

A Qualitative Study Exploring Feasibility and Acceptability of Acupuncture, Yoga, and Mindfulness Meditation for Managing Weight After Breast Cancer

Integrative Cancer Therapies
Volume 21: 1–15
© The Author(s) 2022
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/15347354221099540
journals.sagepub.com/home/ict
 SAGE

Carolyn Ee, PhD¹ , Anna C. Singleton, PhD², Michael de Manincor, PhD¹, Elisabeth Elder, PhD³, Nikki Davis, BSc⁴, Christine Mitchell, Para.Aesth⁵, Tinashe Dune, PhD¹, Freya MacMillan, PhD¹, Kate McBride, PhD¹, and Suzanne Grant, PhD¹

Abstract

Introduction: Weight gain is common after breast cancer. Yoga, mindfulness meditation, and acupuncture may assist with managing weight. However, evidence on effectiveness is limited. This study assessed the feasibility and acceptability of recruiting for and implementing a randomized controlled trial (RCT) evaluating these interventions as adjuncts to lifestyle interventions (diet and exercise) for weight management in women with breast cancer. **Methods:** Qualitative study involving virtual focus groups or semi-structured interviews. Participants were recruited via email invitation from a breast cancer consumer organization and breast cancer center in Australia. Eligible participants had received treatment for breast cancer, and were fluent in English. A purposive sample of culturally and linguistically diverse (CALD) participants was also recruited. Focus groups and interviews were audio-recorded, transcribed verbatim and analyzed using thematic analysis with the constant comparison method. **Results:** Emails were sent to 1415 women of which 37 provided data in 5 focus groups and 1 semi-structured interview, including 1 focus group (n=6) with only women from CALD backgrounds. Yoga and mindfulness meditation were perceived as feasible and acceptable for weight management, but acupuncture was seen to be too invasive to be acceptable. A focus on wellness rather than weight reduction, flexible program delivery, trusted advice, consideration of participant burden and benefit, and peer-support were key factors perceived to increase feasibility and acceptability. **Conclusions:** Yoga and mindfulness meditation are acceptable and useful adjuncts to lifestyle interventions for weight management after breast cancer. This research places end-users at the forefront of trial design, and will inform future trials using these interventions for weight management and improving health and wellbeing after breast cancer.

Keywords

breast neoplasms, weight gain, complementary therapies, yoga, mindfulness, acupuncture, qualitative research

Submitted November 9, 2021; revised March 21, 2022; accepted April 22, 2022

Introduction

Globally, over 1.9 million women are diagnosed with breast cancer every year,¹ including approximately 20 000 Australian men and women. After diagnosis and treatment for breast cancer, weight gain is common.² In a survey of 309 Australian women, almost two-thirds (63%) self-reported gaining weight after breast cancer treatment (mean weight gain of 9.07 kg), with 58% and 87% describing weight gain occurring during the first 1 and 2 year post-diagnosis respectively. Most survey respondents (69%) gained in excess of rates expected in healthy age-matched

¹Western Sydney University, Penrith, NSW, Australia

²Engagement and Co-Design Research Hub, Faculty of Medicine and Health, School of Health Sciences, University of Sydney, Westmead, NSW, Australia

³Westmead Breast Cancer Institute, Westmead, NSW, Australia

⁴Primary Care Collaborative Cancer Clinical Trials Group, Melbourne, VIC, Australia

⁵Breast Cancer Network Australia, Castle Hill, VIC, Australia

Corresponding Author:

Carolyn Ee, NICM Health Research Institute, Western Sydney University, Locked Bag 1797, Penrith, NSW 2751, Australia.
Email: c.ee@westernsydney.edu.au



controls, and almost one out of five women (17%) gained more than 20 kg.³ International literature is consistent with these findings, indicating that weight gain occurs from the time of diagnosis and continues for at least three years post-diagnosis, with only 10% returning to pre-diagnosis weights after 6 years.⁴ Weight gain after breast cancer has been associated with an increase in tumor recurrence, all-cause mortality,² cancer-related symptoms, and quality of life.⁵

Lifestyle interventions are effective for reducing weight gain after breast cancer treatment.⁶ However, there are multiple barriers to lifestyle intervention uptake in women with breast cancer,⁷ including treatment side effects (fatigue), perceived lack of time and motivation and poor mental health. As a result, fewer than 25% of women with breast cancer maintain regular physical activity in the long term.^{8,9} Further interventions are required to increase adoption and maintenance of lifestyle interventions for weight management after breast cancer.

Many cancer survivors use complementary therapies and medicines (CM),¹⁰ which can be defined as “a broad set of health care practices, that are not part of that country’s own tradition or conventional healthcare and are not fully integrated into the dominant healthcare system.”¹¹ Examples of CMs include vitamins and minerals, herbal supplements, acupuncture, and mind-body therapies. We have previously demonstrated a high prevalence of CM use amongst women with breast cancer living in Australia¹² with 73% of the 309 women sampled having used a CM for any health condition in the past 12 months. Moreover, about one-third of women had tried CM for weight loss following breast cancer treatment. Women with breast cancer had various reasons for using CM, including seeking a range of therapeutic options to optimize all aspects of their wellbeing in a holistic manner, and particularly to improve psychological wellbeing.

Mind-body therapies (such as yoga and mindfulness-based interventions) and acupuncture are commonly used CMs in Australia,¹² and internationally¹³ and show promise in the treatment of obesity and overweight in the general (non-cancer) population.¹⁴⁻¹⁹ For example, one meta-analysis reported efficacy of acupuncture compared with sham acupuncture for reducing body mass index (BMI) (MD -0.47 kg/m²), body fat mass (MD -0.66 kg), waist circumference (MD -2.02 cm), and hip circumference (MD -2.74 cm).¹⁹ Mechanistic studies of acupuncture for weight loss suggest multiple responses including appetite suppression,^{20,21} modulation of leptin and ghrelin,²²⁻²⁴ and improved insulin sensitivity.²⁵⁻³⁰ Systematic reviews suggest that mindfulness-based interventions may help improve eating behaviors (eg, reducing emotional eating), increase physical activity, and reduce anxiety and stress.^{14,15,17,18,31,32} These interventions may also have indirect positive effects when combined with diet and exercise interventions due to their ability to improve psychological distress

and cancer treatment side effects (eg, arthralgia, peripheral neuropathy),^{33,34} which can be barriers to successful weight management.⁷

However, there is a significant gap in the evidence on these CMs for weight management after breast cancer. Two pilot studies on mindfulness-based interventions in women with breast cancer report promising findings for weight loss and eating behaviors.^{35,36} Just one pilot uncontrolled trial has been conducted on yoga for weight loss after breast cancer; this trial reported a reduction in waist circumference of 3.1 cm and improvements in quality of life.³⁷ There are no published trials on acupuncture for weight management after breast cancer. Robust clinical research (eg, randomized controlled trials/RCTs) into the effectiveness and efficacy of these low risk³⁸⁻⁴⁰ and novel interventions as adjuncts to diet and exercise is required.

Given that many RCTs fail due to inability to recruit to target,⁴¹ the UK Medical Research Council recommends assessment of feasibility prior to full evaluation of complex interventions.⁴² This ensures that money spent on expensive trials is not wasted due to recruitment and retention failures. Qualitative research involving community stakeholders in the co-design of interventions can assist with exploring acceptability and feasibility of trial procedures, and ensures that the proposed interventions are more likely to be successfully implemented in real-world settings.⁴³ Therefore, the current study aimed to assess feasibility and acceptability of acupuncture, yoga, and mindfulness meditation as adjuncts to lifestyle interventions (diet and exercise) for weight management in women with breast cancer and gain women’s insights into various methods and procedures for recruiting and implementing an RCT.

