm). Women attending Maroondah BreastScreen for routine mammography (throughput ~65/screening day), aged 40+ years, with or without a breast cancer history, and drinking at any level of alcohol consumption will be eligible to participate after they complete their screening appointment. ***Exclusion criteria:*** Women not able to read or comprehend English to enable participation, or who do not have access to computer, tablet or smartphone to complete the follow-up assessment, will be excluded from this iteration of the research. Women who are pregnant will be excluded (also an exclusion of breast screening). Women who participated in the previous Health4Her study will also be excluded (a woman can provide her name to the recruitment researcher for cross-checking against the previous participant list if she is unsure of previous participation. The same recruitment researcher that was onsite for the previous study will be onsite for this study. The researcher will exercise care to ensure security and privacy measures are used, i.e. the list will only include name and year of birth; the list

will be hosted on a secure server managed by Monash University eSolutions and accessible to only the recruiting researcher via a secure login; the list will never be shown to potential participants).

Recruitment: Maroondah BreastScreen reception staff will provide a reminder text message one day prior to recruitment days to flag the study occurring onsite (as well as serving to confirm appointment attendance). Upon arrival at Maroondah BreastScreen, the receptionist will query whether women are aware of the study and provide them with a study flyer to read while waiting for their appointment. Study posters will also be visible on the waiting room notice board and in the screening rooms. At the end of the screening appointment, the radiographer will ask whether the client would like to hear more about the study from the onsite researcher / be involved, and if the client agrees or has further questions, the radiographer will introduce the client to Researcher 1.

Randomisation, interventions and procedure: The study will be described as the "Health4Her women's health study" to minimise the salience of the trial's alcohol focus, and to increase its relevance for all women. In the active and control arms, participants will be provided with an iPad and earbuds, and will self-complete consent (via a landing page) and baseline assessment before being randomly assigned (1:1 allocation ratio, utilising a "permuted blocks of variable size" scheme embedded in the iPad) to receive 1) ~4 minutes of alcohol brief intervention plus ~3 minutes of lifestyle information (active arm: H4H-A), or 2) ~3 minutes of lifestyle information not inclusive of alcohol information (control arm) via interactive animation. An assessment immediately post-intervention will be completed on the iPad (comprising only the set of intention questions containing the primary outcome item). A 4-week follow-up assessment will be completed offsite via online survey, with the follow-up researcher prompting/assisting with survey completion when required.

> ***Alcohol brief intervention (active arm):*** Finalised through the collaborative design process, and based on brief intervention and applied behaviour change principles, the alcohol brief intervention will include information and behaviour-change content regarding alcohol consumption such as: messaging around alcohol risks/harms, positive-framed messaging on the health benefits of reducing alcohol intake, and behaviour change strategies (e.g. drink counting, goal setting, behaviour substitution, problem solving) (12, 23-26). This iteration of the research provides an opportunity to refine and add to the evidence-based intervention elements utilised in the pilot (e.g. provide the intervention in 'chunks', where the participant will view 1-2 minutes of animation before completing a brief activity such as setting goals or problem solving strategies), with the goal of strengthening intervention response. **NB.** H4H-A will be aligned with the National Health and Medical Research Council's recently revised Australian Alcohol Guidelines (i.e. no more than 10 standard drinks per week, with the message 'the less you drink, the lower your risk of alcohol-related harm'). Post-session information will be provided via email (i.e. an electronic brochure summarising alcohol brief intervention content).
>
> ***Lifestyle information (control and active arm):*** Finalised through the collaborative design process, potential elements will be: information on physical activity and maintaining a healthy weight, which can also reduce breast cancer risk (27, 28). Post-session information will be provided via email (i.e. an electronic brochure on nutrition for maintaining a healthy weight).

