Published in final edited form as:

Cancer Nurs. 2017 ; 40(2): E39–E46. doi:10.1097/NCC.0000000000000362.

Exploration of Exercise Outcome Expectations among Breast Cancer Survivors

Rachel Hirschey, PhDc, RN, Sharron L. Docherty, PhD, PNP-BC, FAAN, Wei Pan, PhD, and Isaac Lipkus, PhD

Duke University School of Nursing, Durham, North Carolina

Abstract

Background—Exercise is associated with decreased recurrence risk, improved survival and quality of life for breast cancer survivors. However only an estimated 17% - 37% of survivors adhere to the American Cancer Society exercise guidelines. A critical first step to increase exercise among survivors is to understand how they believe exercise will effect them.

Objective—To explore common exercise outcome expectations among 20 female survivors of stage IA – IIB breast cancer who completed adjuvant treatment and an exercise intervention.

Interventions/Methods—A mixed-method descriptive study consisting of semi-structured telephone interviews assessed exercise outcome expectations and how the experience of cancer and its treatment influenced expected outcomes of exercise. The qualitative data were analyzed using a summative content analysis procedure; means were calculated for each item of the exercise outcome questionnaire. The qualitative and quantitative data were compared and contrasted.

Results—The sample was 70% Caucasian and 30% African American with a mean age was 62 years (± 8.5) and average time since treatment completion of 4.2 years (± 1.3). Three themes emerged from the interviews: 1) prevalence of common expectations, 2) pervasive impact of fatigue, and 3) a brighter future. Overall, findings revealed that breast cancer survivors have low levels of agreement that exercise may mitigate late and long-term cancer and treatment effects.

Conclusions—In general, breast cancer survivors (even those who are motivated to exercise) do not hold strong beliefs that exercise will decrease late and long-term treatment effects.

Implications for Practice—Clinicians can educate survivors about exercise benefits.

The American Cancer Society (ACS) recommends that breast cancer survivors engage in at least 150 minutes/week of moderate-intensity or 75 minutes/week of strenuous intensity aerobic exercise and strength training exercises twice weekly.¹ However, only 17% – 37%^{2,3} of breast cancer survivors in the United States (US) comply with these activity recommendations. Among those who exercised pre-diagnosis, levels decrease during adjuvant therapy and fail to return to pre-diagnosis levels after completion of treatment.^{4,5} This is remarkable in light of empirical work supporting breast cancer survivors as generally

Corresponding Author: Rachel Hirschey, PhDc, RN, Duke University School of Nursing, 307 Trent Dr, Room 3080, Durham, NC, 27710 (Rachel.hirschey@duke.edu).

The authors have no conflicts of interest to disclose.

motivated to make healthy lifestyle changes, including exercise.⁶ A critical step to understand why survivors do not exercise at the recommended levels may be to explore their beliefs about the results of exercise. In this paper we report on breast cancer survivors' knowledge and beliefs about benefits of exercise.

For survivors, remission does not always equate to a return to pre-diagnosis health, functioning, and quality of life. Advancements in cancer treatments have substantially decreased mortality rates and brought about a surge in the number of long-term survivors, with approximately 2.8 million breast cancer survivors alive in the US today. These survivors may endure many physical, psychological, emotional, social, and spiritual challenges for up to 10 or more years after finishing treatment.^{7,8} Long-term effects, such as fatigue, are those that begin during and persist beyond the conclusion of primary treatment.⁹ Late effects, such as secondary cancers, are those that do not manifest until primary treatment is complete.⁹

Exercise has been shown to decrease many negative long-term and late effects caused by chemotherapy, radiation, surgery, and hormone therapy.¹⁰ Thus it may become even more beneficial to survivors to exercise after treatment than it was pre-diagnosis. For example, cardio-pulmonary gains from exercise are especially significant for survivors who have undergone chemotherapy and may be at risk for cardio-pulmonary toxicities and aerobic capacity decline.^{9,11} Similarly, women who undergo radiation are at risk for bone loss and muscular atrophy,¹² both of which are improved by regular exercise.^{13,14} Further, exercise improves quality of life for breast cancer survivors through decreasing treatment effects including fatigue,^{14,15} pain,^{16,17} decreased self-esteem,¹⁸ trouble concentrating,¹⁹ weight gain,^{20,21} depression,²² and disrupted sleep.²³ Finally, due to the association of exercise and recurrence risk reduction, exercise may improve QOL by providing a sense of control to the estimated 34% of breast cancer survivors who fear recurrence to the degree that it effects quality of life.²⁴ Because exercise lessens long-term effects and is associated with a 20-50% lower risk of recurrence,²⁵⁻²⁹ it is especially advantageous for survivors. Yet the extent to which survivors are aware of these benefits and recognize their increased need for exercise is not well known.