Methods

This was a qualitative study involving virtually conducted focus groups supplemented by individual semi-structured in-depth interviews where participants could not attend the groups. The study is reported according to the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines (see Supplemental Item 1).⁴⁴

Ethics

Ethical approval was granted by the Human Research Ethics Committee at Western Sydney University (H13990, 1 September 2020) and Western Sydney Local Health District (2020/ETH02504, 9 December 2020).

Recruitment and Data Collection

Eligible participants had been diagnosed with breast cancer, received any treatment including chemotherapy (adjuvant and neoadjuvant), radiotherapy, hormonal therapy, targeted

therapy, and axillary treatments, and were fluent in English. A convenience sample was drawn from the Breast Cancer Network Australia (BCNA) Review and Survey Group. BCNA is the largest breast cancer consumer organization in Australia, and the BCNA Review and Survey Group comprises BCNA members who have agreed to receive emails about research studies. By limiting research requests to members who volunteer to be part of the Review and Survey Group, BCNA protects members who are not interested in participating in research while allowing members who are engaged in the research process to participate in research studies. The Review and Survey Group represents approximately 2% of all BCNA members. Purposive sampling was also used to recruit demographically diverse participants from the Westmead Breast Cancer Institute, a cancer center which services a socioeconomically diverse sample of breast cancer patients within Western Sydney, Australia. This targeted sample of patients were of a culturally and linguistically diverse (CALD) background who completed active treatment were identified through Westmead Breast Cancer Institute medical records.

All participants were approached about the study via email invitations with a link to the study website, which contained the participant information and consent forms. Participants provided electronic informed consent prior to enrollment. After informed consent, participants completed an online survey which included demographic information (age, sex, ethnicity, education level, employment), self-reported medical information (breast cancer diagnosis, menopausal status, treatment types undertaken, Body mass index [BMI] at diagnosis and currently), use of complementary therapies within the past 12 months and preferred focus group to attend. Participants were then contacted by a researcher confirming the focus group date and time, and were offered an individual semi-structured telephone interview if the focus group dates and times were not suitable.

Focus Group/Interview Procedures

Focus groups were conducted using videoconferencing (Zoom) by AS, a female PhD candidate and research associate at the University of Sydney with 10 years' experience with psychology research (MSc Experimental Psychology, BSc Hons I Psychology) and experience in conducting focus groups in breast cancer populations and other chronic diseases (lung, heart disease). Focus groups lasted 90 minutes and included groups of 6 to 8 women. Semi-structured interviews (60 minutes) were conducted by CE, a female medical doctor with experience in interviewing women with chronic disease. No prior relationships existed between any participants and interviewer/facilitator. The focus group and interview guide included open-ended questions to explore the experiences of weight management after breast cancer, experiences, acceptability, usefulness, and barriers

to using acupuncture, yoga, and mindfulness meditation, and trial feasibility, including preferences for RCT design, perceived important health outcomes, and perceptions of barriers to and facilitators of successful trial recruitment and retention (see Supplemental Item 2). Questions were informed by prior qualitative studies exploring feasibility of similar interventions.⁴⁵ No observers, scribes, or non-participants (such as family members) were present during the focus groups or interview. Participants received a gift voucher worth \$25AUD upon completion of the study. Data was collected until theoretical saturation was achieved, defined when no new major themes were arising. This was determined by discussion between AS and CE.

Data Analysis

Audio recordings were transcribed verbatim using the secure transcription software TRINT™ (Trint Ltd, London, United Kingdom). Verification of the transcripts was conducted by CE and AS. AS made field-notes in a word document to explore in future focus groups. Transcripts were then read and re-read to become familiar with salient themes. Thematic analysis was applied using the constant comparison method where coded extracts were grouped into themes and subthemes (repeated patterns within the data) initially and further refined as new data is compared and contrasted with previous themes and subthemes,⁴⁶ using Quirkos 2.4.1.⁴⁷ Coding was performed by AS and CE using the analyst triangulation method, where 20% of transcripts were independently coded in duplicate with any disagreements in coding of themes and subthemes resolved by discussion, with the remainder coded independently. AS and CE met regularly to discuss the emerging coding framework until final agreement on themes and subthemes was achieved. Example participant excerpts are provided in the results relating to themes identified. Transcripts were not returned to participants given that the focus groups are a culmination of data from multiple participants whose anonymity could be compromised by sharing of whole transcripts. To ensure fairness in data sharing the interview participant did not receive a copy of their transcript.

Results

Study Sample

Email invitations to participate were sent to women with early breast cancer from the BCNA Review and Survey Group on 30 October 2020 (1381 women), and to 36 women from Westmead Breast Cancer Institute on 18 March 2021. A total of 45 women enrolled in the study, with 8 dropping out because they were not available during focus group time (n=6) or changed their mind (n=2). Participant characteristics (demographics, medical history,

CM use) were collected for the remaining 37 participants and are shown in Table 1. Participants' mean age was 53.8 (SD 12.3; range 30-86) years, and 28/37 (75%) women were from Caucasian backgrounds, with the majority being highly educated and employed or self-employed. Most women had been diagnosed with early breast cancer (Stage I-III), with a mean of 5.6 (SD 5.3) years post-diagnosis, and about half were on endocrine therapy. Mean BMI was 27.3 kg/m² (SD 4.7) and mean self-reported weight gain since diagnosis was 1.1 kg, although most (24/37; 65%) women reported a pattern of weight gain or weight fluctuation. Most women (23/37; 62.1%) had used some form of complementary therapy in the last 12 months, the most common being dietary supplements (14/37; 37.8%) and massage (11/37; 29.7%). Yoga had been used by 8/37 (21.6%), mindfulness meditation by 6/37 (16.2%), and acupuncture by 5/37 (13.5%) within the past 12 months.

About 5 focus groups and 1 interview were conducted between 12 November 2020 and 25 March 2021, including 1 focus group (n=6) in women from CALD backgrounds. Focus groups ran to time (90 minutes), as did the interview (43 minutes). Women's perceptions of the feasibility, acceptability, and usefulness of acupuncture, yoga, and mindfulness meditation as adjuncts to lifestyle interventions for weight management, and on trial design, are summarized below. The coding structure of themes and subthemes are provided in Supplemental Item 3 with additional exemplary quotes.

“My Body’s Been Through Too Much For Me to Stick Needles Into It Again”: Mixed Perceptions of the Acceptability and Usefulness of Acupuncture

There was a mixture of participants who had and had not used acupuncture within the past year. Women had tried acupuncture for a variety of health management reasons including injuries, pregnancy, migraines, hay fever, tendonitis, diarrhea, and cancer treatment side effects (eg, frozen shoulder, skin burns after radiation, hot flushes). There were mixed perceptions of the acceptability and usefulness of acupuncture, though the majority of participants found it acceptable and useful:

I actually had a really good experience with acupuncture. It was suggested to me when I was going through chemo. Acupuncture made me feel better and it actually helps to decrease my reaction to the chemo and feeling sick (ID11, age 47 years, FG1)

When I had my radiation therapy, I unfortunately got very, very bad burns and the hospital offered me acupuncture for pain

management and it absolutely worked. I thought it was great. (ID23, age 56 years, FG2)

Acupuncture was perceived to be useful for health and well-being for some women, particularly for musculoskeletal problems, and 1 woman believed it had been useful for weight loss: “I know that when I had [acupuncture] back then, I did lose weight” (ID53, age 35 years, FG5). The benefits were sometimes more general in nature. A key enabler of use was free treatments that were offered at some hospitals, funded through philanthropy.