Implementation evaluation of a modified active arm: This pilot group does not form part of the planned randomised controlled trial or power and sample size calculation, but is included based on findings from the previous phase of this research. A theme from the previous program evaluation was that there may be some barriers to implementing the intervention onsite in practice, due to i) women not having time to complete the intervention onsite, and ii) there being not enough space to implement the intervention at smaller services. Therefore, a small group of women (n~20) who cannot participate on the day of screening (e.g. due to other commitments, paid parking timing out, etc. as identified in the previous study) will be offered to participate in the modified active arm *offsite*. Women who agree to take part in this element of the research will access the intervention after their appointment using their personal device (e.g. computer, iPhone, iPad) and will be offered a QR code before leaving the breast screening setting and/or sent a text/email following their appointment with the link to the Health4Her-Automated platform, to receive the participant information sheet, and complete verbal consent, baseline assessment and alcohol brief intervention. While the two-arm trial remains the main focus of this study (i.e. testing the benefits of an alcohol and lifestyle brief intervention offered to women attending breast screening, which can act as a window of opportunity to increase engagement with breast cancer risk reduction information), the addition of the modified active arm will permit evaluation of this alternative implementation approach.

Power and sample size estimate:

While this study will examine reach, uptake, feasibility and acceptability as important end-points, it will be powered to test the effectiveness of H4H-A in decreasing women's drinking intentions. The sample size has been calculated using data from a previous, related study examining the effects of alcohol warning information about the alcohol-breast cancer link on drinking intentions (15). Using a Likert 5-point response scale (1 = not at all, 5 = to a very great extent, this study showed that the warning information, *Alcohol increases your risk of breast cancer*, increased participants' intention to reduce the amount of alcohol they consume from a pre-exposure mean of 2.37 (SD = 1.18) to a post-exposure mean of 2.63 (SD = 1.22).

Given some differences in the previous study (i.e. the message about alcohol and breast cancer risk was not personally relevant to the whole sample comprising males and females 18-65 years; a single health message was provided, which is different to the Health4Her intervention containing several 'active ingredients' based on alcohol brief intervention and applied behaviour change principles), we anticipate a greater increase in participants' intention to reduce the amount of alcohol they consume in the current study. Further, based on our previous research, we anticipate some assessment reactivity among the control group.

Power and sample size estimations were conducted using General Linear Mixed Model Power and Sample Size (GLIMPSE) software. We estimate (factoring in 5% attrition, and 30% of women attending breast screening who do not drink or have not drank in the past month) that a total sample size of at least 78 (39 per group) will have 80% power (α <0.05) (a total sample size of 90 [45 per group] will provide 85% power, α <0.05) to detect a change in women's drinking intentions of 2.37 to 3.37 (change = 1.00) in the intervention group, and a change of 2.37 to 2.63 (change = 0.26) in the control group between baseline and immediately post-intervention. Therefore, this study will aim to recruit a total

sample size of at least 78 participants. Based on the barriers to participation and implementation identified in the previous phase of this research, the current study will provide an opportunity to collect some pilot data to inform scaled up research and implementation, to provide an indicator of outcomes for participants who complete a modified version of the alcohol brief intervention offsite using their own personal device (n~20).

Statistical analyses: A full Statistical Analyses Plan will be developed prior to trial commencement. All statistical tests will be two-tailed, with the alpha level set to 0.05 and analyses conducted using the most appropriate procedures in Stata or R. All randomised participants will be included in the analyses (i.e. intention-to-treat) for primary and secondary outcomes. Analyses will examine change in outcomes over time (baseline, immediately post-intervention, 4-weeks). For intention outcomes, we will examine differences in responses according to baseline alcohol consumption risk status (i.e. drinking at a level within/exceeding current national alcohol guidelines). For alcohol outcomes, sensitivity analyses will be performed for women who a) report drinking any alcohol in the past month, and b) are identified to be drinking at a level exceeding current national guidelines for weekly and/or single day consumption. The Generalised Linear Mixed Model approach with fixed effects for treatment and time, and their interaction, and random effects for subjects and assessments within subjects, will be applied to examine the treatment effect of the intervention on all outcomes.

4.3 PROGRAM EVALUATION

Study design: A comprehensive mixed-methods program evaluation will be undertaken utilising quantitative and qualitative data (i.e. trial / screening service administrative data, quantitative and qualitative feedback from trial participants, qualitative feedback from Maroondah BreastScreen staff).

Participants: Quantitative feedback will be collected from all trial participants via the 4-week follow-up online survey. Qualitative feedback will be collected from a subset of participants (semi-structured telephone interviews), site staff and managers involved in implementation (focus groups) post-trial.

