Title:

Using the Integrative Model of Behavioural Prediction to understand female breast cancer survivors' barriers and facilitators for adherence to a community-based group-exercise program.

Authors:

Lynnette M. Jones, PhD^a, Lotte L. Reinhoudt, MSc^b, Femke Hilverda, MD^{b, c}, Chantal Rutjes, BSc^d and Sandra C. Hayes, PhD^e

^aSchool of Physical Education, Sport and Exercise Sciences, University of Otago, P.O. Box 56, Dunedin 9054, New Zealand

^bAthena Institute, Faculty of Science, VU University Amsterdam, De Boelelaan 1085, 1081 HV Amsterdam, The Netherlands

^cDepartment of Socio-Medical Sciences, Erasmus School of Health Policy and Management, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands

^dSchool of Public Health and Social Work, Queensland University of Technology, GPO Box 2434, Brisbane, QLD 4001, Australia

^eMenzies Health Institute Queensland, Griffith University, G40 Griffith Health Centre, Level 8.86 Gold Coast campus Griffith University, QLD 4222, Australia

Corresponding Author:

Sandra C. Hayes; sandi.hayes@griffith.edu.au

Declarations of interest: none

Abstract

Objectives: To identify facilitators and barriers associated with adherence to the EXPINKT™ exercise program for breast cancer survivors in a convenience sample of women.

Data sources: Focus groups discussions, The Integrative Model of Behavioral Prediction

Conclusions: Findings suggest that program adherence could be achieved by the establishment, via staff and processes, of a positive and safe exercise environment, which instils a sense of accountability while developing exercise self-efficacy. Further, multiple referral pathways and promotion of exercise benefit during and following treatment by oncology nurses may assist in enrolment in the program.

Implications for Nursing: Oncology nurses may play a unique role in informing and stimulating female breast cancer survivors to partake in breast cancer specific exercise programs. Results of this study show that most women are unaware of the benefits related to exercising in relation to cancer recovery as well as the existence of breast cancer specific exercise programs. Therefore, oncology nurses may play an important role in creating this awareness. Furthermore, shaping a route to adherence to such exercise programs is essential for breast cancer survivors to become and stay sufficiently active.

Keywords

Group-based exercise program, breast cancer survivors, facilitators, barriers, The Integrative Model of Behavioral Prediction, physical activity.

Introduction

Improvements in early diagnosis and breast cancer management have resulted in declining mortality rates for women diagnosed with breast cancer,¹ with around 90% of women currently surviving beyond 5-years in Australia and New Zealand.^{2,3} Studies show compelling evidence supporting the importance of exercise during and following breast cancer treatment in reducing the burden of disease,^{4,5} but also potentially contributing to improved survival.^{6,7} More specifically, results of a systematic review exploring the role of physical activity in women post-breast cancer diagnosis have demonstrated decreased disease specific- and overall-mortality by 40% and 42%, respectively for women participating in the highest level of recreational physical activity compared to women participating in the lowest level.⁸

Concurrent to the growth in the evidence base supporting the role of physical activity and exercise following breast cancer,⁹ the availability of community-based group exercise programs for cancer survivors has also improved worldwide. Some specific examples include FitSTEPS for Life, BEAUTY, LIVESTRONG at the YMCA, Exercise and Thrive, CurvesTM, and The Wellspring Cancer Exercise Program.¹⁰⁻¹⁵ Generally, the aim of these programs is to assist cancer survivors to become and stay sufficiently active, including via targeted exercise, while providing a controlled, supervised, and safe setting in which to do this. Further, there have been international efforts to incorporate exercise as part of standard cancer care. These efforts include the release of position statements on physical activity and exercise from cancer organisations, consumer advocacy groups, exercise organisations (e.g. Exercise and Sports Science Australia, American College of Sports Medicine),^{5,16} as well as clinical organisations, such as the American Society of Clinical Oncology and Clinical Oncology Society of Australia (COSA).^{17,18}

Although still not standard practice, referral to exercise programs or facilities located within or near hospitals for the purpose of integrating exercise as part of breast cancer care is also becoming more common worldwide. A specific example is the 'Exercise Training Beyond Breast Cancer' (EXPINKTTM) program that is directly linked with the care provided to women diagnosed with and treated for breast cancer in Dunedin, New Zealand. While women may hear about the program via word of mouth or program flyers available at the hospital, the intent is for all women to be referred to the program by their oncologist or oncology nurse, as soon as possible following diagnosis of new, recurrent or progressive disease. The exercise prescription provided to each participant

accommodates individual circumstances (including adverse treatment-related side effects) and seeks to improve physical function, strength, and cardiovascular health.

Despite the clinical and patient community becoming better informed about the importance of exercise post-breast cancer, only an estimated 10-15% of breast cancer survivors meet the recommendations of engaging in at least 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity physical activity per week.¹⁹⁻²¹ Further, there is a lack of knowledge about the challenges that breast cancer survivors encounter when maintaining physical activity, and incorporating exercise as part of their breast cancer treatment.^{22,23} Understanding these challenges is essential to helping women improve their exercise behaviour immediately following a breast cancer diagnosis, and throughout and beyond their treatment. In addition, it is vital to gain insight into the way in which oncology nurses may assist women to exercise. After all, oncology nurses are in the front line of providing care to breast cancer patients.²⁴ Therefore, the aim of this study was to identify facilitators and barriers associated with adherence to the EXPINKT™ program in a convenience sample of female breast cancer survivors. Based on these factors, implications about the role of oncology nurses and practical recommendations on how nurses might stimulate enrolment in and adherence to a breast cancer specific exercise program are discussed.