A critical step in increasing exercise among survivors is understanding what outcomes they expect from exercise, that is outcome expectations (OEs). OEs refer to what people expect to obtain or avoid by engaging in a behavior. Simply stated, people exercise because they believe it will produce desired and avoid undesired outcomes.³⁰ Understanding survivors' OEs is key to understanding their exercise behavior. OEs are highly influential in predicting health behaviors and are thus central to key theoretical frameworks of health behavior change such as social cognitive theory,³⁰ theory of planned behavior,³¹ and transtheoretical model.³² Among non-cancer populations, individuals who expect more positive and less negative outcomes are more likely to exercise.^{33,34} Understanding survivors' exercise OEs may provide insights to clinicians and researchers about how to promote exercise among survivors. Identification of more and less recognized OEs will illuminate which OEs to reinforce and which to introduce.

Little is known about which OEs to intervene upon to increase breast cancer survivors' exercise. We located only one study that identified OEs among survivors who have completed adjuvant treatment.³⁵ Findings indicated that among 8 survivors, common exercise OEs include enjoyment, increased energy, feeling good mentally, and maintaining a healthy weight.³⁵ Exercise effects on late and long-term treatment effects, such as recurrence risk were not identified by survivors in this study. Thus the purpose of this study was to explore common exercise OEs among breast cancer survivors and develop a deeper understanding of their beliefs about exercise.

Method

Design

A mixed-method descriptive design was used to explore exercise-related outcome expectations in women post breast cancer treatment.

Recruitment

A convenience sample of twenty female survivors of stage IA – IIB breast cancer were recruited. The sample was post adjuvant treatment and had completed an exercise intervention study,³⁶ at an academic tertiary care center in the southeastern US within the last year. The parent study was a three-arm randomized controlled trial that included a 16-week lab based aerobic exercise intervention. Participants were randomized to either moderate-intensity exercise, strenuous-intensity exercise, or an attention control stretching group. It is not our intention to examine effect of group assignment on OEs as all groups engaged in some intensity of exercise. Because this sample had exercised, it was identified as an ideal group of women to provide preliminary insights into the exercise outcomes that may be most motivating and thus important to target in future exercise interventions for breast cancer survivors. The study prescribed to state and national ethical standards, and was approved by the medical center Institutional Review Board.

Procedures

A semi-structured interview guide was used to conduct telephone interviews to assess exercise outcome expectations and if and how the experience of cancer and its treatment/s influenced expected exercise outcomes. At the beginning of the interview “regular exercise” was defined by the interviewer as 150 minutes per week of moderate intensity physical activity and examples of fast walking, baseball, tennis, and easy bicycling were provided. The interview questions (see Table 1 for interview guide) were selected based on a literature review of OEs and consultations with experts in exercise oncology as well as experts in OEs. The telephone interviews began with open-ended questions about participants' exercise OEs, moving them first through their expectations about exercise in general, and then specific OEs related to cancer and treatment effects, such as recurrence risk. After the open ended questions were asked, participants' answers to the exercise specific questions were elicited by using the Outcome Expectations for Exercise (OEE) Questionnaire³⁷ which was administered by the investigator during the interview. The measure uses a 5-point scale (1 = strongly agree and 5 = strongly disagree) to assess levels of agreement that exercise will result in 9 positive outcomes. This measure was selected because it has demonstrated

reliability and validity in a sample of older adults with Cronbach's alpha = .75 - .87.³⁸ Given that the 9 items on this questionnaire do not ask about exercise outcomes specific to breast cancer and its treatment, we modified the OEE questionnaire by adding 15 items to assess level of agreement about exercise specific to breast cancer survivors. These breast cancer specific items were identified through a review of empirical studies. Items with both causative and correlational support were included. Face validity of the additional 15 items was agreed on by the first author, last author and an exercise physiologist who has expertise in oncology. See Table 2 for items from the Modified Outcome Expectations for Exercise Questionnaire including those from the OEE and the breast cancer specific items that were added. All interviews were conducted by the first author and digitally recorded. On average, the interviews lasted 18 minutes. Notes were taken during the interviews and all recordings were reviewed twice, by the first author, to confirm accuracy of written notes.

Data analysis

The qualitative data were analyzed using a summative content analysis procedure. First, the content of the interviews related to exercise OEs was identified and quantified. Next, latent analysis was conducted to make meaning of the exercise OEs.³⁹ Alternative terms for common keywords and content were identified and their contexts were examined. The trustworthiness of the qualitative analysis and findings were strengthened by the following procedures. An audit trail was created to document data collection, coding and analysis decisions. Reflexive memos were made by the first author, immediately following the interviews and these notes were reviewed in conjunction with the audio recordings to identify linkages, gaps and questions. Peer debriefing was completed between the first and last author to discuss emerging findings, throughout data analysis. Specifically, throughout data collection and analysis, the two researchers met on a weekly basis to review interview content and discuss analysis and findings. The first author also consulted with a qualitative data analysis expert on three occasions to discuss emergent findings.

The quantitative data were analyzed by calculating means and standard deviations for each item on the modified OEE questionnaire. Results from the quantitative and qualitative analyses were linked to ascertain whether they confirm, refute, or otherwise extend or modify each other, and the interview findings offered potential explanations for the quantitative findings.

Participant demographics and characteristics of the parent study were collected to assure scientists and clinicians working to increase exercise among breast cancer survivors will be able to evaluate usefulness of study findings for the patients with whom they interact.