Program evaluation data collection and analyses: Summary statistics of trial administrative data (e.g. rate of uptake, engagement without assistance, level of assistance needed, reasons for nonparticipation, participant characteristics, rate of alcohol/breast cancer risk reduction information-sharing with friends/family) will be presented. Applicable elements of the RE-AIM (20), CFIR (19) and/or NASSS (21) implementation research frameworks will be used to guide the development of semi-structured participant interviews and staff focus groups, and interpretation of feedback. Interviews and focus groups will be audio-recorded and transcribed verbatim. Data will be organised using NVivo, and analysed using deductive thematic analysis.

5 CONSENT

5.1 PARTICIPATION IN THE COLLABORATIVE DESIGN OF H4H-A

For participation in a collaborative design workshop, researchers will provide a written (via email or post) and verbal explanation (aims, process, potential benefits and risks). Potential participants will

have the opportunity to discuss the study and ask questions. Participants will be advised that they can withdraw from the study at any time and that their decision whether to take part or not to take part, or to take part and then withdraw, will not affect their relationship with Eastern Health. The researcher will seek verbal informed consent from the individual to a) participate in the interview, and b) have their interview audio-recorded, with the understanding that the data they provide (i.e. what they say, demographic information provided) will only be used in an anonymised format (i.e. in such a way that they cannot be identified) in reports, publications and/or presentations that arise from this project.

5.2 PARTICIPATION IN THE RANDOMISED CONTROLLED TRIAL OF H4H-A

For participation in the randomised controlled trial, an explanation of the trial will be embedded at the start of intervention participation (aims, process, potential benefits and risks). Participants will be advised via the embedded explanation that they can withdraw from the study at any time without prejudice and that their decision whether to take part or not to take part, or to take part and then withdraw, will not affect their routine care or their relationship with Maroondah BreastScreen or Eastern Health. Potential participants will have the opportunity to discuss the trial with a researcher and ask questions.

Women who are willing to take part will provide consent to participate in the study via check-boxes at the start of intervention participation. Participants will be asked to provide consent to the following items: 1) I consent to participate in the computer survey and receive health promotion as part of the "Health4Her women's health study". 2) I consent to participate in a follow-up survey via email in 4 weeks' time (a researcher can help me if I need). 3) I consent to participate in a telephone interview about the study, if I am selected to do so.

A copy of the participant information sheet will be provided to the participant (link embedded at start of intervention, and emailed). The consent process and participation in study procedures will occur after the participant's breast screen appointment, so as to not interfere with routine service delivery.

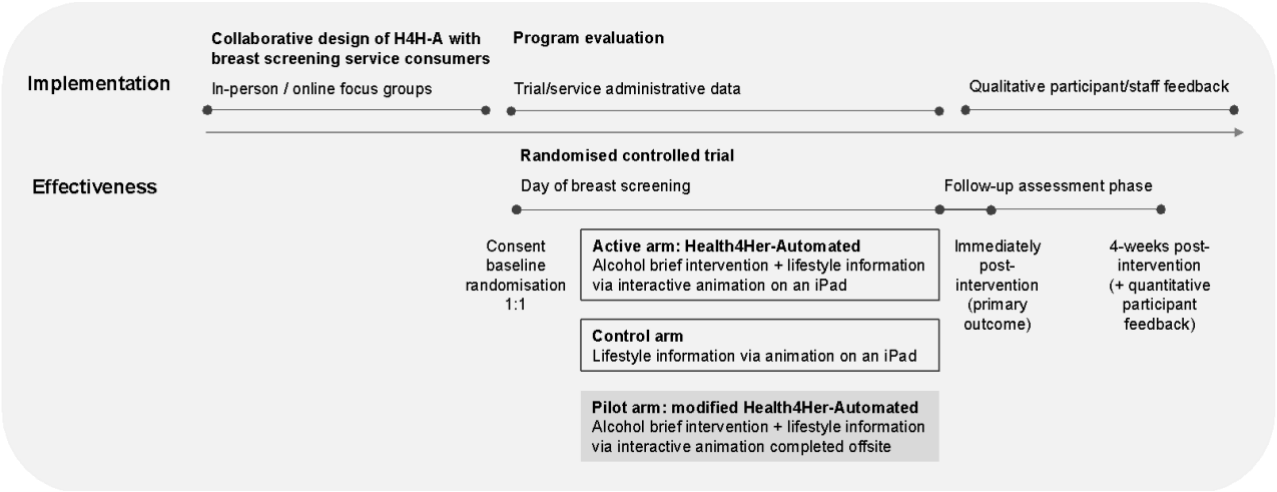
The randomised controlled trial component of this study necessarily requires limited disclosure including active concealment of the trial's alcohol focus. The trial will be described as the "Health4Her women's health study" to minimise the salience of the trial's alcohol focus, to a) increase its relevance for all women attending breast screening (so that women who drink alcohol are not singled out for participation), and to blind participants to group allocation. Participants will instead be informed that the study is concerned with promoting health across a range of lifestyle factors, which accurately corresponds to the intervention conditions (active = ~4 minutes of alcohol brief intervention plus ~3 minutes of lifestyle information; control = ~3 minutes of lifestyle information not inclusive of alcohol information) and planned outcome assessments (comprising questions about diet, exercise, and alcohol). It is anticipated that participants will not be exposed to an increased risk of harm as a result of limited disclosure/concealment; this approach was endorsed by breast screening service consumers in our recently completed preliminary study of Health4Her.