However, others did not find it useful, or were unsure if it had been useful, and were unaware of whether it was beneficial for weight management or cancer:

It was for chronic back pain and I had acupuncture for about three months I’m not sure whether the pain just disappeared through course of time or whether the acupuncture did help (ID4, age 69 years, FG1)

Barriers to uptake of acupuncture included cost, especially in the context of the financial toxicity of cancer. A major barrier to use of acupuncture that may impact on recruitment success was fear of needles and a perception that it was yet another invasive treatment.

I’m not working very much at the moment because I’m crook and I can’t quite afford it. But I think it did help a little bit if I had maybe pursued it a bit more. If I’d won the lottery, I probably would have done it every week (ID18, age 48 years, FG1)

I feel like my body’s been through too much for me to stick needles into it again. [laughs] I think my body is just a bit too sensitive at this point (ID47, age 39 years, FG5)

Undergoing chemotherapy or taking endocrine therapy tablets were added barriers to use of acupuncture, as some medical staff advised against concurrent use of acupuncture with treatment.

We’ve got probably three or four ladies having acupuncture regularly while they’re having their chemo and swear by it and others have said the oncologist said ‘No, don’t have any needles into your skin at all while you’re having chemotherapy’ (ID14, age 70 years, FG2)

To address these barriers and increase recruitment, participants suggested that an educational session about acupuncture within the RCT would be useful to raise awareness and inform patients about their options.

If you had an education session on it [acupuncture], you could correct all those myths because I think that’s the biggest thing. We all have so many fears and we hear from somebody down

Table 1. Participant Characteristics Including Demographics, Medical History, and Complementary Medicine/Therapy Use.

Demographic characteristics	n/N (%)
Current age, mean years (standard deviation)	53.8 (12.3)
Ethnicity	
European/Caucasian/Anglo Saxon	28 (75.7)
Asian or Oceanic (including New Zealand first peoples, Polynesian, Micronesian)	9 (24.3)
Education	
University degree or above	26 (70.2)
High school/vocational college	11 (29.8)
Employment	
Employee	22 (59.5)
Retired or volunteer work	6 (16.2)
Self-employed	5 (13.5)
Unable to work due to illness or other reasons	4 (10.8)
Relationship status	
Married/de facto	26 (70.3)
Single	6 (16.2)
Divorced/separated/widowed	5 (13.5)
Number of children	
None	11 (29.7)
1	6 (16.2)
2	13 (35.1)
>3	7 (18.9)
Medical history	
Diagnosis	
Localized	28 (75.7)
DCIS/LCIS	6 (16.2)
Metastatic or inflammatory	3 (8.1)
Years since diagnosis, mean (SD), range	5.6 (5.3), 0-20
Postmenopausal at diagnosis	13 (35.1)
Treatment	
Sentinel node biopsy/axillary clearance	31 (83.8)
Radiotherapy	26 (70.3)
Lumpectomy	23 (62.2)
Mastectomy	18 (48.6)
Selective estrogen receptor modulator (eg, Tamoxifen)	18 (48.6)
Aromatase inhibitor (eg, Anastrozole)	18 (48.6)
Adjuvant chemotherapy	15 (40.5)
Neoadjuvant chemotherapy	12 (32.4)
GNRH agonist (Goserelin/Zoladex)	8 (21.6)
Targeted therapy (eg, Herceptin)	4 (10.8)
CDK inhibitor (Abemaciclib—clinical trial)	1 (2.7)
Current weight (kg), mean (SD), range	73.1 (14.5), 40-108
Current BMI (kg/m ²), mean (SD), range	27.3 (4.7), 17.5-37.4
Weight at diagnosis (kg) (n = 35), mean (SD), range	71.9 (16.4), 40-121
BMI at diagnosis (kg/m ²) (n = 35), mean (SD), range	26.8 (5.7), 17.3-42.2
Weight change since diagnosis (kg) (n = 35), mean (SD), range	1.1 (9.6), -21 kg to +26 kg
Weight pattern since diagnosis	
Gained weight overall	14 (37.8)
Fluctuated a great deal	10 (27.0)
Lost weight	7 (18.9)
Stable	6 (16.2)

(continued)

Table I. (continued)

Demographic characteristics	n/N (%)
Complementary medicine or therapy use	
Any complementary medicine or therapy use for any reason in past 12 months	23 (62.2)
Supplements	14 (37.8)
Massage	11 (29.7)
Relaxation techniques	9 (24.3)
Yoga	8 (21.6)
Essential oils	6 (16.2)
Meditation	6 (16.2)
Acupuncture	5 (13.5)
Chiropractic	4 (10.8)
Naturopathy	2 (5.4)
Osteopathy	2 (5.4)
Reflexology	2 (5.4)
Prayer	2 (5.4)
Kinesiology	2 (5.4)
Chinese herbal medicine	1 (2.7)
Bowen therapy	1 (2.7)
Yoga delivery (n = 8)	
Group class in yoga studio	4 (50.0)
Self-practice, general	4 (50.0)
Online, pre-recorded	3 (37.5)
Online, live	3 (37.5)
Group class in a non-yoga studio (eg, gym)	2 (25.0)
One-on-one in person	1 (12.5)
Self-practice designed by a teacher	1 (12.5)
Yoga therapy	0 (0.0)

Abbreviations: DCIS, ductal carcinoma in-situ; LCIS, lobular carcinoma in-situ.

the road 'I had it [acupuncture] and their arm fell off.' You know? (ID28, age 48 years, FG2)

“The benefits. . . [are] immense”: Yoga as an Acceptable and Useful Intervention

Many participants had practiced yoga, and generally found it to be an acceptable and useful form of physical activity, stating it “*just really appeals to me as a form of exercise*” (ID9, age 41 years, FG1), but had not considered it as a weight management strategy.

I've never really thought about yoga as a weight management tool so I'm open to finding out more about that (ID22, age 66 years, FG1)

In terms of losing weight, I don't find. . . Like yoga is nice for your flexibility. But I thought I've got to do something more active. So, I do the cardio classes. I wouldn't think you'd gain muscle from doing yoga (ID31, age 51 years, FG4)

Yoga's acceptability stemmed from perceptions of benefits for physical and mental health and managing side effects

from treatment. Themes revolved around yoga being gentle on the body and subthemes involving yoga being useful for flexibility, with gentle stretching seen to be especially useful for improving aches and pains due to cancer treatment. Subthemes of usefulness for mental health involved reducing stress through “*slowing down*” (ID20, age 57 years, FG1), and being able to come to some acceptance about their diagnosis and feeling empowered.

You know, you can hear everything but let it go of you. . . You just can leave it all, all the anxiety and worries and the life changes..[and] just enjoy this perfect moment (ID5, age 60 years, FG1)

I just think it has such an amazing power for us individually to take that control back (ID20, age 57 years, FG1)

Women also found yoga to be an acceptable and useful way to connect the mind and body, viewing yoga as a way of practicing meditation through movement.

The benefits of yoga as a practice to me is immense. And whether that is to do with weight management or anything else,

the benefits I feel from yoga and meditation are absolutely fundamental to anyone going through a cancer diagnosis (ID20, age 57years, FG1)

If you were just starting yoga and meditation, to come to that meditative state would be a little challenging. Whereas the gradual yoga poses, the very slow, the very fluid, the gradually over time, these beautiful slow movements [are] then a great precursor to getting some benefits from the meditation (ID22, age 66years, FG1)

Recruitment, adherence, and retention would be enhanced by flexible delivery of yoga classes at home via videoconference, which was perceived to be especially useful given busy work and family lives, and by engaging an instructor who is knowledgeable about the limitations and side effects that arise after cancer treatment.

That's exactly why I stopped doing yoga since I had breast cancer. I won't go back to do it because I haven't found a place where I feel safe to do it. (ID28, age 48years, FG2)

A potential barrier to recruitment may be the perceived physical limitations after cancer due to treatment-related symptoms such as dizziness, pain, or lymphedema. There were perceptions that yoga requires flexibility (which some women felt was compromised after cancer treatment) or a certain physique. Some women found yoga harder than expected and others wanted a form of exercise that was more vigorous.