Results

Demographic and medical-related characteristics

The sample (n=20) was 70% Caucasian and 30% African American. The mean age was 62 years (± 8.5). Average time since completion of cancer treatment was 4.2 years (± 1.3). Most participants (65%) had undergone chemotherapy and radiation (70%), with 55% having had

a total mastectomy and 45% a lumpectomy. All participants had completed the larger lab based 16-week exercise intervention within the last year.

Qualitative Interview Data

Participants were asked, using both broad open-ended and specific questions, to talk about their exercise-related outcome expectations. Overall, responses were consistently non-specific and provided minimal details. For example, many participants said they expect to feel better from exercise, but despite probing for greater detail, were unable to discuss in what way or how. Participants predominately discussed mental or psychological benefits of exercise with greater detail provided for psychological than physical benefits. Even when asked to focus specifically on physical outcomes, most defaulted to discussing mental health benefits or concluded with final thoughts about the importance of exercise to psychological health. Importantly, participants did not discuss exercise outcomes related to treatment effects such as decreased recurrence risk or improved cardiac health. Overall they seemed unaware of the potential benefits that exercise has to ameliorate negative health effects of cancer and its treatments. Three general themes emerged from analysis of the interviews: 1) prevalence of common expectations, 2) pervasive impact of fatigue, and 3) a brighter future.

Prevalence of common expectations—Participants identified and focused predominately on the benefits that exercise has for the general, non-cancer population. The six most commonly reported expected outcomes or OEs included increased energy, feeling good overall, cardiac health, general health, feeling good mentally and achieving healthy weight. When prompted to talk about exercise outcomes in relation to how it may influence effects associated with their cancer treatments, they had difficulty identifying specific benefits. This sample of women was not able to identify the added benefit that exercise has for those who had survived cancer and its treatment. For example, none spontaneously discussed decreased recurrence risk as an exercise OE. When probed to talk about how their experience with cancer and treatments has changed what they expected to experience from exercise, 30% said they thought exercise might decrease their recurrence risk. One woman explained that she did not learn this from her health care providers and stressed that nurses should educate patients about the association of exercise with recurrence risk. She said:

“Breast cancer is less likely to occur in the first place and less likely to recur if you exercise - I never knew this, I only learned this through the study [referring to the parent RCT]. My doctor actually told me to stop walking the dog during treatment - I didn't listen to her, I decided that was the worst advice I ever got. I would have lost out if I had listened, I walked through my whole treatment. In fact, nurses are important in relaying the message about exercise and cancer. I didn't get any of this information through treatment.”

Talk about the heightened benefits of exercise for cancer survivors was limited to two participants (10%) who provided examples of an increased need for exercise due to treatment effects. One participant discussed her expectation that exercise would mitigate problems she has with her heart that resulted from cancer treatment. Another woman said, *“Even now five years later I still have some side effects - major joint and bone pain. Exercise works best to help with this.”*

Pervasive effect of fatigue—Almost all participants (75%) stressed the role that fatigue played in decisions to exercise. Increased energy was the most common theme participants said they enjoyed or would enjoy most from exercise. However, others (40%) expressed extreme fatigue, most often a result of hormone therapy, as a barrier to exercise. One participant stated she has *“scaled back what I expect, I have problems with my energy, tamoxifen almost killed me, and my body is still trying to recover from the treatments.”* Similarly, another participant expressed that she needs to exercise more but she is too tired; she said *“cancer, radiation, then that medication I took for a year zapped my energy.”* Several participants explained that they are simply too fatigued to exercise and saved their energy for other higher priority life activities.

A brighter future—Many participants (35%) focused and elaborated on the psychological benefits they have or expect to experience from exercise. When the women talked about physical benefits, they tended to just list them; however, those who experienced mental benefits discussed them in more detail. While participants valued both physical and psychological outcomes of exercise, the psychological outcomes were described as the most powerful in affecting their lives. One woman explained, *“you really need to focus on mental benefits of exercise for breast cancer and control is a big issue too, you are dealing with not being in control, exercise is something you can do.”* Another participant explained that exercise really helped her to survive cancer, she said *“to go through diagnosis and treatment and the aftermath is a lot to go through. Personally I think exercise makes it brighter at the end. That you want to stay healthier, you want to eat healthier, you look at life differently because of the diagnosis. A lot of people say cancer, oh god, you hear a lot of women die and you hear the good stories and I say I’m a survivor.”* Participants did not discuss the personal importance of physical outcomes.

Quantitative data

Our intent in using the OEE measure was to quantitatively explore potential exercise outcomes participants thought exercise was most and least likely to produce. Cronbach's alpha of the modified measure for this sample is 0.94, demonstrating excellent reliability. The mean agreement scores and standard deviations from the modified OEE measure are presented in Table 3. Mean level of agreement scores for each item were calculated and ranged from 2.8 (outcome participants least agreed would result from exercise) to 1.1 (outcomes participants most agreed would result from exercise). The average level of agreement score was 1.9 for psychological outcomes, 1.7 for physical outcomes and 1.7 overall. We used the mean level of agreement score of 1.7 to divide the outcomes into those participants most agreed would result from exercise (score <1.7) and those participants who least agreed with what would result from exercise (score ≥ 1.7). Notable items with a mean agreement score ≥ 1.7 include: reducing long-term effects of treatment, feeling less tired, sleeping better, increasing length of life, reducing recurrence risk, increasing mental alertness and decreasing risk of osteoporotic bone fractures. These items are noteworthy as, despite empirical support of their benefit, they were those least endorsed by this sample of survivors.

