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Shouldn't We Know This Already? UK Women's Views About Communicating the Link Between Alcohol Consumption and Risk of Breast Cancer

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ABSTRACT

Alcohol is a causal factor in about 10% of breast cancer (BCa) cases, but awareness of this link is low. This study explored how to raise awareness and inform the development of an intervention using the COM-B model (capability, opportunity, motivation, behavior) framework. Eight online focus groups were conducted with 36 participants (6 expert stakeholders,and 30 women aged 40–65). Participants reflected on a package of information about alcohol and BCa and discussed how to impart this information and encourage women to reduce drinking. Thematic analysis of focus group transcripts was undertaken. Three themes were identified: understanding ineffective messaging; transitions and challenges; and message acceptability. Current health information about alcohol was perceived as judgmental and BCa was put down to chance. Mid-life consisted of many challenges that could lead to increased consumption, but menopause transition may be a key moment for alcohol reduction. Barriers and enablers to communicating risk information and encouraging alcohol reduction were mapped onto the COM-B model. Psychological capability (relating to knowledge), social opportunity (in the form of social pressure) and automatic motivation (relating to drinking to cope) were barriers to behavior change. These will be targeted in an alcohol reduction intervention. It is important to tailor information to women's experiences, taking into account the social benefits of drinking, and encourage the development of healthy coping strategies. Acceptable intervention messages may include personal stories, clear statistics, and suggest healthy alternatives to drinking. It is vital that messaging does not appear judgmental or patronizing.

Breast cancer (BCa) is one of the most commonly diagnosed cancers worldwide and the leading cause of cancer deaths (Bray et al., 2018). In the United Kingdom (UK), 55920 new cases of BCa are diagnosed every year and one in eight women will be diagnosed in their lifetime (Cancer Research UK, n.d.).

Alcohol consumption is an established risk factor for BCa (Anderson et al., 2023; Rumgay et al., 2021) associated with 8–10% of cases (Brown et al., 2018). Heavier drinkers are at increased risk compared to moderate or light drinkers (Sun et al., 2020; World Cancer Research Fund [WCRF], 2018). However, even low levels of alcohol consumption are associated with increased BCa risk (Chen et al., 2011; Freudenheim, 2020). A World Cancer Research Fund review concluded that a 10 g per day increase in alcohol consumption (10 g = just over one UK unit; 8 g/10 ml) significantly raises risk of BCa (WCRF, 2018). BCa risk also increases with age: eight in 10 cases are in women aged over 50 (Cancer Research UK, n.d.) with many diagnosed after menopause (Sun et al., 2020).

At present, awareness of the link between alcohol and BCa is low: 18% of respondents in one UK study correctly identified this relationship compared to 80% who correctly identified that alcohol causes liver cancer (Buykx et al., 2016). Among women attending BCa screening appointments only 19.5% identified alcohol as a risk factor (Sinclair et al., 2019). It is therefore important to develop targeted interventions that could raise awareness and support mid-life women to reduce their drinking.

This study was informed by the Behavior Change Wheel (BCW; see Figure 1) process for the development of interventions (Michie et al., 2014). Within the BCW, behavior is theorized to result from the dynamic combination of an individual's capability, opportunity, and motivation (COM-B). Capability may be physical (skill, strength) or psychological (knowledge, psychological stamina). Opportunity may be physical (environment, time, resources) or social (norms, cues, interpersonal influences). Motivation may be reflective (plans or conscious intentions) or automatic (reactions, desires and habits).

In the COM-B model, psychological capability includes relevant knowledge about the outcomes of a behavior, which, as shown above, is lacking relating to alcohol and BCa. One explanation for low levels of awareness may relate to alcohol industry misrepresentation of the evidence of the link between alcohol and cancer (Petticrew et al., 2018). A further explanation could be that there is a lack of a clear common sense explanation of the mechanism by which alcohol leads to BCa (Hall et al., 2004). For example, previous studies have found