Method

Participants

Following ethical approval from the University of Otago Human Ethics Committee [Health; #H18/057], participants of the EXPINKT™ program were informed about the opportunity to participate in a focus group discussion via study posters and flyers placed in the EXPINKT™ training facility and via discussions with EXPINKT™ staff. Women could show their interest in participating by writing their name and contact details on a ‘sign up’ form held by EXPINKT™ staff. EXPINKT™ program participants were recruited if they [a] were female, [b] 18 years or older, [c] diagnosed with breast cancer [stage 0-IV], [d] willing to sign the consent form, [e] able to speak English and [f] physically able to attend a focus group. Participants were assigned to the focus groups based on availability.

The exercise program

The EXPINKT™ program was developed in 2009 and takes place in an exercise facility located within the School of Physical Education, Sport and Exercise Sciences on the University of Otago campus (approximately 1km to the treating hospital). Women treated for breast cancer at Dunedin hospital are eligible to enrol in the exercise program. Enrolled patients are offered an initial six to twelve-month individualized exercise program, including one-on-one supervision guided by a specialized exercise trainer for a nominal cost (50 New Zealand Dollars (NZD)). After the initial six to twelve-months, women are encouraged to join ‘circuit’ group sessions, scheduled at set, regular times throughout the week, or to complete their own routine without scheduled appointments.

Data collection and analysis

Following written informed consent, focus groups were scheduled. The focus group structure included the researcher first introducing herself (LR) and stating the broad aim of the research project. A semi-structured format was then used to facilitate subsequent discussion, around how they heard about EXPINKT™, why they were interested in participating, what their facilitators and barriers to adherence were, and recommendations they had for program improvement. The researcher used responses to guide more in-depth questioning, with each focus group lasting between 1-2 hours. Data collection was discontinued when no new information was gained, and data saturation was achieved.

All audio-recorded interviews were manually transcribed verbatim. Subsequently, one researcher (LR) performed a thematic analysis of the data. Codes and themes were frequently discussed with another researcher (FH). The first step involved open coding of salient information in the transcripts. Initial codes that addressed a similar topic were grouped together in themes. The Integrative Model of Behavioural Prediction (IMBP), the most recent adaptation of the Theory of Planned Behaviour (TPB),²⁵ was then used to help guide categorising these themes under determinants of behaviour. Specifically, like TPB, the IMBP identifies that human behaviour is influenced by people’s intentions to perform a behaviour, and the strength of an intention is, in the first place, determined by a person’s own *attitude*, *perceived norms*, and *personal agency*. Attitude explains the degree to which behavioural performance is (un)favourable to the individual, and consists of experiential attitude and instrumental attitude. Perceived norms can be injunctive or descriptive, and refer to the social pressure a person experiences to perform the behaviour. Lastly, personal agency is linked to a person’s own confidence to perform the behaviour, and is

based on personal control and self-efficacy.²⁶ However, the IMBP also recognises that intention does not automatically result in the desired behaviour, and as such, describes four secondary determinants that may influence the performance of the behaviour in addition to the concepts of TPB. These secondary determinants include *knowledge and skills*, *salience of the behaviour*, *environmental constraints*, and *habit*.²⁶ These additional determinants may be of importance in the context of this research, as they might be different for female breast cancer survivors compared to the general population and possibly explain their adherence behaviour. Therefore, the IMBP is used to provide a comprehensive approach to address the research question. Table 1 provides a further explanation of the different determinants of the IMBP. After grouping themes under relevant IMBP determinants, quotes from verbatim transcriptions were used to illustrate the themes and to provide a better understanding of the way the data was interpreted. During coding it became apparent that certain themes could not be placed within the IMBP framework. These themes were related to enrolment in the program rather than adherence to the program. Factors that influence the enrolment in the program are deemed important, because the oncology nurse might have an important role in this stage. That is why it was decided to discuss these themes as well and present them next to the IMBP results.

Results

A convenience sample of 20 EXPINKT™ program participants expressed interest in participating, with 17 subsequently providing informed consent to attend one of four focus groups (group 1, n=4; group 2, n=2; group 3, n= 7; group 4, n=4). Three other consenting participants were unable to participate due to other commitments on the day/time the focus group discussions took place. All 17 participants were breast cancer survivors from the Dunedin area in New Zealand, with the focus group discussion being conducted during May-June 2018.

The thematic analysis identified female breast cancer survivors' barriers and facilitators to adhere to a group-based exercise program. These determinants are integrated into the IMBP, and described in the following section. Additional determinants relating to enrolment in the program are presented separately. An overview of results placed within the IMBP framework is presented in Figure 1. Table 2 presents the different determinants along with the identified codes, followed by illustrative quotes from focus group discussions.

Primary determinants of adherence to the program

Attitude

Experiential attitude

The enjoyment experienced due to the social interaction during the sessions was noted as the most important facilitator of program adherence. Exercising with others who have shared a breast cancer experience was reported to facilitate the forming of strong bonds quickly, and the presence of a “comfortable atmosphere” in the gym. The provision of one-on-one supervision and the personal approach of staff also contributed to the “safe, warm and comfortable” atmosphere of the exercise facility and facilitated adherence.