Linking qualitative and quantitative data

The qualitative and quantitative data were compared to ascertain whether they confirmed or refuted each other. The qualitative data was used to make meaning of the quantitative data. We first explored how often items with less agreement on the OEE measure (i.e., scores above 1.7) were mentioned during the interview. Again, the quantitative results indicated that participants reported lower levels of agreement in relation to exercise resulting in: improved sexual desire, improved sexual satisfaction, decreased neuropathy, decreased lymphedema, reduction in long term side effects of breast cancer treatment, feeling less tired, sleeping better, being an enjoyable activity, increasing length of life, recurrence risk reduction, improved arm range of motion, increased mental alertness and decreased risk for osteoporotic bone fracture. With the exception of feeling less tired, items with low agreement scores were not prominent in the qualitative data.

Survivors have been known to be motivated to exercise to reduce their fear of recurrence⁴¹. However, recurrence risk reduction did not spontaneously come up in the qualitative interviews. When asked more specifically about potential exercise outcomes in relations to having cancer and treatments, 30% mentioned recurrence risk reduction. Finally when asked as part of the OEE measure, risk reduction was rated with a lower level of agreement ($m = 1.7$), and several participants paused and made comments such as “huh, I have no idea”, “I really don't know”, “I really hope so, so I'm going to have to say one.”

In summary both the qualitative and quantitative data supported that among a sample of women who are motivated to complete an exercise study, there are low levels of agreement that exercise may mitigate several significant late and long-term cancer and treatment effects.

Discussion

Overall, findings from this study highlight that despite extensive evidence that exercise effectively treats many long-term and late treatment effects, survivors who are motivated to exercise may still be unaware or question these potential benefits. While this sample generally has positive expectations of exercise, they still hold some doubt about the efficacy of exercise as a treatment for long term cancer effects. Given these findings among a sample of survivors who have exercised, knowledge related to exercise benefits among those who are not motivated to exercise is highly questionable. Breast cancer survivors' OEs may be similar to those of non-cancer survivors. The qualitative data revealed that the most common OEs of breast cancer survivors are increased energy, feeling good overall, cardiac health, general health, feeling good mentally, and achieving healthy weight. These findings are similar to those of Short and Colleagues (2013) who report that breast cancer survivors anticipate enjoyment, increased energy, feeling good mentally and maintaining a healthy weight as effects of physical activity. Thus there is an opportunity to increase awareness about the exercise benefits that extend beyond those for the general population to those that decrease late and long term cancer and treatment effects.

Mean scores from the quantitative data indicate that outcomes breast cancer survivors least agree exercise will produce are: decreasing long-term effects of breast cancer treatment,

feeling less tired, sleeping better, increasing length of life, reducing recurrence risk, increasing mental alertness and decreasing risk of osteoporotic bone fractures. These qualitative and quantitative data are congruent. Specifically, none of the items with a low (1.7) quantitative agreement score (i.e. outcomes survivors are least likely exercise will produce) were discussed by participants in the qualitative interviews. The absence of low agreement outcomes in the qualitative data confirm the finding that survivors do not agree, are unaware, or rarely think about exercise resulting in such outcomes. Especially notable is the low scores for recurrence risk and lack of recurrence risk in the qualitative data. These findings support each other in that overall, survivors are unsure of the efficacy of exercise to decrease recurrence risk. Both survivors who do and do not exercise, should be made aware of the association between exercise and risk recurrence.

Increased awareness of the numerous diverse positive outcomes of exercise may motivate breast cancer survivors to exercise more. The greatest concerns among breast cancer survivors include fear of recurrence, fatigue, sleep disturbance, neuropathy, concerns about long-term effects of treatment, weight changes, and sexual issues,⁷ all of which exercise can positively impact. Generally, cancer survivors are motivated to engage in behaviors they believe will improve their health including exercise.⁴¹ Thus, it is possible that increased awareness of the efficacy of exercise to improve long term and late effects may motivate sedentary survivors to exercise and help maintain or increase activity among active survivors.

In addition to increasing knowledge about exercise benefits, highlighting psychological outcomes may be especially effective to increase exercise among breast cancer survivors. This sample, of survivors who have exercised, discussed psychological OEs in greater detail than physical outcomes. Participants explained that they enjoy the psychological outcomes of exercise and that these benefits are especially important given the emotional challenges of going through cancer and treatment. These findings indicate that psychological outcomes are crucial to focus on in exercise interventions among this population.