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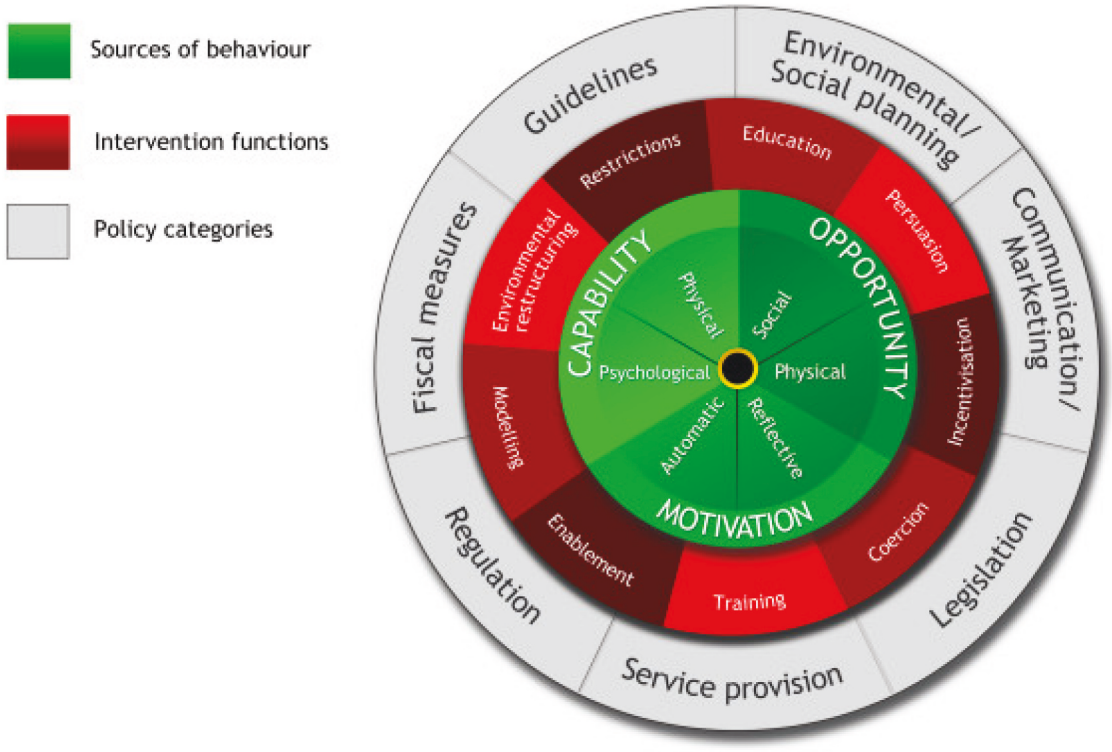

Figure 1. The behavior change wheel (Michie et al., 2014) – see http://www.behaviorchangewheel.com/.

that awareness about the link between alcohol and liver cancer is much higher than the link between alcohol and BCa (Buykx et al., 2016; Calvert et al., 2021). Additionally, the media are often an important source of information about alcohol and BCa, but conflicting stories give rise to mistrust (Rudge et al., 2021). For example, UK participants in an interview study felt that alcohol was portrayed as both a tonic and poison in the media (Davies et al., 2023). This information highlights that we cannot simply fix the deficit in psychological capability in order to bring about behavior change.

The COM-B model is an overarching theory drawing on constructs from a wide range of other theories and frameworks (Michie et al., 2011). Although widely applied to the development of interventions in a range of domains, a criticism of this approach is that it may over-simplify complex decision making processes (Ogden, 2016). The threat of cancer often results in fear, which may be due to its perceived unpredictability (Vrinten et al., 2017). Feeling that one's likelihood of contracting cancer is uncontrollable may lead people feel low levels of response efficacy should they change their behavior because of risk information. We therefore also attempted to use insights from Protection Motivation Theory (PMT) (Rogers, 1983), which takes into account how fear inducing or threatening information is processed and influences behavior change. The theory proposes perceived vulnerability to risk, perceived severity of the outcome, rewards, response efficacy, self-efficacy and response costs interact to influence levels of protection motivation, which in turn, predicts behavior (Rogers, 1983). PMT has been widely applied to the prediction of BCa prevention intentions and behaviors, for example, a recent meta-analysis confirmed its utility for understanding women's intentions about BCa screening (Estebsari et al., 2023). In the present study, we aimed used PMT to understand participants' discussions relating to BCa risk information presented in the focus groups.

This study aimed to 1) explore ways of communicating information about alcohol and BCa and 2) understand facilitators and barriers to alcohol reduction in women aged 40–65, in order to contribute to the development of an intervention.

Method

Focus groups

Focus groups lasting around 60 minutes were conducted using Zoom. Participants received an information booklet beforehand (see Appendix A) with three sections: 1) Facts about alcohol and BCa 2) Alcohol and BCa in the media and 3) Awareness and communication. One media article reported the former England Chief Medical Officer suggesting women should think about BCa risks every time they drink (Press Association, 2016).

Procedure

The first group was facilitated by author 1 (an alcohol researcher with focus group experience), and observed author 2 (a postgraduate research assistant), who facilitated the other seven. The facilitator posed an opening question based on a study showing women aged 50+ drank more alcohol during the pandemic (Niedzwiedz et al., 2020). Participants then discussed the information booklet. Audio was recorded and transcribed automatically and checked for accuracy. Participants

received a £50 shopping voucher for taking part. The study was reviewed by the host institution's ethics committee.