I just decided that I really needed to just go and run it out at the gym or to really sweat it out and feel like I've accomplished something (ID43, age 46years, interview)

My body now is not the body then (ID21, age 47years, FG3)

"I Love the Concept and I Failed Miserably": Mindfulness Meditation is Acceptable But Challenging

There was a mix of participants who had and had not used mindfulness meditation in the past year. Of those who tried mindfulness meditation, many felt that it was acceptable, and worthwhile. However, similar to yoga, few had considered it as a weight management strategy. Some women spoke of using informal mindfulness practices, such as being in the present moment while enjoying the outdoors.

I guess from the menopause, I think it is extra anxiety or irritation. I thought 'I'll go for the mindfulness,' but I didn't think of it at all in terms of weight loss (ID31, age 51years, FG4)

Recruitment appeared feasible because of general perceptions that mindfulness meditation was convenient to practice (time, location) and seen to be useful for managing

health and wellbeing, especially mental health and relief from treatment side effects (eg, insomnia). Despite not having thought of mindfulness meditation as being helpful for weight loss, women could see how it might be useful for diet changes, with 1 participant saying, "*there's reasons behind why we eat*" (ID33, age 60years, FG4).

Physically, my system relaxed, a lot of the mind chatter went [away]. So even the house felt calmer, my partner was saying, So, there was a real spaciousness, which was beautiful. My senses were sharpened (ID 20, age 57years, FG1)

I found it very relaxing, and I found that it helped reduce stress (ID13, age 58years, FG2)

However, a major barrier to uptake of mindfulness meditation, which may impact on recruitment, adherence, and retention, was the belief that mindfulness meditation requires an "emptying" of the mind, which women found challenging. Another barrier was the association with "*mindfulness and wellness gurus*" (ID20, age 57years, FG1), which some women perceived negatively.

I love the concept and I failed miserably (ID 21, age 47, FG3)

I had difficulty shutting down my mind (ID43, age 46years, interview)

RCT Trial Design: Feasibility and Acceptability of Trial Procedures

Six key themes emerged that participants felt were essential for making a trial feasible and acceptable for women with breast cancer: (i) focus on wellness, not weight, (ii) trusted advice, (iii) value of peer-support and shared experiences (eg, online discussion board, in-person chatting time), (iv) flexible program delivery, (v) reducing burdens and maximizing benefits of trial outcome measurements and study groups.

Focus on Wellness, Not Weight

In terms of recruitment, participants felt that the term "weight" would deter women from participating in the trial. One woman stated "*weight, the word itself is so value loaded and ghastly*" (ID22, age 66years, FG1). Others supported this claim explaining that many women struggle with body image after breast cancer, due to scarring or weight gain.

A lot of the ladies are very conscious of body image and they are over their ideal weight, and they're not good at exercising, so they don't actually join in (ID14, age 70years, FG2)

Moreover, during treatment, women felt that they were trying to "*manage to get through this 9 months or more of*

treatment” (ID25, age 39 years, FG4) and that weight was not their focus. Therefore, to encourage recruitment into the trial, participants suggested the trial should be promoted as a wellness program for mental and physical health, and to help women regain a sense of control over their life again and transition back to “normal life,” or as 1 woman described it, “*placing yourself in society as you were before*” (ID 22, age 66 years, FG1).

My focus, it wants to be on my health and wellbeing because I was feeling very unhealthy and very stressed (ID38, age 56 years, FG3)

Yes, being alive [and] living a great life is the immediacy of the cancer. Don't really care if you're a bit overweight, you're alive. You want to just enjoy stuff. So maybe that's the sort of the goal (ID22, age 66 years, FG1)

Trusted Advice

Participants expressed that feasibility of recruitment and retention would be higher if a trusted health professional was engaged to deliver credible health education and the physical activity component and promote the trial. This was in the context of women reporting that myths and misinformation about breast cancer were common and that finding correct information online was overwhelming. Health education sessions were therefore perceived as highly useful and acceptable, especially if they included time to ask questions and receive credible advice.

I actually think having a session that's not just exercise so you have got the opportunity to ask questions is really useful (ID28, age 48 years, FG2)

Education topics of interest were dietetics, managing treatment or medication side effects (eg, sexual health, muscle or joint pain, mental health) and when and how much exercise they could do during and after treatment.

Participants felt strongly that the individual who leads an exercise or yoga class needed to be qualified and knowledgeable about women's experiences during and after breast cancer treatment, so they could feel confident and supported to practice safely.

You could be looking to do those classes specifically with people that were working with a lot of cancer patients. So, they would say, 'oh, well, this works really well for the breast, why don't you do this exercise?'. That was absolutely fantastic (ID5, age 60 years, FG1)

I think there was a lot of confusion on where to start and even with yoga, I was scared I would hurt myself if I pushed to push my body too much. So, if someone could guide me as to what exercises were safe. Even now, I'm not sure in the sense of that my body's been through so much. I would need some guidance as to which I'm ok to do (ID47, age 39 years, FG5)

To improve adherence and retention, women suggested it would be beneficial to be able to contact the instructor between visits, either via telephone or chat group, to increase motivation by having someone “*check*” on them regularly (ID52, age 39 years, FG5) and to have any lingering questions answered. Women, particularly those from CALD backgrounds, wanted information about the proposed trial to be provided to them by healthcare professionals in hospital, such as their oncologist or breast cancer nurse.

I think coming from the doctor, it made me feel very confident to participate in the study as well (ID52, age 39 years, FG5)

Women from non-CALD backgrounds were generally more likely to suggest trial promotion through consumer advocacy groups such as Breast Cancer Network Australia. The role of the general practitioner (GP) and GP clinic in trial promotion was also highlighted, because of the more regular contact with GPs as opposed to annual contact with oncologists. Promoting the trial through breast cancer support groups was also suggested.

I think that GP clinics or your GP need to be a lot more active and have a lot more information about how they can offer these kinds of services and how they can support you during those periods of time. That's really important (ID23, age 56 years, FG2)

The Value of Peer Support and Shared Experiences

Participants repeatedly expressed that having an optional social component of the intervention would be acceptable and useful, either in-person or online (chat or Facebook group). There were recurring subthemes of the need for understanding and compassion through sharing experiences of breast cancer. Women suggested that people could share as much or as little as they wanted but having the option to share was essential.

I really love that social aspect. I think it's very, very important, particularly if ladies are prepared to share information. Since having cancer, I am very willing to share with anybody and everybody just to help them, because I know that I didn't have a great deal of help when I was going through it until I started meeting all these other ladies (ID23, age 56 years, FG2)

Flexible Program Delivery

To optimize feasibility of recruitment and retention, participants felt that intervention delivery would need to be very flexible in terms of timing and location, as well as offer the opportunity to start and stop when it suited them. One to two 90-minute sessions per week for 3 to 6 months was

acceptable and that each session should include both exercise (45–60 minutes) and education (30–45 minutes), rather than delivered separately.

I think if it was combined in a longer session, like that's only once a week you need to go somewhere to do something whereas if it's separate, then it's twice a week, which is probably more difficult for people to get there (ID26, age 41 years, FG2)

However, it was important that sessions have a virtual attendance option and be recorded for participants to watch when they were able. This flexibility would improve adherence and retention as there may be many barriers to participation including family and work commitments, and medical reasons (eg, immune compromise during treatment, intermittent COVID-19 restrictions). They also wanted numerous “touchpoints” (ID13, age 51 years, FG2) along the cancer journey (during and after treatment) to sign up for the trial so that they felt “ready” (ID13, age 51 years, FG2).