Fatigue plays a significant role in breast cancer survivors' decisions to exercise. Cancer-related fatigue is defined by the National Comprehensive Cancer Network as "a distressing persistent subjective sense of physical, emotional, and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and that interferes with usual functioning."⁴² Cancer-related fatigue persists up to ten years into survivorship.^{43,44} Increased energy was one of the most common OEs in the qualitative data, yet the quantitative data indicates low levels of agreement that exercise will help survivors feel less tired and sleep better. This contradiction confirms the pervasive nature of fatigue related to exercise, as survivors identify fatigue as both a great benefit of and barrier to exercise. Indeed, survivors who exercise consistently report having more energy.⁴⁵ Further research is needed to identify how to break down fatigue as an exercise barrier so that survivors may exercise to enjoy higher levels of energy and an improved quality of life. Similarly, efforts are needed to increase levels of exercise to decrease fatigue experienced by survivors.

One weakness of this study is the convenience sample of highly motivated survivors actively engaged in an exercise intervention, limiting generalizability of findings to all breast cancer survivors. Yet, this sample provided great initial insights into what may motivate exercise among survivors. However, because all participants completed a 16-week lab based exercise oncology intervention at a large research hospital, it is reasonable to consider that these participants are more aware of exercise outcomes, compared to other breast cancer survivors. This indicates that among the larger breast cancer population, there is likely an even greater need to shine light on the benefits of exercise related to cancer and treatment effects. Another study weakness is the accuracy with which the quantitative measure assessed OEs. Items on the measure were asked after participants had thought about and discussed outcomes of exercise. Thus, these conversations may have primed participants and impacted their rating.

Implications of these findings

Clinicians working with breast cancer survivors have an opportunity to educate survivors about the role exercise plays in managing late and long-term side effects. Connections between the heightened need for exercise due to treatment effects should be outlined for patients. Particular attention should be given to the association between exercise and recurrence risk reduction. Overall, research is needed to identify the most effective strategies to increase breast cancer survivors' exercise OEs, as a means to increase exercise. OEs have several dimensions including 1) importance – value placed on the outcome(s);^{46,47} 2) certainty - perceived probability outcome(s) will occur;^{46,48} and 3) accessibility – the frequency with which outcome(s) are considered.^{46,49,50} Interventions that simultaneously enhance all these dimensions may be most effective to increase exercise. In summary, it may be necessary to both increase survivors' awareness of diverse exercise outcomes as well as enhance the importance and certainty of these outcomes.

Acknowledgments

We would like to thank Dr. Lee Jones, the principle investigator of the randomized controlled trial, from which we recruited participants for this study. Dr. Jones provided valuable insight to the development of our interview guide as well as recruitment of study participants. We would also like to thank Dr. Alexander Rothman for his expert consultation on the interview guides, specifically regarding assessment of outcome expectations. We would like to acknowledge Dr. Jones' study was funding by the National Institute of Health (CA-142566).

References

1. Rock CL, Doyle C, Demark-Wahnefried W, et al. Nutrition and physical activity guidelines for cancer survivors. *CA Cancer J Clin.* 2012; 62(4):243–274. DOI: 10.3322/caac.21142 [PubMed: 22539238]
2. Smith SG, Chagpar AB. Adherence to physical activity guidelines in breast cancer survivors. *Am Surg.* 2010; 76(9):962–965. [PubMed: 20836343]
3. Blanchard CM, Courneya KS, Stein K. Cancer Survivors “Adherence to Lifestyle Behavior Recommendations and Associations With Health-Related Quality of Life: Results From the American Cancer Society”’s SCS-II. *Journal of Clinical Oncology.* 2008; 26(13):2198–2204. DOI: 10.1200/JCO.2007.14.6217 [PubMed: 18445845]
4. Bock C, Schmidt ME, Vrieling A, Chang-Claude J, Steindorf K. Walking, bicycling, and sports in postmenopausal breast cancer survivors-results from a German patient cohort study. *Psychooncology.* 2013; 22(6):1291–1298. DOI: 10.1002/pon.3134 [PubMed: 22807316]

