Published in final edited form as:

Cancer Nurs. 2019 ; 42(1): E15–E19. doi:10.1097/NCC.0000000000000631.

What Do Breast Cancer Survivors Expect from Exercise?

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Abstract

Background—Exercise outcome expectations (OE) (i.e., what one expects to obtain or avoid by exercising) are influential to increase exercise among cancer survivors.

Objective—To measure the accessibility (i.e. frequency one thinks about exercise resulting in an outcome) and importance (i.e. one's value of the outcome) of OEs among breast cancer survivors.

Methods—Stage Ia to IIb breast cancer survivors who were one to five years post-treatment completed OE questionnaires. Descriptive statistics were used to examine OE accessibility and importance.

Results—The sample ($n = 73$) was 91.8% White, 5.4% African American, 1.4% Asian or Pacific islander and 1.4% other. The mean age was 58 ($SD = 9.6$). OE importance mean was 6.1 ($SD = 0.4$) indicating OEs are overall “important”. Accessibility mean was 4.8 ($SD = 0.6$) demonstrating breast cancer survivors think about exercise OEs “sometimes/50% of the time”. There was a moderate ($r_s = .48$) relationship between OE importance and accessibility indicating they are related, yet distinct.

Conclusions—OEs are generally important to breast cancer survivors. Thus, OEs may motivate increased exercise among this population.

Implications for Practice—Oncology providers should encourage patients to think about OEs more often to increase exercise. Compared to traditional approaches of informing patients about exercise benefits, this may be a more comprehensive and powerful approach to motivate exercise among breast cancer survivors.

Background

The American Cancer Society recommends that breast cancer survivors do strength training twice weekly and exercise each week for a minimum of 75 minutes at a vigorous intensity or 150 minutes at a moderate intensity.¹ Breast cancer survivors who meet these recommendations can experience many benefits.² For example, a recent meta-analysis of 22

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Conflicts of Interest Statement: The authors have no conflicts of interest to disclose.

epidemiological studies found that survivors who meet recommendations have a 40% lower mortality risk than those who do not.³ Additionally, decreased fatigue was observed in another meta-analysis of 3418 breast cancer survivors who participated in 25 physical activity interventions.⁴ Unfortunately, only about one third of the 3.1 million breast cancer survivors in the United States meet exercise recommendations and thus may experience such benefits.⁵

A detailed understanding of survivors' Outcome Expectations (OEs) is foundational to understanding how to increase exercise for this population.⁶ OEs refer to what one expects to obtain or avoid by engaging in a behavior.⁷ This study is guided by a theoretical framework that details three dimensions of OEs⁸. OE dimensions include certainty (i.e. perceived probability of a given outcome), accessibility (i.e. the frequency one thinks about exercise resulting in an outcome), and importance (i.e. one's value of the outcome)^{9–11}. Because survivors are motivated to engage in health behaviors to improve their outcomes¹² and most do not meet exercise recommendations, it is important to understand how they think exercise may impact them.

Previous research, using small sample sizes of eight to 30 participants, indicates that the most common exercise OEs among breast cancer survivors are enjoyment, energy, improved health, weight loss, stress reduction, mental, heart/lung and muscle benefits.^{6,13,14} These OEs are consistent with those of non-cancer populations, suggesting that survivors may not know that exercise can improve their long-term prognosis.⁶ Indeed, survivors do not commonly report OEs of reduced recurrence risk or late effects such as neuropathy or joint pain. These previous explorations of OEs assessed only certainty, as participants were asked to rate the extent to which they agree they will experience outcomes, using Likert type rating scales. This historical approach is restricted to only understanding knowledge about exercise benefits. However, it is well established that knowledge alone does not motivate behavior change.¹⁵ Thus, to maximally increase OEs, as a means to motivate exercise, additional OE dimensions of accessibility and importance of OEs may need to be considered.

No research has explored the accessibility or importance of exercise OEs among breast cancer survivors. To ultimately increase OEs, it is critical to understand how often survivors think about exercise outcomes (i.e. accessibility) and the extent to which they value each outcome (i.e. importance). This information will add to the traditional approach of understanding what survivors think they may experience if they exercise. The purpose of this study was to quantitatively assess the accessibility and importance of exercise OEs among breast cancer survivors. This critical understanding is foundational to informing clinicians about how to talk about exercise OEs with patients in order to motivate them to exercise more. A thorough understanding of OEs will also inform researchers about the dimensions of OEs that should be included in interventions to increase exercise among breast cancer survivors.