Instrumental attitude

In general, women stated that participating in the EXPINKT™ program was beneficial for their health. Specifically, participation was primarily a way “to stay active and fit”, “to feel more energized”, and “to achieving *my* physical goals”. Participants also noted that the reporting around what they did while at EXPINKT™ allowed for progress to be made clear, which in turn could be perceived by way of physical changes, and was also noted as a facilitator for adherence. Perceived benefit to psychological outcomes (including helping them cope psychologically with the disease), although less pronounced, presented as another facilitator. Of note, none of the perceived benefits of program adherence seemed specifically linked to breast cancer or improved breast cancer outcomes.

Perceived norm

Injunctive norm

Unlike what EXPINKT™ participants perceived to be the norm in exercise facilities for the general population and specific everyday life situations, women experienced lower social pressure associated with participating in the EXPINKT™ program. Specifically, it was clear that EXPINKT™ women participated as a result of their own wish and personal initiative, and not due to expectations of others including their treating doctor, EXPINKT™ staff or family and friends. Women expressed that as a direct consequence of exercising with women with shared experiences, they also felt free to talk about their disease without being judged or having to explain themselves

while exercising. Women also noted they were not concerned about their appearance and felt comfortable and welcomed to turn up dressed as they wanted. This related to general aspects of dressing (e.g. type of clothes they wore), but was also breast cancer specific. For example, they felt comfortable whether they exercised with or without a wig or breast prostheses.

Descriptive norm

Exercising in an environment that only included others who were experiencing breast cancer presented as a clear facilitator of adherence to the program. Specifically, having other participants with shared experiences motivated and inspired women to attend regularly, and gave women more confidence about their own ability to exercise.

Personal agency

Perceived control

Work and 'other commitments' were identified as being the most relevant and uncontrollable factors that adversely influenced level of adherence, and this was particularly the case for those women who expressed being unable to be flexible with time commitments (e.g. those with inflexible working (paid or unpaid) hours or conditions, or carers of others). Nevertheless, most women stated that adhering to the program was a priority for them and regular attendance was predominantly within their own personal control.

Self-efficacy

The extensive supervision provided in the EXPINKT™ program allowed women to perform the prescribed exercise correctly and safely. Women expressed that this in turn allowed them to become more confident in exercising and they started to believe more in their own abilities. Self-efficacy was mostly threatened by the set circuit times and the presence of an unusual health issue, that may or may not have been related to breast cancer; specifically, the feeling of being unwell.

Secondary determinants of adherence to the program

Knowledge and skills

Women noted that the personalised supervision and explanation of exercises by staff members improved their knowledge, skills and confidence to exercise effectively and correctly, even in the presence of restrictions, such as treatment-related side effects.

Salience of behaviour

Three factors that were consistently highlighted as being important to adhere to the EXPINKT™ program were accountability, personal motivation and continuation of the program. Women had a greater sense of accountability during the one-on-one sessions, as they recognised personal trainers were relying on their attendance. In contrast, moving into the circuit (group) program after the initial six to twelve-month period brought up barriers including the need to attend at scheduled circuit times, and at the same time, a greater need for personal motivation (as they were less accountable when they knew other women would still attend even if they did not). Another important factor for adherence to the program was an understanding that their (lack of) attendance would influence the viability of the program, and therefore the ability for women to attend the program in the future.

Environmental constraints

The four most important environmental constraints were travel distance, car parking, opening hours of the gym and weather conditions. The EXPINKT™ program was unique in the area and many women had to travel a considerable distance to reach the program, and for some, travel (and exercise) was at times that were not convenient. Once at the facility, women reported the next constraint to contend with was lack of car parking facilities.

Habit

Given adherence to the program was prioritised for many women, for those that could, other commitments were scheduled around the session times of the program, to ensure regular attendance.

Determinants of enrolment in the program

During coding, it became apparent that certain themes could not be placed within the IMBP framework. These themes were related to barriers of enrolment in the program rather than adherence to the program. As the oncology nurse might play an important role in this stage, it was decided to discuss these themes as well and present them next to the IMBP results. The major barrier identified that related to enrolment in the program was awareness

about the existence of the program. As there was no systematic way by whom or when women were referred to the program, many women stated to have heard about the program by “coincidence” or did not hear about it at all.

Additionally, women stated information overload at time of diagnosis may have contributed to their initial lack of awareness that the program existed, or that participating in the program was something they couldn't/didn't want to think about while dealing with their diagnosis and subsequent treatment. Further, once they became aware of the program's existence, many women struggled to get a referral to join the program, and expected a more proactive attitude from their oncology clinicians (e.g. oncologist, oncology nurse). Other barriers relating to enrolment in the program were participants' previous experiences with 'gyms' and their attitudes towards the program. Preconceived ideas about the program varied among participants with some unsure, others concerned about enrolment due to it being a new experience or having had a prior negative experience with going to a 'gym', and others eager to start and relieved to be given guided physical treatment, in contrast to the more 'psychological' therapies they had been previously offered.

Discussion

Incorporating exercise into standard breast cancer care has significant potential to reduce burden of disease and improve survival outcomes.^{22,27} Our findings confirm that multiple factors play a role in adherence to an exercise program specifically designed for breast cancer survivors. As such, these factors need to be considered in future endeavours that seek to integrate physical activity promotion and exercise prescription into standard breast cancer care.