5. Pinto BM, Trunzo JJ, Reiss P, Shiu SY. Exercise participation after diagnosis of breast cancer: trends and effects on mood and quality of life. *Psychooncology*. 2002; 11(5):389–400. DOI: 10.1002/pon.594 [PubMed: 12228872]
6. Demark-Wahnefried W, Peterson B, McBride C, Lipkus I, Clipp E. Current health behaviors and readiness to pursue life-style changes among men and women diagnosed with early stage prostate and breast carcinomas. *Cancer*. 2000; 88(3):674–684. [PubMed: 10649263]
7. Ness S, Kokal J, Fee-Schroeder K, Novotny P, Satele D, Barton D. Concerns Across the Survivorship Trajectory: Results From a Survey of Cancer Survivors. *Oncol Nurs Forum*. 2012; 40(1):35–42. DOI: 10.1188/13.ONF.35-42 [PubMed: 23269768]
8. Harrington CB, Hansen JA, Moskowitz M, Todd BL, Feuerstein M. It's Not Over When It's Over: Long-Term Symptoms in Cancer Survivors-a Systematic Review. *Int J Psychiatry Med*. 2010; 40(2): 163–181. DOI: 10.2190/PM.40.2.c [PubMed: 20848873]
9. Carver JR, Shapiro CL, Ng A, et al. American Society of Clinical Oncology clinical evidence review on the ongoing care of adult cancer survivors: cardiac and pulmonary late effects. *Journal of Clinical Oncology*. 2007; 25(25):3991–4008. DOI: 10.1200/JCO.2007.10.9777 [PubMed: 17577017]
10. Loprinzi PD, Lee H. Rationale for promoting physical activity among cancer survivors: literature review and epidemiologic examination. *Oncol Nurs Forum*. 2014; 41(2):117–125. DOI: 10.1188/14.ONF.117-125 [PubMed: 24578072]
11. Hahn VS, Lenihan DJ, Ky B. Cancer therapy-induced cardiotoxicity: basic mechanisms and potential cardioprotective therapies. *J Am Heart Assoc*. 2014; 3(2):e000665.doi: 10.1161/JAHA.113.000665 [PubMed: 24755151]
12. Sheean PM, Hoskins K, Stolley M. Body composition changes in females treated for breast cancer: a review of the evidence. *Breast Cancer Research and treatment*. 2012; 135(3):663–680. DOI: 10.1007/s10549-012-2200-8 [PubMed: 22903689]
13. Hojan K, Milecki P, Moli ska-Glura M, Roszak A, Leszczy ski P. Effect of physical activity on bone strength and body composition in breast cancer premenopausal women during endocrine therapy. *Eur J Phys Rehabil Med*. 2013; 49(3):331–339. [PubMed: 23438652]
14. Loprinzi PD, Cardinal BJ. Effects of physical activity on common side effects of breast cancer treatment. *Breast Cancer*. 2012; 19(1):4–10. DOI: 10.1007/s12282-011-0292-3 [PubMed: 21725654]
15. Pinto BM, Dunsiger S, Waldemore M. Physical activity and psychosocial benefits among breast cancer patients. *Psychooncology*. Mar.2013 doi: 10.1002/pon.3272
16. Nyrop KA, Muss HB, Hackney B, Cleveland R, Altpeter M, Callahan LF. Feasibility and promise of a 6-week program to encourage physical activity and reduce joint symptoms among elderly breast cancer survivors on aromatase inhibitor therapy. *J Geriatr Oncol*. Dec.2013 doi: 10.1016/j.jgo.2013.12.002
17. Winters-Stone KM, Schwartz A, Hayes SC, Fabian CJ, Campbell KL. A prospective model of care for breast cancer rehabilitation: bone health and arthralgias. *Cancer*. 2012; 118(8 Suppl):2288–2299. DOI: 10.1002/cncr.27465 [PubMed: 22488703]
18. Duijts SFA, Faber MM, Oldenburg HSA, van Beurden M, Aaronson NK. Effectiveness of behavioral techniques and physical exercise on psychosocial functioning and health-related quality of life in breast cancer patients and survivors--a meta-analysis. *Psychooncology*. 2011; 20(2):115–126. DOI: 10.1002/pon.1728 [PubMed: 20336645]
19. Rogers LQ, Hopkins-Price P, Vicari S, et al. A randomized trial to increase physical activity in breast cancer survivors. *Medicine & Science in Sports & Exercise*. 2009; 41(4):935–946. DOI: 10.1249/MSS.0b013e31818e0e1b [PubMed: 19276838]
20. Demark-Wahnefried W, Morey MC, Sloane R, et al. Reach out to enhance wellness home-based diet-exercise intervention promotes reproducible and sustainable long-term improvements in health behaviors, body weight, and physical functioning in older, overweight/obese cancer survivors. *Journal of Clinical Oncology*. 2012; 30(19):2354–2361. DOI: 10.1200/JCO.2011.40.0895 [PubMed: 22614994]