Participants

Thirty-six people (35 women; one man in the expert group; 31 White British; mean age: 50.6 – see Table 1) participated. Six expert stakeholders participated in the first two groups (two alcohol researchers; four from charities/independent groups). The rationale for including expert groups was to provide insights from those working to support women to reduce drinking, which would provide further context and inform intervention development. The remaining participants were women age 40–65 recruited via social media and snowball sampling. We recruited women who identified as current drinkers, as well as those who had drank alcohol in the past to provide insights about what had motivated nondrinkers to change their behavior. Self-described current occupation was categorized according to the Office for National Statistics (ONS) Standard Classification System The most common category was professional.

Analysis

Data were analyzed using Braun and Clarke's six step approach for reflexive thematic analysis (Braun & Clarke, 2006, 2019) guided by a critical realist standpoint (Terry et al., 2017). We began with a deductive approach, with the aim of exploring approaches to messaging, then moved to an inductive approach, identifying other aspects relating to the COM-B model. For the data familiarization step Author 1 and Author 2 read the transcripts, making notes pertinent to the study aims. The second step, involving coding the data, was started by Author 1. Author 1 and 2 then met to discuss coding and the remaining transcripts were fully coded by Author 2. We coded at the semantic (e.g. alcohol units) and latent level (e.g. denial). Step three involved identifying themes. Author 1 and 2 met several times to discuss themes. At step four, we refined the themes to bring together the data relevant to messaging, and barriers and facilitators to alcohol reduction. We named the themes at step five, further returning to the data to make sure they represented the data. Finally, during the process of writing up the themes, we further clarified our thinking about the analysis and interpretation with all authors.

Results

Three main themes and associated subthemes were identified; understanding ineffective messaging; transitions and challenges of midlife, and message acceptability (see Table 2).

Theme 1: Understanding ineffective messaging

Three sub-themes relating to "feelings of judgment", "the luck of the draw", and "ignoring pleasures and benefits" elaborate ways in which the participants' prior experiences of health campaigns and the pleasure found in consuming alcohol could impact the acceptability of alcohol and BCa messaging.

Feelings of judgment

Building on the participants' experiences of being "told off" or "preached to" in other health communications, the sub-theme "feelings of judgment" encapsulates the importance of message framing. When reflecting on the news article about Dame Sally Davis (see Appendix), many said this was patronizing. They appeared weary of information about negative effects of drinking.

> Oh God, you can't even have one glass of wine. (participant 16)

Experts similarly warned that judgmental messages would be discounted. For many, it seemed that these types of messages were judging their behavior as "bad" without accounting for

Table 1. Demographic information and breast cancer experience of focus group participants.

Group	Composition	Age range	Ethnicity (self described)	Occupation *	Drinkers/non drinker	Breast cancer link
1	5 women	42–63	4 White British I White Greek	3 Professionals 2 Administrative	5 current drinkers	2 friends with BCa, 1 personal and family, 1 family, 1 not disclosed
2	5 women	42–64	4 White British 1 White Eastern European	1Managerial 3 Professionals 1 Associate professional	5 current drinkers	4 with family experience, 1 not disclosed
3	5 women	46–59	5 White British	1Managerial 1 Professional 3 Associate professional	3 drinkers, 2 nondrinkers	Not disclosed
4	5 women	40–61	5 White British	2 Professionals3 Associate professional 3 Associate professional	5 current drinkers	1 with friend experience, 2 family experience, 2 not disclosed
5	5 women	41–58	5 White British	1 managerial 3 Professional 1 Skilled trades	5 current drinkers	1 with friend experience, 1 family experience, 3 not disclosed
6	5 women	43–57	4 White British 1 Latin	4 Professionals 1 unemployed	2 drinkers, 3 nondrinkers	Not disclosed
7	3 experts	33–53	2 White British 1 White Irish	3 Professionals	3 drinkers	Not disclosed
8	3 experts	33–52	2 White British 1 White – other	2 Managerial 1 Professional	2 current drinkers, 1 nondrinker	1 with family experience, 5 not disclosed

*Note: Occupations classified according to the Office of National Statistics 2020 Standard Occupation Classification System (ONS, 2020).

Table 2. Themes and sub-themes identified in the analysis of transcripts of women and experts discussing alcohol and breast cancer risk communication.