5.3 PARTICIPATION IN QUALITATIVE PROGRAM EVALUATION

Participation in the qualitative component of the program evaluation involves a) the subset of trial participants invited to participate in a semi-structured telephone interview, and b) site staff and managers invited to participate in a focus group post-trial. Researchers will provide a written (via email or post) and verbal explanation (aims, process, potential benefits and risks). Potential participants will have the opportunity to discuss the study and ask questions. Participants will be advised that they can withdraw from the study at any time and that their decision whether to take part or not to take part, or to take part and then withdraw, will not affect their relationship with Eastern Health. The researcher will seek verbal informed consent from the individual to a) participate in the interview, and b) have their interview audio-recorded, with the understanding that the data they provide (i.e. what they say, demographic information provided) will only be used in an anonymised format (i.e. in such a way that they cannot be identified) in reports, publications and/or presentations that arise from this project.

6 STUDY PROCEDURES

6.1 STUDY FLOW CHART



6.2 SCHEDULE OF ASSESSMENTS

Assessment / Time point:	Pre-trial	Maroondah BreastScreen		Online survey
		0 (immediately pre-intervention)	1 (immediately post-intervention)	2 (4-weeks post-intervention)
COLLABORATIVE DESIGN OF H4H-A				
In-person and online workshops with breast screening service consumers	x			
IMPLEMENTATION OF H4H-A[a]				
Eligibility assessment (breast screening staff will assess English comprehension; question about access to computer, tablet or		x		

smartphone embedded at start of intervention)				
Trial explanation (embedded at start of intervention)		x		
PIS (link embedded at start of intervention, and emailed)		x		
Informed consent (embedded at start of intervention)		x		
Randomisation		x		
Intervention		x		
Measures				
Primary outcome				
Drinking intentions (5-point Likert scale)		x	x	x
Secondary outcomes				
Drinking intentions (QF intentions)		x		x
Alcohol-breast cancer literacy		x		x
Alcohol literacy		x		x
Alcohol consumption (past-month QF)		x		x
Knowledge of other breast cancer risk factors		x		x
PROGRAM EVALUATION[a]				
Trial / service administrative data collection		(throughout implementation)		
Participant feedback				(end trial)
Site staff and manager feedback				(end trial)

[a] Participants in the modified active arm being piloted will participate in eligibility assessment, informed consent, baseline, intervention, follow-up and program evaluation in the same way as participants in the active / control arms, but will not be randomised and will complete all activities offsite.

7 ASSESSMENTS

Eligibility and baseline assessment will be self-completed on the iPad provided at Maroondah BreastScreen. The 4-week follow-up assessment will be self-completed online via a link sent by email or SMS (as preferred) Baseline and follow-up assessments will take 5-10 minutes to complete.

7.1 SCREENING MEASURES

Standard *demographic characteristics* (e.g., age, gender, education level) will be recorded during the eligibility and baseline assessment, as well as information pertaining to the study's inclusion and exclusion criteria.

7.2 OUTCOME MEASURES

7.2.1 PRIMARY OUTCOME MEASURE – DRINKING INTENTIONS

Behavioural intention is considered in many health-behaviour models as being a necessary pre-requisite for producing a behaviour (39). Specifically, intentions for alcohol consumption have been demonstrated to be important predictors of actual drinking behaviour (39). Drinking intentions will be measured using an adapted item from previous, related research (15), "*Over the next month, to what extent do you intend to reduce the amount of alcohol you consume?*" (5-point scale response option; 1 'not at all' to 5 'to a very large extent').