I think there was about 10 days between my diagnosis and my first surgery, and I just felt overwhelmed with information. But a couple of weeks afterwards, that gap between the surgery and the chemo, when you do have time to draw breath and think about how you're going to manage and keep your life on track. It might be worth having a two shot at the communication, give people information that they can take away and read and think about. Having a couple of chances to revisit the decision would have been good (ID39, age 66 years, FG1)

Reducing Burdens and Maximizing Benefits of Trial Outcome Measurements and Study Groups

Overall, participants were willing to complete well-designed, brief (<5 minutes) surveys about mental health and body image at different stages during the trial (baseline, midpoint, end-of-study) and then option to exit and return to the survey was important. A minority of women would be happy to complete much longer surveys, because they felt motivated by the opportunity to help others going through the same experiences. However, surveys needed to feel logical.

Is [the] survey well designed and logical? Because quite often you're doing a survey and you think 'that question makes no sense, given my answer to the previous one'. . . very frustrating. [When] they're well-done and logical, we don't mind filling them in (ID19, age 64 years, FG3)

Weight seemed to be an acceptable measurement only if it was not the focus of the trial (secondary outcome).

There's just so much emotional crap attached to weight, like whether weight gain or weight loss, that for this program, having weight be a goal or a measurement can just be like

another layer of stress that's unnecessary. So, I think the whole idea being like a wellbeing check feels a lot less overwhelming or just feels a lot more holistic than just focusing on weight (ID53, age 35 years, FG5)

Participants expressed that waist circumference and muscle mass may be more acceptable outcome measures, because these can change even when body weight stays the same—“quite often you can lose inches rather than weight” (ID33, age 60 years, FG4). Moreover, participants explained that women may want to sign up for the study if participants could choose a personal goal to track throughout the study and if the study tracked improvements for breast cancer-specific issues, like shoulder range of motion after surgery.

Participants also expressed that numerous invasive tests, like blood tests or bone density scans, may be a deterrent to participation because their bodies had “been through enough” (ID 47, age 39 years, FG5) and they only wanted to complete tests that were absolutely necessary.

Any extra tests, I would have to be very much convinced that they need to be done for a research purpose. If you wanted me to do another MRI, you can't even pay me [shakes head]. And I'm even out of active treatment. . . if you want a blood sample from me, I'll have a very long conversation before that happens (ID21, age 47 years, FG3)

A variety of control group ideas were presented, including the option of not having a control arm at all (a single arm, pre/post trial), and having access to the program but “in a limited way” (ID23, age 50 years, FG2). Overall, participants felt that a wait-list control group would be most acceptable and feasible for participant recruitment and retention so that participants had “something to look forward to” (ID13, age 58 years, FG2) and they would not be “missing out” (ID23, age 50 years, FG2). Some participants expressed that the ability to have free testing (eg, bone density scans) may be acceptable and enticing for the control group.

I was part of a research group and was in the non-interference [group]. I got to have the free MRIs, the free bone densities, the free everything! So, I was really happy to be part of it (ID44, age 69 years, FG3)

Participants also suggested providing a pamphlet regarding exercise and dietary recommendations for patients during and after breast cancer treatment, and/or some group teleconferences, where participants talk about their cancer experiences to improve retention in the control group.

Maybe you could have the control group just meeting and chatting (ID39, age 66 years, FG1)

Yeah, a [teleconference] group with maybe a topic each time so people can share (ID27, age 59 years, FG2)

Participants felt sham acupuncture as part of the control group would deter participation, as this would be stressful, and result in a placebo effect.

It seems a little bit more devious to do it with pricks, with a little needle that's not actually doing anything for anyone (ID5, age 60 years, FG1)

Discussion

This qualitative study found that an RCT for women with breast cancer that included yoga and mindfulness meditation would be feasible, acceptable and useful adjuncts to a lifestyle (diet, exercise) intervention for weight management, while women were generally less accepting of the use of acupuncture. Our participants felt trial recruitment, adherence, and retention would be optimized through a focus on wellness rather than weight as an objective, the use of flexible delivery, and incorporation of education and social components. The value of a trusted provider was also highlighted as a means to increase recruitment and retention.

Participants felt strongly that in order to optimize recruitment, *wellness* should be the intervention focus, not weight. As our previous research has found, weight gain after breast cancer is common and levels of concern over weight are high among breast cancer survivors.³ In general, the stigma associated with overweight and obesity can lead to increased stress or healthcare avoidance, especially for people from linguistically diverse backgrounds.^{48,49} In this study, acceptability of a wellness program that included yoga and mindfulness meditation was high. This is consistent with systematic review evidence that attrition rates in yoga RCTs are relatively low (eg, a median of 12%).⁵⁰ The value of the mind-body connection that yoga can facilitate has also been reported in other qualitative studies that described the transferability of yoga through breathing⁵¹ and benefits through increased awareness of the physical body.⁵² Similarly, women in our study described psychological benefits of mindfulness meditation, such as reduction of stress, which has been described in other qualitative studies in women with breast cancer.⁵³⁻⁵⁵ Practicing mindfulness meditation has been described as facilitating a process of personal growth⁵⁶ and being able to let fear and the cancer go.⁵⁷ In our study, women found mindfulness meditation useful for managing treatment side effects and indeed Mindfulness-Based Stress Reduction, one of the most commonly used mindfulness-based programs, has been shown to be effective in improving physical and cognitive function and fatigue in women with breast cancer.⁵⁸ We hypothesize that combining the promotion of these holistic benefits and weight-inclusivity during trial recruitment through careful promotional material wording would help to increase uptake and reduce attrition and weight stigma barriers⁴⁹ to

participation. The alleviation of treatment-related symptoms such as fatigue, which has been cited as a major barrier to weight management after breast cancer,⁷ may facilitate greater uptake of and adherence to diet and exercise interventions.

One of the major barriers to practicing mindfulness meditation was the perception that “emptying the mind” was a prerequisite. Similarly, the belief that yoga is primarily a physical practice which requires a certain level of joint and muscle flexibility, coupled with disappointment at the physical limitations of the post-treatment body, may also be a major barrier to enrolling in an RCT that incorporates yoga. These misperceptions highlight a gap in adequate awareness about the true nature of yoga and mindfulness meditation practices. The practice of yoga may include a range of techniques, such as breathing, relaxation, visualization, and meditation, and is not limited to the practice of physical postures (*asanas*).⁵⁹ Furthermore, the physical postures can be readily modified according to the physical capability of each individual person, regardless of level of flexibility, including for those with cancer or post-treatment. Similarly, mindfulness meditation does not involve emptying the mind of all thoughts, but rather, the moment-to-moment awareness of one’s thoughts, feelings, and surroundings, with an attitude of non-judgment.⁶⁰ In order to optimize recruitment and retention, these knowledge barriers should be addressed by provision of information at the time of recruitment that describes mindfulness meditation and yoga accurately. The enablers that yoga is perceived to be a gentle form of physical activity, and a knowledgeable instructor is key to acceptability and usefulness, should also be incorporated into the messaging about the trial at the time of recruitment to optimize recruitment rates. In particular yoga-based interventions for women with breast cancer should be led by instructors (preferably yoga therapists) who have experience in teaching women with breast cancer and who can modify the yoga practice for individual needs, accounting for physical limitations such as pain, lymphedema, and dizziness. Yoga itself has been shown to be a useful tool to come to an understanding of loss associated with disability after breast cancer, through the development of acceptance of oneself and one’s circumstances, and enhancement of the understanding of embodiment,⁶¹ and this may encourage women to remain physically active despite new physical limitations.