Theme	Sub-themes	Example quote
Understanding ineffective messaging	Feelings of judgment	I think nobody likes being told what to do, what's right and what's wrong, and if you say "don't do this", then people would just get put off (participant 35)
	The luck of the draw	and we might say, well, "the person that got breast cancer, it might be mainly for genetic reasons, not so much about sort of drinking alcohol so I'm sure that won't happen to me' (Participant 7)
		it's quite difficult to comprehend, who, it will affect and who it won't affect really I think (participant 21)
	Ignoring pleasures and benefits	I do wine in a social context – it's drinking it socially with food, you have the benefits of social interaction there and friendship and stuff so that's kind of something else and I'm not saying that you need that – you need to drink to have that but it's kind of part of a lot of people's sort of daily lives (participant 29)
Transitions and challenges of midlife	Menopause	I don't know if it's the menopause or what's going on, but I can't cope with drinking now – it doesn't – it's not good for me (participant 18)
	Stress and coping	On our helpline, there seems to be professional group of women over 50 that are under the stress of lockdown drinking more (expert 1).
	Social media and pressure	my friend is almost tee-total so she'll have tonic with bitters butsometimes you know people go "Oh go on. Don't be silly. One's not going to hurt" (participant 20)
		sometimes you know people go "Oh go on. Don't be silly. One's not going to hurt" (participant 20)
Message acceptability	Empowerment and sharing knowledge	I think things like, you know, women are very good at having groups and looking after each other, I think you know the one positive thing you've got here is, women do talk to each other and confide in each other, and so, for me, I think, sharing this information amongst your groups of friends, I think, is most probably something really positive (participant 9)
	Presentation of statistics	I think just give the facts in the straight manner – not making it complicated because, as soon as you say too much, then people don't finish reading it. Yeah – keep it simple but honest (participant 11)
	Personal stories	my understanding is that people react well to a sort of messages from people who are like them so they can identify that "Oh, this is this is someone like me and they don't drink anymore" (expert 5)
	Healthy choices	It's not kind of just take something away from me, it's what can I replace it with that's going to be almost as good? (participant 16)

the pleasurable social aspects of drinking. For some participants it seemed no matter how hard they tried to incorporate health advice into their lifestyles, there was always something new they were not currently doing, or were doing wrong.

> it's just everything's bad you know it feels now that unless you're a vegan seven days a week and you run marathons, you know twice a month, that you're somehow you're just automatically unhealthy. (participant 26)

Participants and experts made numerous comparisons to campaigns that they perceived as judgmental, and therefore were both ineffective and stigmatizing.

The luck of the draw

Even if a message was not judgmental, it seemed possible that it could be disregarded as irrelevant to the individual due to low response efficacy – e.g. reducing drinking would not impact their chances of BCa.

> I think there's a bit about that around breast cancer, about that luck of the draw, genetics and not believing there's a preventable aspect to it. (expert 1)

Because participants were aware of numerous other BCa risks, they could easily diminish the effect of alcohol, couching their own drinking as responsible. Even when surprised by the statistic that 1 in 8 women got BCa, they quickly placed themselves as one of the other 7.

> My first kind of gut feeling was' well that's a 2% increase' – it's not so bad you know, like it's worth it - everything in life, like you're weighing it up … like the risk vs pleasure … so that wouldn't necessarily put me off, seeing that figure. (participant 13)

Some acknowledged that they would only change their drinking behavior if something occurred to affect their health. For others, there was a sense that it was impossible to control the outcome of every risky behavior.

> So many things have a risk. We can't all go under the bed! (participant 11)

Participants were also able to distance themselves from being the "type of person" who needed to heed information about reducing their drinking – and could recognize this common bias.

> We're very good as human beings at disconnecting ourselves from the risk. "Oh, - drinking can cause other people to get breast cancer." (participant 10)

Conflicting or sensationalized information reported in the media contributed to the sense that many health impacts of drinking were down to chance.

Ignoring pleasures and benefits

An important problem identified with current health communication was that it ignored the subjective benefits of drinking. There was a strong sense that women would resist messages that failed to acknowledge positive aspects of alcohol consumption.

> I want to know the most important thing [about alcohol and cancer], because also socializing, having fun and going out is something I enjoy and I'm not going to give up drinking for that. (participant 29)

As one of the experts pointed out, there may be a backlash against messaging that failed to account for these pleasures.

> The last thing I need is someone telling me about how this one thing I've got that gives me some you know, joy or relaxation or whatever, at the end of the day is also bad. I just don't want to hear it and you're going to have people really turn off from those messages. (expert 2)

Theme 2: Transitions and challenges of midlife

Midlife is characterized by a number of significant life transitions and challenges, which appeared to be important influences on drinking behaviors. These experiences appeared to be related to three aspects of life, captured in the following sub-themes.

Menopause

Some groups mentioned the menopause as a factor associated with BCa as they had received mammogram invitations. There was also a sense of the difficulties faced by many women as they dealt with the menopause. Not knowing how to manage symptoms, or the feeling of being in flux, could result in drinking alcohol to cope.

> There can be a sense of kind of "well, what is my life for anymore?" You know "This a different stage and I don't quite know how to navigate it." Alcohol could well be enticing because of that. Bearing in mind that things like depression, anxiety can increase and alcohol could well be a welcome diversion. (participant 14)

The menopause was seen as a time when many would be receptive to changing health behaviors.

> I suppose it's thinking about how can I get myself in good shape, I suppose, to help me get through it? How can I have a healthy lifestyle, while still allowing the treats? (participant 16)

The benefits of reducing alcohol consumption to lessen menopause symptoms could provide a promising intervention approach. Whereas cancer was viewed as something that might happen in the dim and distant future, the short-term effects of reducing hot flushes were more tangible.