7.2.2 DRINKING INTENTIONS

Drinking intentions will also be measured using adapted versions of alcohol frequency/quantity items used in national alcohol intake surveys (40), i.e. intended frequency of alcohol consumption in the next month (categorical response item), intended type/number of drinks consumed on a typical

drinking day in the next month (visual drag and drop item). A composite value will be calculated from responses to these items, estimating intended standard drinks consumed in the next month.

7.2.3 KNOWLEDGE OF ALCOHOL AS A BREAST CANCER RISK FACTOR

An item adapted from previous research in this research area (30) will be used to measure participants' knowledge of alcohol as a breast cancer risk factor. Participants will be asked to rate six factors (family history of breast cancer, physical inactivity, antiperspirant deodorant use, alcohol, processed meats and being overweight) using a scaled-response option: clear risk factor for breast cancer ("*there is strong, consistent evidence that this factor increases the risk of breast cancer*"), possible risk factor ("*there is some evidence that this factor increases the risk of breast cancer, but not enough to be certain*"), not a proven risk factor ("*the evidence is too limited to determine whether this factor increases the risk of breast cancer*"), or unsure. The correct responses were taken from Cancer Australia's 2018 review of the evidence on breast cancer risk factors (31).

7.2.4 ALCOHOL LITERACY

Alcohol literacy will be measured using three questions to ascertain knowledge of i) the amount of alcohol in an Australian standard drink, ii) the number of standard drinks in an average restaurant serve of wine, and iii) the maximum number of standard drinks per week recommended by current Australian Alcohol Guidelines (multiple-choice and free-text response items) adapted from previous literature (35). Alcohol-specific items will be nested among general health questions to conceal the focus on alcohol.

As a measure of distributed alcohol literacy (36), a question ascertaining whether participants shared the health information they learned with others (e.g. family members, friends) will be included (binary response item).

7.2.5 ALCOHOL CONSUMPTION

Alcohol consumption will be measured using adapted versions of alcohol frequency/quantity items used in national alcohol intake surveys (40), i.e. frequency of alcohol consumption during the past month (categorical response item), and type/number of drinks consumed on a typical drinking day during the past month (visual drag and drop item). A composite value will be calculated from responses to these items, estimating standard drinks consumed during the past month. This composite value will also be used to inform which normative feedback is provided in the brief intervention.

7.2.6 KNOWLEDGE OF OTHER BREAST CANCER RISK FACTORS

Two questions will be used to measure participants' knowledge of inactivity and excess weight as clear risk factors for breast cancer (scaled-response items) (37, 38).

8 PARTICIPANT WITHDRAWAL

8.1 WITHDRAWING CONSENT TO PARTICIPATE AND/OR FUTURE USE OF DATA

All participants have the right to withdraw their consent to take part in the trial. The right to withdraw without consequence (i.e. without affecting their care received by Maroondah BreastScreen or Eastern Health) will be outlined during the consent process and in the participant information sheet. If a participant wishes to withdraw consent, verbal or written (i.e. via email) revocation of consent can be provided by the participant. No further contact with the participant will be initiated by the research team upon verbal revocation of informed consent. Participants will have the option to remove all of their previously collected data or just remove consent for further data collection.

8.2 LOSSES TO FOLLOW-UP

Participants who have not completed the online survey and cannot be contacted after 5 phone calls/emails/SMS will be deemed to be lost to follow-up.

9 ADVERSE EVENTS AND RISKS

9.1 RISKS

The risks of harm and discomfort to participants are anticipated to be minor and transient (e.g. some distress or discomfort may be experienced discussing health or health behaviours). Participants will be informed that if they wish to discontinue the study due to feelings of discomfort or distress, they can stop participating at any time. Participants will be provided with a list of support services that they can contact as needed.

9.2 ADVERSE EVENTS

The research team will look out for possible adverse effects throughout the conduct of this trial. Any adverse events (AEs) or serious adverse events (SAEs) occurring during the course of this study, whether or not they are deemed to be related to participation in this study, will be followed rigorously, and in conjunction with the participant's general practitioner (GP) when required (GP details will be requested from the participant when this is deemed appropriate). Participants will be withdrawn from the study if any events compromise any existing treatment or their well-being.