The most important identified facilitators of adherence were positive attitude (including enjoyable social interaction, mutual understanding and shared experiences between program participants, confidence in exercising properly and safely due to degree of supervision and personalised approach to exercise prescription, and perceived physical and psychological benefits) and perceived norms (including non-judgemental environment with respect to physical appearance, and social acceptance). In addition, although less pronounced, salience of behaviour (i.e., feeling accountable to attend both in the short and longer term and being personally motivated to do so), habit (regular attendance breeds regular attendance), and knowledge and skills about how to exercise (as a consequence of explanation and targeted approach by staff members) were also noted as facilitators. Moreover, while this study identified knowledge and skills as a facilitator of adherence, a recent systematic review identified a lack of

knowledge about exercises (e.g. exercise technique, types of exercises) as a barrier,²⁸ reinforcing the importance of having knowledge about exercises and the positive effect it has on regular program attendance. Although these findings were situational and specifically related to features of the EXPINKT™ program and facilities, they are similar to those previously reported by others following a study exploring the barriers and facilitators of female breast cancer survivors participating in a community-based physical activity program.²⁹ Further, other current and future programs can benefit from these findings; specifically, a successful program will likely be one that establishes a positive and safe exercise environment, which instils a sense of accountability while developing participants' exercise self-efficacy.

Understanding potential barriers is also important for the underlying success of exercise programs. Personal agency (including time constraints, competing commitments) and environmental constraints (including travel distance, car parking) were identified as the most important barriers in this study. These represent similar findings reported previously,^{29,30} but of particular note is that these are also similar to barriers to structured exercise reported by healthy populations.^{31,32} Thus, they were largely unrelated to breast cancer. However, while EXPINKT™ is designed to cater for women during treatment for breast cancer, the majority of focus group participants had completed their treatment. As such, the potential for treatment-related side effects to present as barriers for this subgroup of women would likely be less than for those in active treatment. Therefore, although not elucidated by this work, it seems likely that adherence to exercise programs specifically targeting women recently diagnosed with breast cancer and/or in active treatment (such as EXPINKT™) would likely benefit by educating women about the role of exercise in the prevention and management of treatment-related side effects and how the program can and will be adapted on a session by session basis to accommodate fluctuations in treatment-related side effects.

Despite acknowledging barriers to adherence, there was clear agreement among participants that the facilitators outweighed/helped overcome any barrier noted. Further, it was clear from focus group discussions that participants felt that the greatest barrier to overcome related to enrolment in the program. While EXPINKT™ is designed and promoted to be a standard component of breast cancer treatment for women diagnosed in the Dunedin area, women stated that they only heard about the program by 'accident'. That is, there was no mention of a clear referral from any member of the treating team to EXPINKT™. These results are noteworthy given the important role oncology nurses may play in promoting physical activity in breast cancer patients during and after

treatment.^{33,34} Specifically, receiving physical activity advice from oncology clinicians and nurses makes breast cancer survivors more likely to engage in physical activity.^{35,36} However, the noted lack of systematic referral to EXPINKT™ does not necessarily confirm the absence of a referral. Instead, it may be a reflection of information overload that is known to occur around the time of diagnosis, with focus group participants acknowledging this as a possibility themselves. Nonetheless, it is clear that a more systematic way of referring, or mentioning the program at multiple time points, could assist women to enrol in an exercise program as soon as possible following a diagnosis. Oncology nurses are likely to be one of the most influential health care professionals.³⁷ They are a trusted point of reference, offering patients emotional and psychological support in relation to problems patients may encounter throughout the different.³⁸ Therefore, they play an important role in providing a range of support services, such as physical activity counselling, to the patient.³⁹⁻⁴² As a result, they may be in the position to provide an important role in the referring process.

A particularly interesting finding from the focus groups was that the participants reported a lack of understanding about the benefits of physical activity and exercise specific to their breast cancer. This was also evident in their perceived facilitators, with no one participant identifying benefits related to their disease as being a motivator for attendance. Highlighting potential benefits (and risk of harm) of any form of potential treatment would ordinarily form part of discussions related to treatment options between the clinician and patient. However, time constraints have been identified as the most prominent barrier to translation of exercise into cancer care.³³ Therefore, it seems plausible that more women may enrol in an exercise program as part of their breast cancer treatment if they are aware of the disease-specific benefits. Promoting the benefits of exercise and the existence of a breast cancer specific exercise program should therefore go hand-in-hand. Further, a core component of a breast cancer-specific exercise program should be education about the potential benefits of exercising during and beyond breast cancer treatment. The continuous care offered by oncology nurses places them in the unique position to educate breast cancer patients about the benefits of physical activity during the different treatment stages and beyond treatment,³⁷ as well as offering continuous support and encouragement by engaging patients in conversations about physical activity.^{39,41} This in itself could prove to be another important facilitator of enrolment in exercise programs and then subsequent attendance. Further, querying enrolment and adherence by oncology nurses throughout the treatment phases would allow for additional opportunities of referral, as well as discussion of potential benefits or concerns in participation.

This study is the first of its kind in the way that results are linked to the IMBP, providing a more structured way to understand and explain which, and how, different factors influence adherence to a post-breast cancer diagnosis exercise program. Another strength of this study includes data saturation that occurred through the conduct of four different focus group discussions each consisting of between 2-7 participants. There were also several limitations in this study worthy of consideration. Women who participated in the focus group discussions were regular attendees of EXPINKT™ and most of them had been participating for more than one year. Therefore, their perceptions regarding the exercise program may have been more positive in general than participants who participated less frequently or for a shorter period. Exploring barriers and facilitators of those who initiated the program but stopped participating would further improve understanding of ways in which adherence can be optimised. Further, exploring whether barriers and facilitators had changed over time would also provide information about how programs may need to adapt for long-term participants and how programs can help transition patients out of a supervised, breast cancer specific setting to a community or home-based setting. Further, only women participated in these focus groups. While <1% of breast cancer cases occur in men,⁴³ there is a paucity of information about their survivorship care needs, and barriers and facilitators to accessing and attending survivorship programs.