> If we know that, by not drinking that night you're not going to wake up in the night really hot, and you know that that's a more effective deterrent, I think, than the possible risk of extra risk of breast cancer in 10 years' time, maybe. (participant 24)

Stress and coping

Most participants talked about alcohol consumption during lockdown and as a coping strategy to deal with stress related to work, families, and relationships.

> The bigger picture is everyone's just trying to cope with a really, really horrible world at the best of times, let alone in the pandemic so it's kind of really acknowledging that. If we were all super happy all the time we wouldn't need any of these things. (participant 25)

It is vital that health communications do not ignore that some do drink alcohol as a means to cope. While learning to deal with stress in an alternative way may be challenging, being able resist drinking when feeling under pressure could be rewarding for some.

> I'd had a really, really stressful 24 hours . . . .and I thought I just need to have a glass of wine and I thought "no you don't" and I was very proud of myself and the bottle has remained untouched. This habit/reward cycle is quite hard to break. (participant 27)

Social media and pressure

The discussions revealed that social opportunity in the COM-B may be a significant barrier to reducing alcohol consumption. Due to lockdown conditions, participants talked about jokes shared on social media, rather than face to face interactions. In particular, they mentioned humorous posts making light of pandemic drinking, acting to reinforce that drinking was a habitual behavior.

> It's all over social media, you know, it's cool to be in the gin club and it's you know it's cool to open a bottle of wine and everyone's like 'oh it's Friday - I'm opening a bottle of wine or "is four o'clock too early to get the wine open?" and you kind of just feel like to fit in really and particularly when you've got people at home around you drinking. (participant 18)

Social media presented alcohol as an appropriate response to a range of both positive and negative experiences. However, social media was also identified as a useful avenue to combat the discourse that alcohol was the answer to all of life's pleasures and pains.

> I think Facebook could be a very good place to start. I just wanted to find an example, so I was just looking on my Facebook and within a minute I found a jokey thing of an older woman and a thing saying "don't take alcohol with this medicine" and there's an older woman they're going "Big wink wink nudge nudge." I think there's that underlying message constantly coming over you know "oh it's gin o'clock". (participant 20)

Theme 3: Message acceptability

The theme "message acceptability" draws together aspects of the discussions that have the potential to contribute to effective health communications. In interpreting this theme, it is important to recognize that participants were often considering what would work for "other people" (e.g. a third person effect).

Empowerment and sharing knowledge

Participants were surprised to be previously unaware of the prevalence of BCa, the proportion of cases that were preventable, and the link between alcohol and BCa.

> I was intrigued that there obviously is this link and the fact that this is about how it's put across to people. And I thought - well if I - if it hadn't sort of occurred to me - I can't be the only one. (participant 12)

Participants reflected on why this information was not well known, and many revealed that they had mentioned it to friends having read our information booklet. It seems that this information may have changed their perception of the perceived severity of BCa. This revealed a sense of them wanting to empower other women with the surprising knowledge they had gained, but felt like it was something they should have already been made aware of.

> I had never specifically considered breast cancer and that did feel like a surprise - it felt like new information, and it also felt like I should know and should be familiar [with it]. And the other thought I had was around women sharing that information to other women, but not as a "you shouldn't do it," but 'Did you know? Shouldn't we know this as women? And sort of take the power into our hands somehow. (Participant 10)

Presentation of statistics

Although many participants talked about the difficulties in interpreting statistics on BCa risk, many still felt that clear

statistics were the best way to impart information. The following quote relates to the information booklet stating in group of 50 women who do not drink, about six will develop BCa in their lifetime and in a group 50 women who drink two units of alcohol a day about seven will develop BCa:

> It feels like that's one extra from a group of women that don't drink - yeah I mean it didn't feel like it was a massive amount when actually yeah - You know the six women - what are their lifestyles? What's their, you know, dietary situation? (participant 31)

Perceptions of the relevance of health statistics are easily downplayed if one is able to reinforce one's own healthy lifestyle as one of moderation, and of any minor transgressions being for "good reason." Some had difficulty interpreting the statistics.

> I think it's got to be kept simple - is it no alcohol whatsoever? Or is it only alcohol at weekends. Or is it you know have four days off? It's got to be something so simple that you can latch on - it's a bit late once you're down the wine aisle. (participant 8)

There was a lack of understanding about alcohol and health risks in general. Particularly in comparison to the risks associated with smoking as well as nutritional information provided on food labels.