9.3 Additional support and resources

Participants will be advised (via the trial explanation embedded at start of intervention, and the participant information sheet) to contact their GP if they are concerned about any aspect of their health raised during the course of this research (i.e. alcohol use, general health and lifestyle factors). The participant information sheet will contain the contact details for additional sources of support (e.g. Lifeline, DirectLine, CounsellingOnline).

10 DATA MANAGEMENT

10.1 DATA COLLECTION

The Health4Her-Automated platform will comprise an electronic form that will be completed for each participant, and will contain participant information and study data. Developed by Action Lab (Department of Human-Centred Computing, Monash University), the project uses Google Cloud Platform (GCP) services, including Firestore, to handle electronic protected health information (ePHI). In order to meet the requirements of the Health Insurance Portability and Accountability Act (HIPAA), the project ensures the essential services, as outlined below, are appropriately configured following best practices:

Access Controls and Authentication: Firestore provides robust access controls and authentication mechanisms to ensure that only authorised individuals can access ePHI. This includes features like Identity and Access Management (IAM), which allows granular control over who can access and manage Firestore resources.

Encryption (Data security and protection): Firestore encrypts data at rest by default. Data are encrypted using Google's default encryption keys.

Network and Infrastructure Security: Google Cloud employs various security measures to protect the infrastructure and network supporting Firestore. These include physical security controls, firewalls, network segmentation, and intrusion detection systems to safeguard against unauthorised access.

Auditing and Monitoring: Firestore logs and audit trails are used to track access to ePHI and monitor system activities. It allows us to detect and respond to any security incidents or breaches promptly.

Data Backup and Disaster Recovery: Automated data backups offered by Firestore are in place within the primary GCP resource location, which geographically resides in Australia (AUSTRALIA-SOUTHEAST1 Sydney), for disaster recovery purposes.

Ability to execute authorised and complete destruction of data: Firestore provides the ability to delete data both programmatically and through the project console. Deleting data (including its backups) will remove it from Firestore and data will not be recoverable. Data collected by the Health4Her web system will be retained for 5 years from the end of the collaboration. After this time, only non-identifiable data will be kept, indefinitely, as per Monash University policy and the Australian Code for the Responsible Conduct of Research (2018).

Longevity of the systems within the cloud: GCP ensures that its services, ranging from computing engines to storage solutions, are designed for extended lifespans and minimal disruption. GCP ensures resilience and longevity through regular system updates, backward compatibility, and long-term support options.

Prevention of unauthorised disposal: GCP offers robust access controls and logging mechanisms through its Identity and Access Management (IAM) service. Only authorised users will have access to the project and be able to perform deletion. Additionally, with Firestore's built-in audit trails via Cloud Audit Logs, every action performed on the data is logged, providing transparency and accountability.

The team will review these logs regularly (at least once per day) to help in detecting and acting upon any unauthorised disposal attempts.

Protection of copyright and proprietary interests in data: GCP's terms of service, complemented by its robust security infrastructure, make it clear that users retain ownership rights to the data they store. Firestore, as a part of GCP, extends this principle, ensuring that data stored within its databases remains the intellectual property of the user.

Data retrievability (while in the cloud): Firestore emphasises real-time data access and efficient querying, combined with the ability to export data snapshots to Google Cloud Storage for additional backup. Together, these tools and features ensure that user data is not only secure but also readily accessible and recoverable whenever needed.

Extractability (if the service is discontinued): Firestore permits users to manually export their database contents to Google Cloud Storage, making data transfer and migration more streamlined. As such the team will have autonomy over the data and have ongoing access irrespective of the platform's future.

Access Controls and Authentication: Firestore provides robust access controls and authentication mechanisms to ensure that only authorised individuals can access ePHI. This includes features like Identity and Access Management (IAM), which allows granular control over who can access and manage Firestore resources.

Only approved members of the research team will have access to the data. While a unique identifying code will be generated for each participant in order to retain data integrity and manage data across time points, the platform will be used to collect *all* data for participants, which means that it will store identifiable data (i.e. name, contact information) as well as study data (i.e. participant responses to trial measures). However, identifiers will be flagged and will be removed from all data exports, to provide additional protection for these data elements. The data and identifiers will be accessible only to the Chief Investigator (Jasmin Grigg) and the Action Lab team members involved in platform maintenance during trial implementation, and the research assistants managing and cleaning baseline and follow-up data. On completion of data collection, non-identifiable trial data will be transferred from the platform to a statistical software package for analysis.