Despite the growing number of exercise programs available for women with breast cancer and the support shown by international organisations for exercise post-breast cancer, exercise is yet to be incorporated into standard care.^{18,22} Further, even for those breast cancer specific exercise programs that do exist and are specifically designed to form part of standard treatment, challenges remain with enrolling patients and ensuring adherence to the program.

Conclusions

This work identified several barriers and facilitators related to adherence to the EXPINKT™ exercise program. Understanding these factors may help current and future breast cancer specific exercise programs optimise regular attendance, which in turn will ensure benefit to the participants. Further, it became apparent that oncology nurses may play an important role in the promotion of exercise benefit during and following treatment, which in turn may improve enrolment in the program.

Acknowledgments

The authors would like to acknowledge all women who participated in the focus group discussions and shared their personal experiences. The authors would also like to thank the staff of the EXPINKT™ program for their cooperation and support towards this study. Furthermore, the authors would like to acknowledge the financial contributions provided by the Fundatie van de Vrijvrouwe van Renswoude, Stichting dr. Hendrik Muller's Vaderlandsch fonds, and Stichting Bekker-la Bastide-fonds, which covered Lotte L. Reinhoudt's travel expenses and therefore enabled the conduct of this study. Lastly, the authors would like to acknowledge Cancer Council Queensland for providing Senior Research Fellowship support to Professor Sandra C. Hayes at the time this study was conducted.

Declaration statements

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of interest: none

Ethics approval: All procedures performed were in accordance with the ethical standards of the institution and committee (The University of Otago Human Ethics Committee, Health; #H18/057) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Author contributions: All authors have provided significant contributions to study concept, design, implementation, data entry and cleaning, data analysis and/or reporting, and have given final approval of the version to be submitted.

References

1. Carioli G, Malvezzi M, Rodriguez T, Bertuccio P, Negri E, La Vecchia C (2018) Trends and predictions to 2020 in breast cancer mortality: Americas and Australasia. *Breast*. <https://doi.org/10.1016/j.breast.2017.12.004>
2. Australian Institute of Health and Welfare (2019) Cancer in Australia 2019. Canberra, AIHW.
3. Aye PS, Elwood JM, Stevanovic V. Comparison of cancer survival in New Zealand and Australia, 2006–2010. *NZ Med J*. 2014;127(1407):14-26.

4. Campbell KL, Winters-Stone KM, Wiskemann J, May A, Schwartz AL⁵, Courneya KS, Zucker DS, Matthews CE, Ligibel JA, Gerber LH, Morris G, Patel AV, Hue TF, Perna FM, Schmitz KH. Exercise Guidelines for Cancer Survivors: Consensus Statement from International Multidisciplinary Roundtable. *Med Sci Sports Exerc.* 2019;51(11):2375-2390. <https://doi.org/10.1249/MSS.0000000000002116>
5. Hayes SC, Newton RU, Spence RR, Galvão DA. The Exercise and Sports Science Australia position statement: Exercise medicine in cancer management. *J Sci Med Sport.* 2019. <https://doi.org/10.1016/j.jsams.2019.05.003>
6. Friedenreich CM, Stone CR, Cheung WY, Hayes SC. Physical activity and mortality in cancer survivors: a systematic review and meta-analysis. *JNCI Cancer Spectr.* 2020;4(1):pkz080. <https://doi.org/10.1093/jncics/pkz080>
7. Patel AV, Friedenreich CM, Moore SC, Hayes SC, Silver JK, Campbell KL, Winters-Stone K, Gerber LH, George SM, Fulton JE, Denlinger C, Morris GS, Hue T, Schmitz KH, Matthews CE. American College of Sports Medicine Roundtable report on physical activity, sedentary behavior, and cancer prevention and control. *Med Sci Sports Exerc.* 2019;51(11):2391-2402. <https://doi.org/10.1249/MSS.0000000000002117>
8. Spei ME, Samoli E, Bravi F, La Vecchia C, Bamia, C, Benetou V. Physical activity in breast cancer survivors: A systematic review and meta-analysis on overall and breast cancer survival. *Breast.* 2019;44:144-152. <https://doi.org/10.1016/j.breast.2019.02.001>
9. Battaglini CL, Mills RC, Phillips BL, Lee JT, Story CE, Nascimento MG, Hackney AC. Twenty-five years of research on the effects of exercise training in breast cancer survivors: a systematic review of the literature. *World J Clin Oncol.* 2014;5(2):177-190. <https://doi.org/10.5306/wjco.v5.i2.177>
10. Haas BK, Kimmel G, Hermanns M, Deal B. Community-based FitSTEPS for life exercise program for persons with cancer: 5-year evaluation. *J Oncol Pract.* 2020;8(6):320-324. <https://doi.org/10.1200/JOP.2012.000555>
11. Leach HJ, Danyluk J, Nishimura, KC, Culos-Reed SN. Evaluation of a community-based exercise program for breast cancer patients undergoing treatment. *Cancer Nurs.* 2015;38(6):417-425. <https://doi.org/10.1097/NCC.0000000000000217>
12. Musanti R, Chao YY, Collins K. Fitness and Quality of Life Outcomes of Cancer Survivor Participants in a Community Exercise Program. *J Adv Pract Oncol.* 2019;10(1):24. <https://doi.org/10.6004/jadpro.2019.10.1.2>