> There's nothing on the label to tell you that other than, you know, where it's come from, it tastes nice with fish and, you know, drink it warm . . . how to enjoy it. But you don't know what it's doing but if I buy a ready meal, I know how much saturated fats it has, I know the carbs. I count carbs. I can't count carbs on my alcohol. (participant 28)

Personal stories

Personal stories about people who had experienced BCa, or had felt health effects from their drinking, could be a useful means of conveying information:

> I'm just thinking about Jade Goody all those years ago and the whole cervical cancer wasn't it? People either loved or hated her, but she had a massive impact, particularly in the short term - in terms of people getting testing and screened that otherwise wouldn't have . . . . (participant 15)

Expert 4 also pointed out that, it is not only stories about celebrities that can have an impact on people's behavior. It may be just understanding that someone similar has been in the same situation.

> Loads of people I speak to say that the big "light bulb moment" is reading other people's stories and going "oh, my God that's me" - "I thought it was just me" but realizing that this is a recognized problem if you are drinking half a bottle, a bottle of wine a night - that could help people be more receptive to the idea of the health information. (P4)

Healthy choices

Alternative means of socializing and coping with stress of life seemed important. In one group, the conversation centered on the potential of alcohol-free products, which could help to retain some of the psychosomatic benefits of intoxication, while a person engaged in the rituals of socialization with others who drank.

> For me, alcohol free beer has been like a massive change - it is really nice - you feel like you're having that like exciting drink, great bottle, great sound - everything you know - you can have it in a beer garden. It's been really great. (participant 25)

However, healthier choices could also be about alternative ways to spend time with friends, or relieve stress. Unfortunately, some participants perceived little opportunity for such alternatives for women in mid-life, and appeared to have low self-efficacy.

> I like yoga but you know it could be anything that people will pay for like Pilates or something that was non-judgmental – it wasn't for the really fit kind of Lycra clad, beautiful people telling you to work harder - I would be there like a shot, honestly. (participant 36)

This quote highlights that there are barriers to suggesting alternatives to alcohol, for example suggesting that a person takes up a new hobby or engages in a new sporting pursuit instead of drinking alcohol.

Findings were mapped to the COM-B model (Table 3).

Discussion

This study explored ways of communicating information about alcohol and BCa in women aged 40–65 and highlighted key facilitators and barriers to alcohol reduction, with implications for the development of an intervention.

Theme 1 suggested alcohol health communication was perceived judgmental, vague, and often dismissed for ignoring benefits of drinking. Participants put BCa risk down to luck. When considering the findings of theme one in relation to the COM-B model and PMT, they underscore that targeting psychological capability (knowledge) alone will be insufficient for behavior change. Intervention messages need to be non-judgmental and appropriately framed, but if participants may feel their own perceived vulnerability to BCa is low, and that the costs of reducing alcohol consumption are high (due to the perceived benefits) then it is likely that they will not be motivated to reduce their drinking. Our findings echo those of an Australian study, which found women were unaware that alcohol causes BCa, and they thought current health information was lacking (Meyer et al., 2019).

Our participants were aware of the tendency for socio-cognitive biases such as "unrealistic optimism" which describes how individuals tend to be overly optimistic about their personal susceptibility to different health outcomes in comparison to other people's (Shepperd et al., 2013). Such optimism will impact on perceived vulnerability to BCa, reducing the likelihood that people are motivated to drink less.

Theme two revealed a range of challenges faced by midlife women, which influenced drinking. Many experienced menopause symptoms, and research suggests alcohol can exacerbate hot flushes and poor sleep (Epstein et al., 2007) and may lead to increased drinking to cope (Milic et al., 2018). Our participants were also facing challenges due to the pandemic. Because of COVID-19 restrictions, our participants were drinking with others online. The findings from theme two have relevance for the COM-B and PMT. The menopause may offer a golden or "teachable" moment for alcohol health communication

Table 3. Summary of COM-B analysis and possible intervention functions to target increased awareness of the link between alcohol and BCa and reduced drinking in women aged 40–65.

COM-B Components	Barriers to behavior change from focus groups.	What needs to happen for the target behavior to occur?	TDF Domain	Possible intervention functions
Physical capability	This was assessed as not applicable to the behavior	N/A	N/A	N/A
Psychological capability	Lack of awareness of link between alcohol and BCa. Health messaging about alcohol easily dismissed. Personal susceptibility is perceived as low.	Appropriately communicated knowledge of the risks of BCa and benefits of drinking less.	Knowledge Memory/ attention and decision making	Education Enablement
Physical opportunity	Bars, pubs, gardens as alcohol infused spaces.	Access to alcohol free spaces, and drinks.	Environmental context and resources	Environmental restructuring
Social opportunity	Social media encourages drinking. Friends, family expectation of drinking.	Supportive friends and family. Supportive social norms and expectations about drinking. Social media as a space that supports non-drinking.	Social influences	Modelling Enablement
Reflective motivation	Belief that personal likelihood of getting BCa due to drinking is low. Belief that alcohol is needed to have fun and unwind.	Belief that reducing drinking is a good thing for overall health. Making intentions to reduce drinking/drink less.	Beliefs about capabilities Intentions Beliefs about consequences	Education Persuasion Modelling
Automatic motivation	Alcohol as a coping method used at times of stress.Habits and patterns of drinking. Habits and patterns of drinking.	Alternative coping strategies.Replace habitual behaviors. Replace habitual behaviors.	Emotion Behavioral regulation	Persuasion Enablement Modelling

because alleviation of menopause symptoms may influence response efficacy and change automatic (habitual) motivations. Beliefs about the benefits of reducing alcohol intake at this time may influence reflective motivations to drink.