Among the women who took part in this study, there was some hesitancy around the use of acupuncture due to beliefs that it was invasive and possibly unsafe. Our findings are consistent with previous qualitative research in women with early breast cancer and hot flashes, which reported that some women were reluctant to subject themselves to more needles, and that acupuncture-naïve women in particular were less likely to want to participate in acupuncture clinical trials.⁶² The use of sham acupuncture was seen as

an undesirable form of deception, which is consistent with earlier literature.⁶² However, women in our study suggested that providing education about the potential benefits of acupuncture may improve recruitment into an acupuncture arm.

Participants also highlighted that study recruitment from trusted health professionals and receiving the intervention from a knowledgeable intervention instructor with expertise in the breast cancer experience would help them feel safe and comfortable to enroll, especially from those with CALD backgrounds. This is similar to findings of a study with 187 breast cancer survivors that found 50% of participants were interested in “wellness activities” (eg, mind-body therapies, nutrition) but recommendations from a trusted health professional increase interest and engagement with these activities.⁶³ Another study of women preferred to be informed about exercise programs at the time of cancer diagnosis by a trusted health professional, and most (79.1%) desired a supervised exercise program.⁶⁴ Future RCT design and promotional materials should therefore be promoted and delivered by health professionals that women trust.

Our study also revealed that participants felt they would be more likely to sign up for a flexible program, with multimodal and multi-component options (eg, online, in-person, text, videos, phone calls) for participation and peer- or instructor-support and personal goal-setting, as well as consideration of participant burden. In general, women valued the opportunity of being able to join a group and learn from peers (importance of community, sharing, gaining from group experiences), which has been reported in other qualitative studies of yoga.^{51,52,65} Previous research on internet-delivered yoga programs has similarly reported that women wanted flexibility in terms of timing of yoga classes, found that online delivery significantly improved access to yoga, and recommended that researchers consider the burden imposed when choosing surveys or research instruments.⁶⁵ Other research suggests that multimodal delivery of a 3-month wellness program can increase engagement with the intervention and was found to improve multiple health outcomes (eg, anxiety, physical activity, quality of life) for menopausal women.⁶⁶ Moreover, repeated and varied contacts are consistent with behavior change techniques, such as provision of instructions and general encouragement, setting graded tasks, demonstrating desired behaviors and identifying barriers (Social Cognitive Theory⁶⁷), reviewing behavioral goals and provision of feedback (Control Theory⁶⁸). A systematic review found that physical activity interventions based on behavior change theories were effective for improving physical activity among breast cancer patients.⁶⁹ For example, a pre-post study of 20 breast cancer survivors with overweight or obesity found a 3-month wellness program with 4 coaching calls was effective for improving physical activity, dietary habits, and quality of life (physical well-being, breast cancer-specific concerns) and resulted in weight loss in 40% of participants.

Participants felt the coach was essential to success, due to ongoing encouragement, accountability, and setting and achieving small goals.⁷⁰ Moreover, in a study testing a video-based support group, the intervention was rated much higher among participants who received peer-support than those who did not.⁷¹ Providing web-based engagement options may also be less time, cost, and resource intensive.⁷² However, having optional face-to-face contact may reduce attrition.⁶⁶

Significance

Ours is the first qualitative study to explore the feasibility and acceptability of recruiting women to a clinical trial on yoga, acupuncture, and/or mindfulness-based interventions for weight management after breast cancer. Limited qualitative research has been conducted on acceptability and feasibility of these interventions for other clinical concerns in women with breast cancer, especially in the context of recruiting for a clinical trial. We demonstrate high levels of acceptability of yoga and mindfulness meditation as adjuncts to lifestyle interventions for weight management after breast cancer. This study will inform the development of a yoga and mindfulness-based intervention that is aimed at increasing initiation in and maintenance of optimal lifestyle habits. Potential benefits to women from this body of research include improvements in quality of life and reduced risk of tumor recurrence and sequelae of obesity/overweight such as diabetes cardiovascular disease through weight loss or prevention of weight gain.⁷³⁻⁷⁵ These individual health improvements may play a role in reducing economic and health system burden due to breast cancer as well as other chronic diseases.

Strengths and Limitations

The current study put consumer voices at the forefront of research about them, by aiming to understand women’s preferences, barriers and enablers for study recruitment and intervention design prior to developing the intervention. Involving consumers at the outset is beneficial for health services, as it has been found to improve program user satisfaction and engagement.⁶⁸ Moreover, purposive sampling was used to specifically gain insights from women from CALD backgrounds, which added richness and depth to the results. However, this study also has limitations. Although recruitment occurred through a large, diverse sample, 3 quarters of participants were of European/Caucasian/Anglo Saxon descent, 70% were highly educated, and all spoke fluent English, which may not reflect opinions of all women with breast cancer. Moreover, it is possible that videoconference technology was a barrier to participation. However, the option to use a standard landline instead of the videoconference was available and the sample varied in age from

30 to 86 years, suggesting that age was not a barrier to technology use.

Conclusion

The current study found that yoga and mindfulness meditation were acceptable and feasible adjuncts to lifestyle (diet, exercise) interventions for women with breast cancer, and acupuncture may be acceptable given enough education about its benefits. Participants felt strongly that flexibility and choice will be key in delivering the intervention, which may contribute to women's sense of needing to regain control over bodies and lives. Support from peers and qualified health professionals was an unmet need for some women and should be incorporated into the intervention using multimodal and multi-component (online, telephone, in-person) strategies.

Acknowledgments

Participants in this research were recruited from Breast Cancer Network Australia's (BCNA) Review and Survey Group, a national, online group of Australian women living with breast cancer who are interested in receiving invitations to participate in research. We acknowledge the contribution of the women involved in the Review and Survey Group who participated in this project. We also acknowledge the assistance of Masrura Kabir from Westmead Breast Cancer Institute who assisted us with Ethics approvals and participant recruitment at the Institute. Thank you to participants for providing their valuable time to participate in the study and co-design the future RCT intervention.

Authors' Note

Elisabeth Elder is now affiliated to School of Medicine, Faculty of Medicine and Health, University of Sydney, Westmead.

Author Contributions

CE conceived of the original research idea and designed the analysis. All authors contributed to design of the study. CE and AS collected and analyzed data, and wrote the first draft of the manuscript. All authors contributed to interpretation of the findings and revising the manuscript for important intellectual content. CE and AS are joint first author.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: CE declares that she is the Program Lead of an academic integrative healthcare center that offers mindfulness and yoga services. She does not receive any remuneration from the operation

of this center. As a medical research institute, NICM Health Research Institute receives research grants and donations from foundations, universities, government agencies, and industry. Sponsors and donors provide untied and tied funding for work to advance the vision and mission of the Institute. All other authors declare that they have no conflict of interest.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This project was funded by a Training Award from the Primary Care Collaborative Cancer Clinical Trials (PC4) group. AS's stipend is provided by the University of Sydney's Research Training Program Scholarship and a Supplementary Postgraduate Research Scholarship in Breast Cancer. CE's salary is supported by an endowment from the Jacka Foundation of Natural Therapies.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethical approval was granted by the Human Research Ethics Committees at Western Sydney University (H13990, 1 September 2020) and Western Sydney Local Health District (2020/ETH02504, 9 December 2020).

Consent to Participate

All participants provided written informed consent.

ORCID iD

Carolyn Ee  <https://orcid.org/0000-0002-3363-9199>

Supplemental Material

Supplemental material for this article is available online.