13. Rajotte EJ, Jean CY, Baker KS, Gregerson L, Leiserowitz A, Syrjala KL. Community-based exercise program effectiveness and safety for cancer survivors. *J Cancer Surviv.* 2012;6(2):219-228. <https://doi.org/10.1007/s11764-011-0213-7>
14. Sabiston CM, Fong AJ, O'Loughlin EK, Meterissian S. A mixed-methods evaluation of a community physical activity program for breast cancer survivors. *J Transl Med.* 2019;17(1):206. <https://doi.org/10.1186/s12967-019-1958-4>
15. Santa Mina D, Au D, Brunet J, Jones J, Tomlinson G, Taback N, Field D, Berlingeri A, Bradley H, Howell D. Effects of the community-based Wellspring Cancer Exercise Program on functional and psychosocial outcomes in cancer survivors. *Curr Oncol.* 2017;24(5):284. <https://doi.org/10.3747/co.24.3585>
16. Schmitz KH, Courneya KS, Matthews C, Demark-Wahnefried W, Galvão DA, Pinto BM, Irwin ML, Wolin KY, Segal RJ, Lucia A, Schneider CM, von Gruenigen VE, Schwartz AL, American College of Sports Medicine. American College of Sports Medicine roundtable on exercise guidelines for cancer survivors. *Med Sci Sports Exerc.* 2010;42(7):1409-1426. <https://doi.org/10.1249/MSS.0b013e3181e0c112>
17. Ligibel JA, Alfano CM, Courneya KS, Demark-Wahnefried W, Burger RA, Chlebowski RT, Fabian CJ, Gucalp A, Hershman DL, Hudson MM, Jones LW, Kakarala M, Ness KK, Merrill JK, Wollins DS, Hudis CA. American Society of Clinical Oncology position statement on obesity and cancer. *J Clin Oncol.* 2014;32(31):3568. <https://doi.org/10.1200/JCO.2014.58.4680>
18. Cormie P, Atkinson M, Bucci L, Cust A, Eakin E, Hayes S, McCarthy S, Murnane A, Patchell S, Adams D. Clinical Oncology Society of Australia position statement on exercise in cancer care. *Med J Aust.* 2018;209(4):184-187. <https://doi.org/10.5694/mja18.00199>
19. Kushi LH, Doyle C, McCullough M, Rock CL, Demark-Wahnefried W, Bandera EV, Gapstur S, Patel AV, Andrews K, Gansler T, American Cancer Society 2010 Nutrition and Physical Activity Guidelines Advisory Committee. American Cancer Society Guidelines on nutrition and physical activity for cancer prevention: reducing the risk of cancer with healthy food choices and physical activity. *CA Cancer J Clin.* 2002;62(1):30-67. <https://doi.org/10.3322/caac.20140>
20. Lynch BM, Dunstan DW, Healy GN, Winkler E, Eakin E, Owen N. Objectively measured physical activity and sedentary time of breast cancer survivors, and associations with adiposity: findings from NHANES (2003-2006). *Cancer Causes Control.* 2010;21(2):283-288. <https://doi.org/10.1007/s10552-009-9460-6>
21. Sabiston CM, Brunet J, Vallance JK, Meterissian S. Prospective examination of objectively assessed physical activity and sedentary time after breast cancer treatment: sitting on the crest of the teachable

- moment. *Cancer Epidemiol Biomarkers Prev.* 2014;23(7):1324-1330. <https://doi.org/10.1158/1055-9965.EPI-13-1179>
22. Bluethmann SM, Vernon SW, Gabriel KP, Murphy CC, Bartholomew LK. Taking the next step: a systematic review and meta-analysis of physical activity and behavior change interventions in recent post-treatment breast cancer survivors. *Breast Cancer Res Treat.* 2015;149(2):331-342. <https://doi.org/10.1007/s10549-014-3255-5>
 23. Irwin ML, Cartmel B, Harrigan M, Li F, Sanft T, Shockro L, O'Connor K, Campbell N, Tolaney SM, Mayer EL, Yung R, Freedman RA, Partridge AH, Ligibel JA. Effect of the LIVESTRONG at the YMCA exercise program on physical activity, fitness, quality of life, and fatigue in cancer survivors. *Cancer.* 2017;123(7):1249-1258. <https://doi.org/10.1002/cncr.30456>
 24. Coleman C. Early detection and screening for breast cancer. *Semin oncol nurs.* 2017;33(2):141-155. <https://doi.org/10.1016/j.soncn.2017.02.009>
 25. Fishbein, M. A Reasoned Action Approach to Health Promotion. *Med Decis Making.* 2008;28(6): 834–844. <https://doi.org/10.1177/0272989X08326092>
 26. Dai M, Wombacher K, Matig JJ, Harrington NG. Using the Integrative Model of Behavioral Prediction to Understand College Students' Hookup Sex Beliefs, Intentions, and Behaviors. *Health Commun.* 2018;33(9):1078-1087. <https://doi.org/10.1080/10410236.2017.1331306>
 27. Rock CL, Doyle C, Demark-Wahnefried W, Meyerhardt J, Courneya KS, Schwartz AL, Bandera EV, Hamilton KK, Grant B, McCullough M, Byers T, Gansler T. Nutrition and physical activity guidelines for cancer survivors. *CA Cancer J Clin.* 2012;62(4):242-274. <https://doi.org/10.3322/caac.21142>
 28. Clifford BK, Mizrahi D, Sandler CX, Barry BK, Simar D, Wakefield CE, Goldstein D. Barriers and facilitators of exercise experienced by cancer survivors: a mixed methods systematic review. *Support Care Cancer.* 2018;26(3):685-700. <https://doi.org/10.1007/s00520-017-3964-5>
 29. Wurz A, St-Aubin A, Brunet J. Breast cancer survivors' barriers and motives for participating in a group-based physical activity program offered in the community. *Support Care Cancer.* 2015;23(8):2407-2416. <https://doi.org/10.1007/s00520-014-2596-2>
 30. J, Taran S, Burke S, Sabiston CM. A qualitative exploration of barriers and motivators to physical activity participation in women treated for breast cancer. *Disabil Rehabil.* 2013;35(24):2038-2045. <https://doi.org/10.3109/09638288.2013.802378>