However, theme two shows that the COM-B component of social opportunity may act as both a barrier and facilitator. The discussion of social media and pressure to drink in our sample echoes those found in of other studies about "mummy drinking" social media groups. Such groups (for example, "Mummy needs gin") provide a much needed connection to others facing similar challenges, but they may also reinforce alcohol as coping mechanism (Bosma et al., 2022). Such sites appear to engage in a trivialization of overconsumption, which may foster a widespread acceptance of heavy consumption (Seaver, 2020). While there are a number of meta-analyses on the way that social media influences young people's drinking, there is less research on how it may influence mid-life women's drinking (Kersey et al., 2022). An Australian study of women aged 40–65 similarly highlighted the important role of alcohol for social connection, showing the importance of taking this into account when developing interventions (Wright et al., 2021).

Theme three suggests interventions should empower women to share information and ensure statistical information is clear and unambiguous. However, PMT offers an explanation as to why this information may not lead to behavior change, highlighting a key benefit of augmenting understandings from the COM-B model more specific theories of risk communication. Participants' accounts indicated that ignoring perceived benefits of drinking means that they may evaluate there to be a high cost to reducing drinking. Presenting statistics about the relative risks of BCa needs care and consideration of how different people interpret risk information. Discussions revealed many of our participants evaluated their perceived vulnerability as low, given the prevalence of the disease. People consistently evaluate their own drinking behaviors as less risky than other people's (Davies, Lewin, et al., 2022; Melia et al., 2021) believing they have little need to change their own drinking behavior. This also suggests evidence of a third person effect, whereby suggestions for communicating risks may be thought of as more impactful to others (Perloff, 1999).

Intervention implications

The COM-B model was used to identify barriers and enablers from the focus group findings for use in the next stages of our research (Table 3). At the time of writing, we are co-developing intervention content with a group of five women aged 40–65, who have relevant lived experience. This group are working with the research team to identify behavior change techniques to target the components in Table 3. For example, deficits in psychological capability will be targeted through communicating statistics on alcohol and BCa risk and highlighting other benefits of reducing drinking. Deficits in physical opportunity will be targeted by encouraging behavior substitution. The intervention will be delivered via a bespoke website and contain guided content. For example, goal setting relating to substitution of drinking alcohol with other pastimes or nonalcoholic drinks. Automatic motivation will be targeted via self-monitoring and recognition of cues to alcohol consumption. Participants will have the opportunity to discuss the activities and share progress through the intervention with other participants. The interactive elements aim to provide social support, and target social opportunity and reflective motivation.

The findings of our study also have wider implications for interventions aimed at mid-life women. The use of personal stories that women can share with friends may prompt positive changes in behavior. The supportive community aspect of groups on social media could be harnessed to promote alcohol reduction. Promoting behavior change through personal testimonies may also by promising. For example, when the singer Kylie Minogue was diagnosed with BCa in 2005, this led to

a 40% temporary increase in mammogram bookings (Chapman et al., 2005). Further research is needed to understand whether these approaches could form the basis of effective interventions.

Limitations

This study took place online under lockdown restrictions, although virtual focus groups can generate similarly rich data to that generated face to face (Flynn et al., 2018). However, because freedom to socialize was limited, participants' drinking behaviors may have been different to how they were pre- or post-lockdown (Davies, Puljevic, et al., 2022).

Our sample was recruited opportunistically and lacked diversity. While generalizability is not an aim of qualitative research, it is important to note that this was a UK sample, who will have experienced different drinking cultures than women in other countries. Furthermore, prior research has shown that social class may also shape how women perceive alcohol and BCa risk perception (Meyer et al., 2022). Our information pack was designed to stimulate discussion, but the way this was presented will likely have influenced the participants' views. Further to this, it the discussions were influenced by the inclusion of current nondrinkers.

An additional limitation may pertain to the use of the COM-B model to categorize barriers and facilitators to behavior change. While this theory is useful in applied work, such as when developing interventions, the use of further insights from health communication models could deepen the theoretical contribution of the research.

Finally, it is important to acknowledge our prior positions as alcohol and cancer researchers will have influenced our interpretation of the findings. We are all women in, or close to, the sample age and therefore share some of the experiences and challenges of our participants.