Methods

Participants

Participants were recruited at a tertiary cancer center in the southeastern United States. Medical charts were reviewed to identify participants meeting eligibility criteria. Eligibility criteria included stage Ia to IIb breast cancer diagnosis, being one to five years post chemotherapy, radiation and/or surgery, no evidence of recurrence or other cancers, ability to read English, having no contraindications for unsupervised exercise determined by the Physical Activity Readiness Questionnaire ¹⁶ and being community-dwelling (i.e. not residing in a skilled nursing or assisted living facility). Potentially eligible participants were approached in the clinic or mailed an invitation letter and screening form to participate in the study, from their oncologist.

Design and Procedures

This study uses a cross-sectional approach. Eligible, interested participants provided written consent. Participants were e-mailed a web link to complete online questionnaires through REDCap (Research Electronic Data Capture) ¹⁷. Participants who did not have access to the Internet were sent questionnaires and prepaid return envelopes, through the mail. Questionnaires were to be completed within one week of email or mail receipt. This study was approved by the medical center and cancer committee internal review boards (Pro00044422).

Measures

Existing exercise OE measures ^{13,18–20} were reviewed and modified to include outcomes most relevant to breast cancer survivors (e.g. recurrence risk) and to assess OE importance and accessibility. Items were added based on previous research exploring OEs among breast cancer survivors ^{6,13,14} and research testing the beneficial effects of exercise for breast cancer survivors.² All potential items were reviewed, for relevance and face validity, by the research team that consists of three nurse scientists, a behavioral psychologist, a medical oncologist and a statistician with expertise in measurement. Additionally, an expert in exercise oncology was consulted on the items for comprehensiveness and clarity. To establish content validity, three nurse practitioners who care for breast cancer survivors scored the items. They were asked to rate how relevant each item is for breast cancer survivors. All items that scored 2 (somewhat relevant), 3 (quite relevant) or 4 (very relevant) were retained for a final 20 items as has been done in similar OE measure development research ²¹ (See Table 1).

To create questions capturing OE accessibility and importance the research team reviewed the OE literature ^{9–11} and consulted with a behavioral psychologist who has expertise in OEs. As a result, OE accessibility was assessed with the question “How often do you think about exercise resulting in you...”, with a 1–7 rating scale (1=never to 7=all the time) ($\alpha = .96$). OE importance was assessed with the question “How important to you is...”, with a 1–7 rating scale (1=extremely unimportant to 7=extremely important) ($\alpha = .97$).

Data analysis

All statistical analyses were conducted using IBM SPSS Version 23.0 (Chicago: SPSS Inc). Descriptive statistics were used to examine how often survivors think about OEs (i.e. accessibility) and how much they value the OEs (i.e. importance).

Results

Participants

Recruitment packets were sent to 274 potential participants from the registry, of which 71 enrolled. Twenty-nine patients were referred from oncologists, of which 13 enrolled, for a total sample of 84. Measures were completed by 73 participants. The sample was 91.8% White, 5.4% African American, 1.4% Asian or Pacific islander and 1.4% other. The mean age was 58 (SD = 9.6), 78% of the sample had at least some college education, 77% were married, 39% worked full time, 32% were retired and 100% had health insurance.

OE Accessibility (i.e., the frequency one thinks about exercising resulting in an outcome)—OE scores are detailed in Table 1. Mean accessibility scores for each individual outcome ranged from 3.50 (SD =1.7) to 5.62 (SD =1.3). OE Accessibility overall mean was 4.8 (SD = 0.6), indicating that generally, breast cancer survivors think about exercise OEs “sometimes/50% of the time”. Outcomes that fell above this mean level, include general health, recurrence risk, feeling good physically, disease risk, feeling good mentally, weight, control over health, heart health, longevity and other cancer risk. Overall these are more physically oriented outcomes compared to those that fell below the mean (i.e., feeling tired, sleep, tension/stress, bone strength, attractiveness, sense of accomplishment, pain, enjoyment social interactions, and self-esteem).