31. Franco MR, Tong A, Howard K, Sherrington C, Ferreira PH, Pinto RZ, Ferreira ML. Older people's perspectives on participation in physical activity: a systematic review and thematic synthesis of qualitative literature. *Br J Sports Med*. 2015;49(19):1268-1276. <https://doi.org/10.1136/bjsports-2014-094015>
32. Justine M, Azizan A, Hassan V, Salleh Z, Manaf H. Barriers to participation in physical activity and exercise among middle-aged and elderly individuals. *Singapore Med J*. 2013;54(10):581-586. <https://doi.org/10.11622/smedj.2013203>
33. Jones LW, Courneya KS, Fairey A, Mackey JR. Effects of an oncologist's recommendation to exercise on self-reported exercise behavior in newly diagnosed breast cancer survivors: a single-blind, randomized controlled trial. *Ann Behav Med*. 2004;28(2):105-113. https://doi.org/10.1207/s15324796abm2802_5
34. Wolin KY, Schwartz AL, Matthews CE, Courneya KS, Schmitz KH. Implementing the exercise guidelines for cancer survivors. *J Support Oncol*. 2012;10(5):171. <https://doi.org/10.1016/j.suponc.2012.02.001>
35. Fisher A, Williams K, Beeken R, Wardle J. Recall of physical activity advice was associated with higher levels of physical activity in colorectal cancer patients. *BMJ open*. 2015;5(4):e006853. <https://doi.org/10.1136/bmjopen-2014-006853>
36. Hardcastle SJ, Cohen PA. Effective Physical Activity Promotion to Survivors of Cancer Is Likely to Be Home Based and to Require Oncologist Participation. *J Clin Oncol*. 2017;35(32):3635. <https://doi.org/10.1200/JCO.2017.74.6032>
37. Keogh JWL, Pühringer P, Olsen A, Sargeant S, Jones LM, Climstein. M. Physical Activity Promotion, Beliefs, and Barriers Among Australasian Oncology Nurses. *Oncol Nurs Forum*. 2017;44(2):235-245. <https://doi:10.1188/17.ONF.235-245>
38. Jiwa M, Halkett G, Daes K, Ward P, O'Connor M, O'Driscoll C, O'Brien E, Wilson L, Boyle S, Weir J. How do specialist breast nurses help breast cancer patients at follow-up? *Collegian*. 2010;17(3):143-149. <https://doi:10.1016/j.colegn.2010.04.003>
39. Hall-Alston JM. Exercise and the breast cancer survivor: the role of the nurse practitioner. *Clin J Oncol Nurs*. 2015;19(5):E98-102. <https://doi:10.1188/15.CJON.E98-E102>
40. Amir Z, Scully J, Borrill C. The professional role of breast cancer nurses in multi-disciplinary breast cancer care teams. *Eur J Oncol Nurs*. 2004;8(4):306-314. <https://doi.org/10.1016/j.ejon.2003.12.011>
41. 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. <https://doi.org/10.1188/12.ONF.269-274>

42. Schwartz AL. Physical activity. *Semin Oncol Nurs.* 2008;24(3):164-170.
<https://doi:10.1016/j.soncn.2008.05.004>
43. Ly D, Forman D, Ferlay J, Brinton LA, Cook MB. An international comparison of male and female breast cancer incidence rates. *Int J Cancer.* 2013;132(8):1918-1926. <https://doi.org/10.1002/ijc.27841>
44. Montano DE, Kasprzyk D. Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In: Glanz K, Rimer BK, Viswanath K, eds. *Health Behavior: Theory, Research, and Practice 5th edn.* San Francisco: John Wiley & Sons, Inc; 2015:95-124

Tables and Figures

Table 1 The Integrative Model of Behavioural Prediction explained^a

Primary determinants	Aspect	Meaning
Attitude	Experiential attitude	The personal emotional response to the thought of performing the behaviour
	Instrumental attitude	The individual's positive/negative evaluation of the behavioural outcomes
Perceived norm	Injunctive norm	The social pressure the individual experiences to perform the behaviour
	Descriptive norm	The individual's perceptions about what others do in similar situations
Personal agency	Perceived control	The amount of control the individual perceives to have over factors that make it easy or difficult to perform the behaviour
	Self-efficacy	The individual's belief of the individual's effectiveness in performing the behaviour
Secondary determinants		Meaning
Knowledge and skills		The degree to which an individual has a good understanding of what is needed to perform the behaviour and the skills that are needed to effectively perform the behaviour
Salience of the behaviour		The degree to which the behaviour is important to the individual
Environmental constraints		Environmental factors the individual encounters that make it more difficult to perform the behaviour
Habit		Continuation of performing the behaviour

^aAdapted from Montano DE, Kasprzyk D. Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In: Glanz K, Rimer BK, Viswanath K, eds. *Health Behavior: Theory, Research, and Practice 5th edn*. San Francisco: John Wiley & Sons, Inc; 2015:95-124.⁴⁴

Fig 1 The Integrative Model of Behavioural Prediction: an overview of results

Table 2. Key quotes illustrating the identified codes.