Conclusions

While there is a need to target psychological capability to increase awareness of the link between alcohol and BCa, it is important to tailor information to women's experiences, considering the pleasures and uses of alcohol, and the likelihood that people may feel their personal level of risk is low. Messaging should not reinforce judgmental or patronizing ideas about women's drinking and may benefit from a focus on healthy alternatives to drinking alcohol in order to target barriers to behavior change.

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Appendix. The pre-focus group information pack

Oxford Brookes Healthy Ageing Network: **Alcohol, health and breast cancer project**

Thank you for agreeing to take part in our research. Please read this information pack before attending your session.
Please contact Julie Bennett juliebennett@brookes.ac.uk or Emma Davies edavies@brookes.ac.uk if you have any questions beforehand.

Contents

Links for more information and advice

If you would like further information, or sources of support about cancer or alcohol consumption, then you may find the following links helpful.
About alcohol:
https://www.nhs.uk/live-well/alcohol-support/
https://soberistas.com/
https://joinclubsoda.com/
About breast cancer:
https://www.nhs.uk/conditions/breast-cancer/
https://breastcancernow.org/
https://www.macmillan.org.uk/cancer-information-and-support/breast-cancer

Facts about alcohol and breast cancer

The purpose of our study is to explore people's awareness about the health risks of drinking, specifically the links between alcohol and breast cancer. We would like to find out what people think are the best ways to communicate this health information to women aged 40-65. Here are some facts that show the kind of information that we might want to communicate:

- Breast cancer is the most common cancer in the UK.
- 55,000 new cases of breast cancer are diagnosed each year.
- One in eight women will be diagnosed with breast cancer in their lifetime.
- Eight out of 10 cases are in women aged 50 and over.
- There are many reasons why someone might develop breast cancer, including their age when they experience menopause, and their family history. Certain genes are known to increase your risk.
- Breast cancer treatments are very effective – Survival rates have doubled in the last 40 years.
- 76% of people diagnosed with breast cancer live for 10 or more years after diagnosis.

What is the role of alcohol in breast cancer?

- 23% of UK breast cancer cases are preventable.
- Alcohol is thought to cause about 8-10% of breast cancer cases.
- Alcohol increases the levels of estrogen and other hormones in the body, which are linked with breast cancer.
- However, the exact role of alcohol in breast cancer is not yet fully understood.
- What we do know is that the more alcohol someone drinks, the more their risk of breast cancer increases.
- In a group of 50 women who **do not drink**, about six will probably develop breast cancer in their lifetime.
- In a group of 50 women who **drink two units of alcohol** a day (for example, a standard glass of wine), about seven will develop breast cancer in their lifetime.
- So drinking two units a day causes one extra woman out of every 50 to develop breast cancer.

If you would like to read the source of this information then you can find links here:
https://breastcancernow.org/information-support/have-i-got-breast-cancer/breast-cancer-causes
https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/breast-cancer/survival
https://www.nature.com/articles/bjc2014579?report=reader

Alcohol and breast cancer in the mediatemp
https://www.theguardian.com/society/2016/dec/30/breast-cancer-warning-wine-dame-sally-davies

Alcohol and breast cancer in the mediatemp
https://www.standard.co.uk/news/uk/one-bottle-of-wine-increases-cancer-risk-by-same-amount-as-ten-cigarettes-a4102836.html

Awareness of the links between alcohol and cancer

- Alcohol is a cause of seven different types of cancer – mouth, upper throat, larynx, esophagus, breast, liver, and bowel.
- In a UK study, 12.9% of people knew that alcohol could cause cancer.
- In an international study, 33% of people knew that alcohol could cause cancer.
- Another UK study found that 19.5% of women attending breast screening knew that alcohol was a possible cause of breast cancer.

Other information about alcohol, health and cancer

- The NHS advises that sticking to no more than 14 units each week is a good way to reduce the impact of alcohol on your health.
- 14 units is about 6 pints of 4% strength beer or 7 glasses of 11.5% wine.
- Not many people know what a unit of alcohol is or what the guidelines are. In one study, 8% of people knew that the guidelines were 14 units per week.
- Alcohol can also worsen the symptoms of the menopause, such as hot flushes and night sweats. We could not find any studies that told us whether this was something people were aware of or not.
- Keeping active is another way to reduce the risk of getting cancer. However, awareness of this link is also very low – in one study, only 3.4% of people were aware that being active can reduce the likelihood of being diagnosed with cancer.

Communication

In the session we want to know your ideas for communicating the links between alcohol and breast cancer, as well as thinking about ways to encourage people to drink a bit less and live healthier lives overall. We will use the information in this document as a starting point for our discussions.

We will ask you what you think about:

- What do people need to know?
- How should this information be presented, by whom, and where?
- Any other ideas or views on this topic?

Thank you for reading this information. We look forward to hearing your views.