OE Importance (i.e., one’s value of a respective exercise outcome)—Mean importance scores for each individual outcome ranged from 4.95 (SD =1.5) to 6.63 (SD =1.1). OE Importance overall mean was 6.1 (SD = 0.4) indicating OEs are overall “important”. Items above this mean rating included the following: recurrence; other cancer and disease risk reduction; feeling good mentally and physically; heart, bone, and general health; longevity; control over health; and less tension/stress. All of these items overlapped with those survivors think about most (i.e. items with highest accessibility scores), except for weight, bone strength and less tension/stress. Similar to the outcomes survivors think about most, those that are most important to them are more physically, rather than psychologically, socially or emotionally oriented.

Discussion

This is the first study to measure exercise OE accessibility and importance. The findings indicate that potential exercise outcomes are important to breast cancer survivors, however they do not often think about how exercise may benefit them. While this is the first study to assess the accessibility and importance of OEs, previous studies have assessed OE certainty (e.g. the extent to which one believes an outcome will be achieved) and reported that survivors are generally uncertain about how exercise may benefit them. For example, a

previous qualitative exploration among 20 breast cancer survivors revealed that only 30% of the sample reported a relationship between exercise and recurrence risk.⁶ In another exploratory study, in which eight breast cancer survivors were interviewed, they did not report recurrence risk as a common OE.¹⁴ A larger, quantitative study of 84 breast cancer survivors concluded that they may not be as aware of OE related to survival, as compared to traditional OEs (such as weight loss).²² Taken together, these findings indicate that survivors value exercise outcomes, however, they don't necessarily believe that exercise will benefit them and they don't often think about the potential benefits of exercise. Only a multi-dimensional approach of measuring OEs, such as the one taken in this study could discern this.

A traditional approach of telling patients about exercise benefits, such as decreased fatigue or associations between higher levels of exercise and lower cancer recurrence risk may not be sufficient. Rather tailored exercise counseling, based on survivor's individual OE deficits, may be more effective. For example, survivors with low OE certainty may benefit from encouragement that they may experience positive exercise outcomes^{10,11}, while survivors with low OE acceptability may need help planning prompts to think more often about exercise and it's positive outcomes^{10,23}. A survivor with low OE importance may be motivated to exercise from a nurse's assistance with thinking about how their daily life could be improved from positive exercise outcomes^{10,24}. The most effective approach, may be one that encompasses all dimensions and strategies to address each. Research is needed to identify and test such strategies. Additionally, to better understand the influence of OEs on exercise, future research should compare exercise OE dimensions with levels of exercise among survivors.

One limitation of this study is that the more commonly assessed OE dimension of certainty was not included. To minimize risk for bias, from participant fatigue, only accessibility and importance were measured. Thus, while other research shows OE certainty to be low, it is difficult to make comparisons between OE certainty, accessibility and importance within our sample. Future research should measure all three dimensions. Another limitation of this study is that the measure used to assess OEs had been substantially modified to include two new dimensions of accessibility and importance and to include items most relevant to this population, such as recurrence risk. While this measure shows good reliability in this sample, further work is needed to refine the measure, using larger samples.

Finally, the sample was 92% White. Recent research indicates that exercise OEs differ between Black and White breast cancer survivors.²⁵ Additional work is necessary to better understand how OEs differ between various racial and ethnic groups. This information is critical to develop appropriate interventions for such groups. If researchers fail to understand these differences and designing interventions that are not racially and ethnically appropriate, they may inadvertently increase health disparities. Generalizability of findings is also limited due to inclusion of only early stage breast cancer survivors and 27% response rate to study invitations.

Implications

Findings suggest that OE dimensions differ among breast cancer survivors, thus a more holistic approach, in which all dimensions are considered, is needed when talking to survivors about exercise benefits. A detailed assessment and understanding of OEs can be used to develop improved exercise interventions. Most survivors do not exercise enough to experience the potential benefits. Thus, it is critical that nursing researchers continue to identify the most impactful, novel ways to motivate exercise. Exercise oncology research began with two pioneer nurses in the 1980s, as they were the first to identify the effects of aerobic exercise on nausea among cancer patients.²⁶ Today nurses continue to lead efforts to increase exercise among cancer patients.²⁷ Given the increasing demands of cancer care and busy clinic schedules, theory and evidence-based methods are needed to deliver succinct and effective messages to patients. Ultimately, improved exercise interventions will lead to better self-management of late and long-term side effects, for improved quality of life.