21. DeNysschen CA, Brown JK, Cho MH, Dodd MJ. Nutritional symptom and body composition outcomes of aerobic exercise in women with breast cancer. *Clin Nurs Res*. 2011; 20(1):29–46. DOI: 10.1177/1054773810379402 [PubMed: 20736382]
22. Ergun M, Eyigor S, Karaca B, Kisim A, Uslu R. Effects of exercise on angiogenesis and apoptosis-related molecules, quality of life, fatigue and depression in breast cancer patients. *Eur J Cancer Care (Engl)*. 2013; 22(5):626–637. DOI: 10.1111/ecc.12068 [PubMed: 23731173]
23. Payne JK, Held J, Thorpe J, Shaw H. Effect of Exercise on Biomarkers, Fatigue, Sleep Disturbances, and Depressive Symptoms in Older Women With Breast Cancer Receiving Hormonal Therapy. *Oncol Nurs Forum*. 2008; 35(4):635–642. DOI: 10.1188/08.ONF.635-642 [PubMed: 18591167]
24. Custers JAE, van den Berg SW, van Laarhoven HWM, Bleiker EMA, Gielissen MFM, Prins JB. The Cancer Worry Scale. *Cancer Nurs*. 2014; 37(1):E44–E50. DOI: 10.1097/NCC.0b013e3182813a17 [PubMed: 23448956]
25. Loprinzi PD, Cardinal BJ, Winters-Stone K, Smit E, Loprinzi CL. Physical activity and the risk of breast cancer recurrence: a literature review. *Oncol Nurs Forum*. 2012; 39(3):269–274. DOI: 10.1188/12.ONF.269-274 [PubMed: 22543385]
26. Holmes MD, Chen WY, Feskanich D, Kroenke CH, Colditz GA. Physical activity and survival after breast cancer diagnosis. *JAMA*. 2005; 293(20):2479–2486. DOI: 10.1001/jama.293.20.2479 [PubMed: 15914748]
27. Chen X, Lu W, Zheng W, et al. Exercise After Diagnosis of Breast Cancer in Association with Survival. *Cancer Prev Res (Phila)*. 2011; 4(9):1409–1418. DOI: 10.1158/1940-6207.CAPR-10-0355 [PubMed: 21795422]
28. Ibrahim EM, Al-Homaidh A. Physical activity and survival after breast cancer diagnosis: meta-analysis of published studies. *Med Oncol*. 2011; 28(3):753–765. DOI: 10.1007/s12032-010-9536-x [PubMed: 20411366]
29. Sternfeld B, Weltzien E, Quesenberry CP, et al. Physical activity and risk of recurrence and mortality in breast cancer survivors: findings from the LACE study. *Cancer Epidemiol Biomarkers Prev*. 2009; 18(1):87–95. DOI: 10.1158/1055-9965.EPI-08-0595 [PubMed: 19124485]
30. Bandura A. Health Promotion by Social Cognitive Means. *Health Education & Behavior*. 2004; 31(2):143–164. DOI: 10.1177/1090198104263660 [PubMed: 15090118]
31. Ajzen I. The theory of planned behavior. *Organizational behavior and human decision processes*. 1991; 50(2):179–211.
32. Prochaska, JO., Redding, CA., Evers, KE. The Transtheoretical Model and Stages of Change. In: Glanz, K.Rimer, BK., Lewis, FM., editors. *Health Behavior and Health Education*. 3rd. San Francisco: Jossey-Bass; 2002. p. 99-120.
33. Williams DM, Anderson ES, Winett RA. A review of the outcome expectancy construct in physical activity research. *Ann Behav Med*. 2005; 29(1):70–79. DOI: 10.1207/s15324796abm2901_10 [PubMed: 15677303]
34. Resnick B, Nigg C. Testing a theoretical model of exercise behavior for older adults. *Nursing Research*. 2003; 52(2):80–88. [PubMed: 12657983]
35. Short CE, James EL, Plotnikoff RC. How Social Cognitive Theory can help oncology-based health professionals promote physical activity among breast cancer survivors. *Eur J Oncol Nurs*. 2013; 17(4):482–489. DOI: 10.1016/j.ejon.2012.10.009 [PubMed: 23177321]
36. Jones LW, Douglas PS, Eves ND, et al. Rationale and design of the Exercise Intensity Trial (EXCITE): A randomized trial comparing the effects of moderate versus moderate to high-intensity aerobic training in women with operable breast cancer. *BMC Cancer*. 2010; 10:531.doi: 10.1186/1471-2407-10-531 [PubMed: 20925920]
37. Resnick B, Zimmerman SI, Orwig D, Furstenberg AL, Magaziner J. Outcome expectations for exercise scale: utility and psychometrics. *J Gerontol B Psychol Sci Soc Sci*. 2000; 55(6):S352–S356. [PubMed: 11078112]
38. Resnick B, Zimmerman S, Orwig D, Furstenberg AL, Magaziner J. Model testing for reliability and validity of the Outcome Expectations for Exercise Scale. *Nursing Research*. 2001; 50(5):293–299. [PubMed: 11570714]

39. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qualitative Health Research*. 2005; 15(9):1277–1288. DOI: 10.1177/1049732305276687 [PubMed: 16204405]
40. Miles, MB., Huberman, AM., Saldana, J. *Qualitative Data Analysis*. SAGE Publications; 2013.
41. Templeton AJ, Thürlimann B, Baumann M, et al. Cross-sectional study of self-reported physical activity, eating habits and use of complementary medicine in breast cancer survivors. *BMC Cancer*. 2013; 13:153.doi: 10.1186/1471-2407-13-153 [PubMed: 23530694]
42. Piper BF, Cella D. Cancer-related fatigue: definitions and clinical subtypes. *J Natl Compr Canc Netw*. 2010; 8(8):958–966. [PubMed: 20870639]
43. Minton O, Stone P. How common is fatigue in disease-free breast cancer survivors? A systematic review of the literature. *Breast Cancer Research and treatment*. 2008; 112(1):5–13. DOI: 10.1007/s10549-007-9831-1 [PubMed: 18064565]
44. Bower JE, Ganz PA, Desmond KA, et al. Fatigue in long-term breast carcinoma survivors: a longitudinal investigation. *Cancer*. 2006; 106(4):751–758. DOI: 10.1002/cncr.21671 [PubMed: 16400678]
45. Cramp, F., Byron-Daniel, J. *Exercise for the Management of Cancer-Related Fatigue in Adults*. Cramp, F., editor. Chichester, UK: Wiley Online Library; 2012.
46. Olson, JM., Roese, NJ., zanna, MP. Expectancies. In: Higgins, ET., Kruglanski, AW., editors. *Social Psychology: Handbook of Basic Principles*. New York, NY: Guilford Press; 1996. p. 211-238.
47. Boninger, DS., Krosnick, JA., Berent, MK. The Causes and Consequences of Attitude Importance. In: Petty, RE., Krosnick, JA., editors. *Attitude Strength: Antecedents and Consequences*. New Jersey: Lawrence Erlbaum; 1995. p. 159-190.
48. Gross, SR., Holtz, R., Miller, N. Attitude Certainty. In: Petty, RE., Krosnick, JA., editors. *Attitude Strength: Antecedents and Consequences*. New Jersey: Lawrence Erlbaum; 1995. p. 215-246.
49. Fazio, RH. Attitudes as Object-Evaluation Associations: Determinants, Consequences, and Correlates of Attitude Accessibility. In: Petty, RE., Krosnick, JA., editors. *Attitude Strength: Antecedents and Consequences*. New Jersey: Lawrence Erlbaum; 1995. p. 247-282.
50. Petty, RE., Krosnick, JA. *Attitude Strength*. Psychology Press; 2014.