References

1. Ji P, Gong Y, Jin M-L, Hu X, Di GH, Shao Z-M. The burden and trends of breast cancer from 1990 to 2017 at the global, regional, and national levels: results from the global burden of disease study 2017. *Front Oncol.* 2020;10:650.
2. Vance V, Mourtzakis M, McCargar L, Hanning R. Weight gain in breast cancer survivors: prevalence, pattern and health consequences. *Obes Rev.* 2011;12:282-294.
3. Ee C, Cave AE, Naidoo D, Bilinski K, Boyages J. Weight before and after a diagnosis of breast cancer or ductal carcinoma in situ: a national Australian survey. *BMC Cancer.* 2020;20:113.
4. Saquib N, Flatt SW, Natarajan L, et al. Weight gain and recovery of pre-cancer weight after breast cancer treatments: evidence from the women's healthy eating and living (WHEL) study. *Breast Cancer Res Treat.* 2007;105:177-186.
5. Imayama I, Alfano CM, Neuhouser ML, et al. Weight, inflammation, cancer-related symptoms and health related quality of

- life among breast cancer survivors. *Breast Cancer Res Treat.* 2013;140:159-176.
6. Reeves MM, Terranova CO, Eakin EG, Demark-Wahnefried W. Weight loss intervention trials in women with breast cancer: a systematic review. *Obes Rev.* 2014;15:749-768.
 7. Ee C, Cave AE, Naidoo D, Bilinski K, Boyages J. Weight management barriers and facilitators after breast cancer in Australian women: a national survey. *BMC Womens Health.* 2020;20:140.
 8. Rey D, Touzani R, Bouhnik AD, et al. Evolution of physical activity and body weight changes in breast cancer survivors five years after diagnosis – VICAN 2 & 5 French national surveys. *Breast.* 2021;59:248-255.
 9. Boyle T, Vallance JK, Ransom EK, Lynch BM. How sedentary and physically active are breast cancer survivors, and which population subgroups have higher or lower levels of these behaviors? *Support Care Cancer.* 2016;24:2181-2190.
 10. Wanchai A, Armer JM, Stewart BR. Complementary and alternative medicine use among women with breast cancer: a systematic review. *Clin J Oncol Nurs.* 2010;14:E45-E55.
 11. World Health Organization. Traditional, complementary and integrative medicine. May 12, 2022. Accessed May 12, 2022. https://www.who.int/health-topics/traditional-complementary-and-integrative-medicine#tab=tab_1
 12. Ee C, Cave AE, Naidoo D, Boyages J. Prevalence of and attitudes towards complementary therapy use for weight after breast cancer in Australia: a national survey. *BMC Complement Altern Med.* 2019;19:332.
 13. Greenlee H, Kwan ML, Ergas IJ, et al. Complementary and alternative therapy use before and after breast cancer diagnosis: the pathways study. *Breast Cancer Res Treat.* 2009;117:653-665.
 14. Carrière K, Khoury B, Günak MM, Knäuper B. Mindfulness-based interventions for weight loss: a systematic review and meta-analysis. *Obes Rev.* 2018;19:164-177.
 15. Katterman SN, Kleinman BM, Hood MM, Nackers LM, Corsica JA. Mindfulness meditation as an intervention for binge eating, emotional eating, and weight loss: a systematic review. *Eat Behav.* 2014;15:197-204.
 16. Lauche R, Langhorst J, Lee MS, Dobos G, Cramer H. A systematic review and meta-analysis on the effects of yoga on weight-related outcomes. *Prev Med.* 2016;87:213-232.
 17. Olson KL, Emery CF. Mindfulness and weight loss: a systematic review. *Psychosom Med.* 2015;77:59-67.
 18. Rogers JM, Ferrari M, Mosely K, Lang CP, Brennan L. Mindfulness-based interventions for adults who are overweight or obese: a meta-analysis of physical and psychological health outcomes. *Obes Rev.* 2017;18:51-67.
 19. Zhang RQ, Tan J, Li FY, Ma YH, Han LX, Yang XL. Acupuncture for the treatment of obesity in adults: a systematic review and meta-analysis. *Postgrad Med J.* 2017;93:743-751.
 20. Richards D, Marley J. Stimulation of auricular acupuncture points in weight loss. *Aust Fam Physician.* 1998;27 (Suppl 2):S73-S77.
 21. Li H, Zhang JB, Xu C, et al. Effects and mechanisms of auricular vagus nerve stimulation on high-fat-diet—induced obese rats. *Nutrition.* 2015;31:1416-1422.
 22. Firouzjaei A, Li GC, Wang N, Liu WX, Zhu BM. Comparative evaluation of the therapeutic effect of metformin monotherapy with metformin and acupuncture combined therapy on weight loss and insulin sensitivity in diabetic patients. *Nutr Diabetes.* 2016;6:e209.
 23. Güçel F, Bahar B, Demirtas C, Mit S, Cevik C. Influence of acupuncture on leptin, ghrelin, insulin and cholecystokinin in obese women: a randomised, sham-controlled preliminary trial. *Acupunct Med.* 2012;30:203-207.
 24. Hsu CH, Wang CJ, Hwang KC, Lee TY, Chou P, Chang HH. The effect of auricular acupuncture in obese women: a randomized controlled trial. *J Womens Health.* 2009;18:813-818.
 25. Lin RT, Tzeng CY, Lee YC, et al. Acupoint-specific, frequency-dependent, and improved insulin sensitivity hypoglycemic effect of electroacupuncture applied to drug-combined therapy studied by a randomized control clinical trial. *Evid Based Complement Alternat Med.* 2014;2014:371475.
 26. Lin RT, Chen CY, Tzeng CY, et al. Electroacupuncture improves glucose tolerance through cholinergic nerve and nitric oxide synthase effects in rats. *Neurosci Lett.* 2011;494:114-118.
 27. Lin RT, Tzeng CY, Lee YC, et al. Acute effect of electroacupuncture at the Zusanli acupoints on decreasing insulin resistance as shown by lowering plasma free fatty acid levels in steroid-background male rats. *BMC Complement Altern Med.* 2009;9:26.
 28. Liang F, Koya D. Acupuncture: is it effective for treatment of insulin resistance? *Diabetes Obes Metab.* 2010;12:555-569.
 29. Peplow PV, Baxter GD. Electroacupuncture for control of blood glucose in diabetes: literature review. *J Acupunct Meridian Stud.* 2012;5:1-10.
 30. Wang F, Tian DR, Han JS. Electroacupuncture in the treatment of obesity. *Neurochem Res.* 2008;33:2023-2027.
 31. Noordali F, Cumming J, Thompson JL. Effectiveness of mindfulness-based interventions on physiological and psychological complications in adults with diabetes: a systematic review. *J Health Psychol.* 2017;22:965-983.
 32. Ruffault A, Czernichow S, Hager MS, et al. The effects of mindfulness training on weight-loss and health-related behaviours in adults with overweight and obesity: a systematic review and meta-analysis. *Obes Res Clin Pract.* 2017;11:90-111.
 33. Ben-Horin I, Kahan P, Ryvo L, Inbar M, Lev-Ari S, Geva R. Acupuncture and reflexology for chemotherapy-induced peripheral neuropathy in breast cancer. *Integr Cancer Ther.* 2017;16:258-262.
 34. Greenlee H, DuPont-Reyes MJ, Balneaves LG, et al. Clinical practice guidelines on the evidence-based use of integrative therapies during and after breast cancer treatment. *CA Cancer J Clin.* 2017;67:194-232.
 35. Chung S, Zhu S, Friedmann E, et al. Weight loss with mindful eating in African American women following treatment for breast cancer: a longitudinal study. *Support Care Cancer.* 2016;24:1875-1881.
 36. Thomas EA, Mijangos JL, Hansen PA, et al. Mindfulness-oriented recovery enhancement restructures reward processing and promotes interoceptive awareness in overweight cancer