Acknowledgments

We would like to thank Christy Page, NP, DNP, Denise Spector NP, PhD, and Dr. Rita Deimler, NP, DNP for reviewing the items added to the initial measure. We would like to thank Lee Jones, PhD for reviewing items for face validity and Alexander Rothman, PhD for consulting on question and anchor structure.

Funding Statement: This research is funded by NINR grants 1F31NR015690-0 and 2T32NR007091, and the Oncology Nursing Society Foundation.

References

1. Rock CL, Doyle C, Demark-Wahnefried W, et al. Nutrition and physical activity guidelines for cancer survivors. CA: A Cancer Journal for Clinicians. 2012; 62(4):243–274. DOI: 10.3322/caac.21142 [PubMed: 22539238]
2. Loprinzi PD, Lee H. Rationale for promoting physical activity among cancer survivors: literature review and epidemiologic examination. Oncology Nursing Forum. 2014; 41(2):117–125. DOI: 10.1188/14.ONF.117-125 [PubMed: 24578072]
3. Lahart IM, Metsios GS, Nevill AM, Carmichael AR. Physical activity, risk of death and recurrence in breast cancer survivors: A systematic review and meta-analysis of epidemiological studies. Acta Oncologica. 2015; 54(5):635–654. DOI: 10.3109/0284186X.2014.998275 [PubMed: 25752971]
4. Juvet LK, Thune I, Elvsaas IKØ, et al. The effect of exercise on fatigue and physical functioning in breast cancer patients during and after treatment and at 6 months follow-up: A meta-analysis. Breast. 2017; 33:166–177. DOI: 10.1016/j.breast.2017.04.003 [PubMed: 28415013]
5. 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]
6. Hirschey R, Docherty SL, Pan W, Lipkus I. Exploration of Exercise Outcome Expectations Among Breast Cancer Survivors. Cancer Nursing. Feb.2016 :1.doi: 10.1097/NCC.0000000000000362 [PubMed: 26632667]
7. Bandura A. Health Promotion by Social Cognitive Means. Health Education & Behavior. 2004; 31(2):143–164. DOI: 10.1177/1090198104263660 [PubMed: 15090118]
8. Hirschey R, Kimmick G, Hockenberry M, Shaw R, Pan W, Lipkus I. Protocol for Moving On: a randomized controlled trial to increase outcome expectations and exercise among breast cancer survivors. Nursing Open. Jan.2018 :1–8. DOI: 10.1002/nop.2.119
9. 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. 211–238.
10. Petty RE, Krosnick JA. Attitude Strength. Petty RE, Krosnick JA, editors Psychology Press; 2014.