Table 1
Interview Guide

1	In general, what are your thoughts and feelings about exercise?
2	What do you expect you will experience during, that is, while you exercise at a moderate to strenuous intensity?
3	What do you expect will be the outcome(s) of exercising regularly for at least 150 minutes per week at a moderate to strenuous intensity? These outcomes can occur immediately after exercise to years down the road.
4	Based on how much you have exercised so far, what expected outcomes have been met?
5	What expected outcomes have not been met?
6	How, if at all, do you keep track of the outcomes you experience from exercising? That is, how do you know when an expected outcome has been met?
7	What if anything have you experienced, either during exercise or as a result of exercise, which you did not expect?
8	Have your expectations of exercise changed, since you began exercising?
9	(If Yes) How have your expectations changed?
10	What has brought you the most satisfaction from exercise and why?
11	What has brought you the least satisfaction from exercise and why?
12	How, if at all, do you keep track of how much you exercise?
13	To what extent do you intend to exercise for at least 150 minutes per week at a moderate to strenuous intensity, in the next six months, on this scale from 1 to 7 where 1 means "I definitely do not intend to exercise" and 7 means "I definitely intend to exercise"?
14	How, if at all, has your cancer influenced what you expect to be the outcomes from exercise?
15	How, if at all, has your cancer influenced your intention to exercise?
16	Are there any additional things, I didn't ask about, which you expect may result from regularly exercising 150 minutes per week at a moderate to strenuous intensity?
17	Would you like to share any thoughts you have about this interview?

Table 2
Modified Outcome Expectations for Exercise (OEE) Questionnaire

Original 9 Items	
1	Makes me feel better physically
2	Makes my mood better in general
3	Helps me feel less tired
4	Makes my muscles stronger
5	Is an activity I enjoy
6	Gives me a sense of personal accomplishment
7	Makes me more alert mentally
8	Improves my endurance performing daily activities
9	Helps strengthen my bones
Added 15 Items	
1	Reduces the chance of breast cancer coming back
2	Reduces the long term side effects of breast cancer treatment
3	Improves overall quality of life
4	Decreases risk for osteoporotic bone fractures
5	Improves arm range of motion (range of motion = the distance and direction your arm can move)
6	Decreases risk of lymphedema (lymphedema = swelling due to a build up of fluid)
7	Improves heart health
8	Improves lung health
9	Results in weight loss
10	Improves my body image
11	Helps me sleep better
12	Decreases neuropathy (neuropathy = nerve damage that can result in pain or numbness)
13	Improves sexual desire
14	Improves sexual satisfaction
15	Increases the length of my life

Table 3
Mean Scores for Items on the Modified Outcome Expectations for Exercise (OEE)
Questionnaire

Outcome	Mean	SD
Improves overall quality of life	1.1	0.2
Improves heart health	1.1	0.2
Make my muscles stronger	1.2	0.5
Improves lung health	1.2	0.5
Makes me feel better physically	1.3	0.7
Helps strengthen my bones	1.4	0.7
Make my mood better in general	1.4	0.7
Improves my body image	1.4	0.8
Give me a sense of personal accomplishment	1.5	0.7
Results in weight loss	1.5	0.8
Improves my endurance performing daily activities	1.6	1.0
Increases the length of my life	1.7	0.2
Reduces the chance of breast cancer coming back	1.7	0.9
Makes me more alert mentally	1.7	0.9
Decreases risk for osteoporotic bone fractures	1.7	0.9
Improves arm range of motion	1.7	1.0
Is an activity I enjoy	1.9	0.9
Helps me sleep better	1.9	1.2
Reduces the long term side effects of breast cancer treatment	2.1	1.2
Helps me feel less tired	2.1	1.4
Decreases risk of lymphedema	2.2	1.2
Decreases neuropathy	2.5	0.9
Improves sexual satisfaction	2.7	1.2
Improves sexual desire	2.8	1.0

Note. Items are listed in order participants most agree they may experience from exercise to those they least agree they experience from exercise with 1= *strongly agree* – 5 = *strongly disagree*.