- survivors: mechanistic results from a stage I randomized controlled trial. *Integr Cancer Ther*. 2019;18:1534735419855138.
37. Littman AJ, Bertram LC, Ceballos R, et al. Randomized controlled pilot trial of yoga in overweight and obese breast cancer survivors: effects on quality of life and anthropometric measures. *Support Care Cancer*. 2012;20:267-277.
 38. Witt CM, Pach D, Brinkhaus B, et al. Safety of acupuncture: results of a prospective observational study with 229,230 patients and introduction of a medical information and consent form. *Forsch Komplementarmed*. 2009;16:91-97.
 39. White A. A cumulative review of the range and incidence of significant adverse events associated with acupuncture 20041119 DCOM-20041221. 2004(0964-5284 (Print)).
 40. MacPherson H, Thomas K, Walters S, Fitter M. A prospective survey of adverse events and treatment reactions following 34,000 consultations with professional acupuncturists. *Acupunct Med*. 2001;19:93-102.
 41. Sully BG, Julious SA, Nicholl J. A reinvestigation of recruitment to randomised, controlled, multicenter trials: a review of trials funded by two UK funding agencies. *Trials*. 2013;14:166.
 42. Skivington K, Matthews L, Simpson SA, et al. Framework for the development and evaluation of complex interventions: gap analysis, workshop and consultation-informed update. *Health Technol Assess*. 2021;25:1-132.
 43. Bowen DJ, Kreuter M, Spring B, et al. How we design feasibility studies. *Am J Prev Med*. 2009;36:452-457.
 44. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. 2007;19:349-357.
 45. Ee C, Smith C, Costello M, et al. Feasibility and acceptability of a proposed trial of acupuncture as an adjunct to lifestyle interventions for weight loss in polycystic ovary syndrome: a qualitative study. *BMC Complement Altern Med*. 2018;18:298.
 46. Corbin JM, Strauss A. Grounded theory research: procedures, canons, and evaluative criteria. *Qual Sociol*. 1990;13:3-21.
 47. Quirkos v1.5.1. 2019. <https://www.quirkos.com>
 48. Spooner C, Jayasinghe UW, Faruqi N, Stocks N, Harris MF. Predictors of weight stigma experienced by middle-older aged, general-practice patients with obesity in disadvantaged areas of Australia: a cross-sectional study. *BMC Public Health*. 2018;18:640.
 49. Mensinger JL, Tylka TL, Calamari ME. Mechanisms underlying weight status and healthcare avoidance in women: a study of weight stigma, body-related shame and guilt, and healthcare stress. *Body Image*. 2018;25:139-147.
 50. El-Hashimi D, Gorey KM. Yoga-specific enhancement of quality of life among women with breast cancer: systematic review and exploratory meta-analysis of randomized controlled trials. *J Evid Based Integr Med*. 2019;24:2515690x19828325.
 51. Galantino ML, Greene L, Archetto B, et al. A qualitative exploration of the impact of yoga on breast cancer survivors with aromatase inhibitor-associated arthralgias. *Explore*. 2012;8:40-47.
 52. Loudon A, Barnett T, Williams A. Yoga, breast cancer-related lymphoedema and well-being: a descriptive report of women's participation in a clinical trial. *J Clin Nurs*. 2017;26:4685-4695.
 53. Dobkin PL. Mindfulness-based stress reduction: what processes are at work? *Complement Ther Clin Pract*. 2008;14:8-16.
 54. Hoffman CJ, Ersser SJ, Hopkinson JB. Mindfulness-based stress reduction in breast cancer: a qualitative analysis. *Complement Ther Clin Pract*. 2012;18:221-226.
 55. Robertson MC, Cox-Martin E, Liao Y, et al. Acceptance- and mindfulness-based techniques for physical activity promotion in breast cancer survivors: a qualitative study. *Support Care Cancer*. 2022;30:465-473.
 56. Mackenzie MJ, Carlson LE, Munoz M, Specia M. A qualitative study of self-perceived effects of mindfulness-based stress reduction (MBSR) in a psychosocial oncology setting. *Stress Health*. 2007;23:59-69.
 57. Weitz MV, Fisher K, Lachman VD. The journey of women with breast cancer who engage in mindfulness-based stress reduction a qualitative exploration. *Holist Nurs Pract*. 2012;26:22-29.
 58. Zhang Q, Zhao H, Zheng Y. Effectiveness of mindfulness-based stress reduction (MBSR) on symptom variables and health-related quality of life in breast cancer patients—a systematic review and meta-analysis. *Support Care Cancer*. 2019;27:771-781.
 59. de Manincor M, Bensoussan A, Smith C, Fahey P, Bouchier S. Establishing key components of yoga interventions for reducing depression and anxiety, and improving well-being: a Delphi method study. *BMC Complement Altern Med*. 2015;15:85.
 60. Kabat-Zinn J. *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness*. Revised and updated ed. Bantam Books; 2013.
 61. Thomas R, Quinlan E, Kowalski K, Spriggs P, Hamoline R. Beyond the body: insights from an Iyengar yoga program for women with disability after breast cancer. *Holist Nurs Pract*. 2014;28:353-361.
 62. Schapira MM, Mackenzie ER, Lam R, et al. Breast cancer survivors willingness to participate in an acupuncture clinical trial: a qualitative study. *Support Care Cancer*. 2014;22:1207-1215.
 63. Szuhany KL, Malgaroli M, Riley G, et al. Barriers and engagement in breast cancer survivorship wellness activities. *Breast Cancer Res Treat*. 2021;188:317-325.
 64. Yildiz Kabak V, Gursen C, Aytar A, Akbayrak T, Duger T. Physical activity level, exercise behavior, barriers, and preferences of patients with breast cancer-related lymphedema. *Support Care Cancer*. 2021;29:3593-3602.
 65. Addington EL, Sohl SJ, Tooze JA, Danhauer SC. Convenient and live movement (CALM) for women undergoing breast cancer treatment: challenges and recommendations for internet-based yoga research. *Complement Ther Med*. 2018;37:77-79.
 66. Anderson D, Seib C, McGuire A, Porter-Steele J. Decreasing menopausal symptoms in women undertaking a web-based

- multi-modal lifestyle intervention: the women's wellness program. *Maturitas*. 2015;81:69-75.
67. Bandura A. Health promotion from the perspective of social cognitive theory. *Psychol Health*. 1998;13:623-649.
 68. Carver CS, Scheier MF. Control theory: a useful conceptual framework for personality-social, clinical, and health psychology. *Psychol Bull*. 1982;92:111-135.
 69. Liu MG, Davis GM, Kilbreath SL, Yee J. Physical activity interventions using behaviour change theories for women with breast cancer: a systematic review and meta-analysis. *J Cancer Surviv*. Published online September 7, 2021. doi:10.1007/s11764-021-01104-9
 70. Stan DL, Cutshall SM, Adams TF, et al. Wellness coaching: an intervention to increase healthy behavior in breast cancer survivors. *Clin J Oncol Nurs*. 2020;24:305-315.
 71. Visser A, Prins JB, Jansen L, et al. Group medical consultations (GMCs) and tablet-based online support group sessions in the follow-up of breast cancer: a multicenter randomized controlled trial. *Breast*. 2018;40:181-188.
 72. van der Hout A, Jansen F, van Uden-Kraan CF, et al. Cost-utility of an eHealth application 'Oncokompas' that supports cancer survivors in self-management: results of a randomised controlled trial. *J Cancer Surviv*. 2021;15:77-86.
 73. Calle EE, Rodriguez C, Walker-Thurmond K, Thun MJ. Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults. *N Engl J Med*. 2003;348:1625-1638.
 74. Nichols HB, Trentham-Dietz A, Egan KM, et al. Body mass index before and after breast cancer diagnosis: associations with all-cause, breast cancer, and cardiovascular disease mortality. *Cancer Epidemiol Biomarkers Prev*. 2009;18:1403-1409.
 75. Kroenke CH, Chen WY, Rosner B, Holmes MD. Weight, weight gain, and survival after breast cancer diagnosis. *J Clin Oncol*. 2005;23:1370-1378.