Electronic spread sheets containing identifiable information (i.e. name, contact number) and re-identifiable information (i.e. screening number, randomisation number) as well as administrative information will be used for the purpose of a) recruitment and process evaluation during recruitment (e.g. keeping record of engagement without assistance, level of assistance needed, etc.), and b) managing follow-ups (e.g. keeping record of follow-up attempts, assistance with survey completion, etc.). These spreadsheets will only be accessed by the research assistants performing these roles, and will be password-protected and held on secure drives.

Finally, all audio-recordings will be password-protected and held on a secure drive. Turning Point uses a professional transcribing company, Pacific Transcription, which complies with the Australian Privacy Principles contained in the Privacy Act 1988 (Cth), as well as the Guidelines on Privacy in the Private Health Sector issued by the Federal Privacy Commissioner under the National Health Act 1953 (Cth),

maintains a secure online website to uphold data security, and has all necessary safeguards in place to protect the information of research participants and uphold participant privacy and confidentiality.

10.2 DATA RETENTION

All data collected during this study will be retained by the Investigator for a period of at least 5 years as outlined in the Australian Code for the Responsible Conduct of Research.

11 STUDY OVERSIGHT

11.1 STUDY MONITORING

The Investigators of this study have expertise relevant to the study and capacity to monitor the research team, monitor compliance with the protocol, monitor compliance with ethical and clinical governance, provide training and other means of quality control and assurance as appropriate, oversee trial arm fidelity, and provide necessary support to the research team. Regular liaison between the research staff and Principal Investigator will occur, and the broader research team will meet as needed.

12 ETHICS AND DISSEMINATION

This study will be carried out according to the Declaration of Helsinki, the NHMRC National Statement on Ethical Conduct in Research Involving Humans (1999) and the Notes for Guidance on Good Clinical Practice as adopted by the Australian Therapeutic Goods Administration (2000) (CPMP/ICH/135/95) and the ICH GCP Guidelines.

12.1 RESEARCH ETHICS APPROVAL

This protocol and the informed consent document and any subsequent modifications will be reviewed and approved by the Eastern Health Human Research Ethics Committee (HREC). A letter of protocol approval by the HREC will be obtained prior to the commencement of the study, as well as approval for other study documents subject to HREC review. It is the responsibility of the Principal Investigator to report annual study progress to the Eastern Health HREC.

12.2 MODIFICATIONS TO THE PROTOCOL

Protocol amendments will be submitted to the Eastern Health HREC. No changes to the protocol will be implemented without prior approval.

12.3 PROTOCOL DEVIATIONS

All protocol deviations must be recorded and must be reported to the Principal Investigator. Protocol deviations will be assessed for significance by the Principal Investigator, and reported to the Eastern Health HREC if deemed to have a potential impact on the integrity of the study results, patient safety or ethical acceptability of the study.

12.4 CONFIDENTIALITY

The study will be conducted in accordance with applicable Privacy Acts and Regulations. All information regarding study participants will be treated in strict confidence. Data that identify any

study participant will not be revealed to anyone not directly involved in the collection and management of data for this study.

12.5 PARTICIPANT REIMBURSEMENT

Participants of a collaborative design workshop will receive a $30 supermarket voucher. An incentive of a pledge of $10 to breast cancer research for trial participation (and an additional $10 pledge for qualitative program evaluation participation) will be used to optimise participation.

12.6 FINANCIAL DISCLOSURE AND CONFLICTS OF INTEREST

The research is funded by Shades of Pink.

12.7 DISSEMINATION AND TRANSLATION PLAN

Dissemination of findings to the research and clinical communities will be via peer-reviewed publications and conference presentations. Participants of the collaborative design component of this research will be informed they can access the Turning Point website for a summary report of research findings in 2024. The summary report of the trial will be made available to trial participants and non-participating clients of Maroondah BreastScreen in 2024. Since limited disclosure including active concealment of the trial's alcohol focus is necessary, the summary will include a full explanation of the trial's aims and methods, and the reason why concealment was necessary.

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