11. Gross SR, Holtz R, Miller N. Attitude Certainty. In: Petty RE, Krosnick JA, editors *Attitude Strength: Antecedents and Consequences*. New Jersey: Lawrence Erlbaum; 1995. 215–246.
12. O'Neill SC, DeFrank JT, Vegella P, et al. Engaging in health behaviors to lower risk for breast cancer recurrence. *PLOS ONE*. 2013; 8(1):e53607.doi: 10.1371/journal.pone.0053607 [PubMed: 23326466]
13. Rogers LQ, Courneya KS, Shah P, Dunnington G, Hopkins-Price P. Exercise stage of change, barriers, expectations, values and preferences among breast cancer patients during treatment: a pilot study. *European Journal of Cancer Care*. 2007; 16(1):55–66. DOI: 10.1111/j.1365-2354.2006.00705.x [PubMed: 17227354]
14. Short CE, James EL, Plotnikoff RC. How Social Cognitive Theory can help oncology-based health professionals promote physical activity among breast cancer survivors. *European Journal of Oncology Nursing*. 2013; 17(4):482–489. DOI: 10.1016/j.ejon.2012.10.009 [PubMed: 23177321]
15. Kelly MP, Barker M. Why is changing health-related behaviour so difficult? *Public Health*. 2016; 136:109–116. DOI: 10.1016/j.puhe.2016.03.030 [PubMed: 27184821]
16. Thomas S, Reading J, Shephard RJ. Revision of the Physical-Activity Readiness Questionnaire (Par-Q). *Can J Sport Sci*. 1992; 17(4):338–345. [PubMed: 1330274]
17. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009; 42(2):377–381. DOI: 10.1016/j.jbi.2008.08.010 [PubMed: 18929686]
18. 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]
19. Steinhardt M, Dishman R. Reliability and validity of expected outcomes and barriers for habitual physical activity. *Journal of Occupational Medicine*. 1989; 31(6) http://pm6mt7vg3j.search.serialssolutions.com/OpenURL_local?sid=Entrez:PubMed&id=pmid:2786559.
20. Wójcicki TR, White SM, McAuley E. Assessing outcome expectations in older adults: the multidimensional outcome expectations for exercise scale. *Journal of Gerontology: Psychological Sciences*. 2009; 64(1):33–40. DOI: 10.1093/geronb/gbn032
21. Resnick B, Zimmerman SI, Orwig D, Furstenberg AL, Magaziner J. Outcome expectations for exercise scale: utility and psychometrics. *Journal of Gerontology: Psychological Sciences*. 2000; 55(6):S352–S356.
22. Karvinen K, Vallance J. Breast and Colon Cancer Survivors' Expectations About Physical Activity for Improving Survival. *Oncology Nursing Forum*. 2015; 42(5):527–533. DOI: 10.1188/15.ONF.527-533 [PubMed: 26302281]
23. 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. 247–282.
24. 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. 159–190.
25. Dean LT, Brown J, Coursey M, Schmitz KH. Great expectations: racial differences in outcome expectations for a weight lifting intervention among black and white breast cancer survivors with or without lymphedema. *Psychooncology*. 2016; 25(9):1064–1070. DOI: 10.1002/pon.4175 [PubMed: 27192633]
26. Winningham ML, MacVicar MG, Bondoc M, Anderson JJ, Minton JP. Effect of aerobic exercise on body weight and composition in patients with breast cancer on adjuvant chemotherapy. 1988; 16(5):683–689.
27. Hall-Alston J. Exercise and the breast cancer survivor: the role of the nurse practitioner. *Clin J Oncol Nurs*. 2015; 19(5):E98–E102. DOI: 10.1188/15.CJON.E98-E102 [PubMed: 26414588]

Table 1

OE accessibility and importance items and scores.

<u>Item</u>	<u>Accessibility</u>			<u>Importance</u>		
	<u>Mean</u>	<u>SD</u>	<u>Median</u>	<u>Mean</u>	<u>SD</u>	<u>Median</u>
General health	5.62	1.26	6	6.63	1.12	7
Recurrence risk	5.60	1.55	6	6.49	1.32	7
Feel good physically	5.60	1.41	6	6.48	1.18	7
Less disease risk	5.43	1.46	6	6.47	1.20	7
Feel good mentally	5.41	1.44	6	6.44	1.21	7
Healthy weight	5.31	1.40	6	6.41	1.32	7
Control over health	5.17	1.54	5	6.36	1.24	7
Heart health	5.04	1.47	5	6.33	1.48	7
Living longer	4.93	1.78	5	6.27	1.23	7
Other cancer risk	4.89	1.67	4.5	6.25	1.25	7
Less tired	4.79	1.56	5	6.16	1.44	7
Sleeping better	4.74	1.61	5	6.07	1.48	7
Less tension/stress	4.73	1.69	5	6.06	1.56	7
Bone strength	4.66	1.69	5	6.00	1.56	7
Feel attractive	4.53	1.59	5	5.93	1.44	6
Sense of accomplishment	4.52	1.62	4.5	5.71	1.53	6
Less pain	4.43	1.73	4	5.64	1.61	6
Enjoyment	4.31	1.58	4.5	5.63	1.28	5.5
Social interactions	3.50	1.73	3	5.51	1.45	5.5
Self-esteem	3.39	1.83	4	4.95	1.45	5
Overall Score	4.80	0.60		6.10	0.40	

Note Accessibility anchors: 1 = never, 2 = Rarely (less than 10% of the time), 3 = Occasionally (about 30% of the time), 4 = Sometimes (about 50% of the time), 5 = Frequently (about 70% of the time), 6 = Usually (about 90% of the time), 7 = All the time. Importance anchors: 1=extremely unimportant, 2 = unimportant, 3 = somewhat unimportant, 4 = neither unimportant/important, 5 = somewhat important, 6 = important, 7=extremely important