Determinants	Codes	Quotes
Attitude Experiential attitude	Enjoyment of social interaction	“Friendships have been created through the gym too. (..) When entering the gym, if you are on the treadmill and you have a lady next to you and you have not met her before, you introduce yourself, chatting away.” (#17, FG4)
	Shared experiences	“It is the social part. The fact that we all have been through the same experiences. (...) So there is a very strong caring layer there somewhere that’s within the participants. And I think it strengthens the effect because we are all in the same boat.” (#9, FG3)
	Supervision One-on-one	“The best thing that keeps you coming is that one-on-one business, right at the start.” (#1, FG1)
	General	“It is the supervision, yes, and... you are not going to have an accident (..) causing an injury, you know, because of the structure, and you know that someone is keeping an eye on you all the time.” (#3, FG1)
	Personal approach	“(..) It is just lovely to be greeted when you come in, every time, by name. Because other gyms you go to you are just a number really.” (#14, FG4)
Instrumental attitude	Benefits of exercising	
	Physical	“I mean, I have gotten incredibly much more fitter than I was (...). So, I certainly see the benefit, but it took two years or so (...) suddenly the penny dropped that suddenly I could do what I hadn’t been able to do, and that it didn’t hurt.” (#11, FG3)
	Psychological	“It was really good coming here, (...) me not getting really frustrated that on the bike all I could do was bike downhill (...) they helped me put that into perspective and into a place that made sense without me getting grumpy about it.” (#7, FG3)
Perceived norm Injunctive norm	No social pressure Physical appearance	“And you are just welcomed however you want to be. Some people, you know they have been wearing a wig and then some day they are not wearing it and you know that’s a big step and you just felt welcome.” (#9, FG3)
	Social acceptance	“It is also being in that space and knowing not having to worry about the reaction of others, or knowing that there is not going to be that reaction, that you might end up having to take care of, or respond to, in some way.” (#7, FG3)
	Personal initiative	“They, the hospital, they don’t say anything you must follow up with an exercise programme, it is over to the individual as to what they do.” (#6, FG2)
	Seeing other exercising	“And you know, some people are terminal, and they are still exercising, and I find that inspiring.” (#5, FG2)
Descriptive norm		

Personal agency Perceived control	Personal control	“Because for me, it’s a priority, it’s something I can do for myself, it’s something I have control over, and I can help myself by coming.” (#10, FG3)
	Work	“And it is... because I am the only practised nurse there, I have got an appointment booked that I run so I don’t just want to shut that off early. Because it does not really work for my patients necessarily.” (#12, FG3)
	Other commitments	“Yes, other commitments too. So just basic household stuff and walking the dog and keeping the house vaguely clean (laughing) and cooking and I have got a mom who has had a stroke, so she needs a little bit of extra care like driving around and thinks like that. I fit it all in now, but I’m not working. Once I start working it gets harder.” (#5, FG2)
Self-efficacy	Belief in oneself	“Yeah I started when I started chemo. And it was great knowing that whatever I was doing was OK and an addition to that treatment. And being confident that it was going to be OK.” (#7, FG3)
	Set circuit times	“Once you start off with a personal trainer supposedly for the first 12 months and you get to pick your target. After that you are supposed to then go to a circuit which is set times. But sometimes it is just ah... Because I do not work, I cannot be bothered to go at 4:30.” (#1, FG1)
	Supervision	“And here, they are working on the appropriate muscles and exercises for us, really. Because often when you are going to the gym you know, you are just left to do whatever. And here, you are being corrected, if you are doing it wrong and you get into bad habits and it is good because yeah, I am really impressed.” (#3, FG1)
	Health-related issues	“Yeah that’s the only thing that stops me from coming really, if I’m unwell. I had a flu a couple of weeks ago, so I was off a couple of weeks.” (#12, FG3)
Knowledge and skills	Targeting supervision	“And it was just so comfortable coming in and getting a personalized program that took into account that I could not do a lot with my arm, but still encouraged me to work on some of the other things and certainly the stiffness from the radiotherapy I found, that was really a big issue for me. But lots of exercises to help with that.” (#16, FG4)
Salience of behaviour	Accountability	“That is what I always found that is good about it. I have got somebody else (personal trainer, red.) that I am accountable to.” (#11, FG3)
	Personal motivation	“(.) I am in my seventies, and you do slow down on life the older you get, so coming here twice a week does help me to a little bit of fitness.” (#6, FG2)
	Continuation of the program	“(.) If I go somewhere else, it’s just for me, and if I do not go, well I am the one who suffers from that. But here it is like, I do want to support this, I do want it to continue.” (#12, FG3)

Environmental constraints	Travel distance	“I know a lot of other people in the community that are working that cannot come because they are too far away. And that is just that thing... that is tough, for a lot of people.” (#4, FG3)
	Car parking	“12 o’clock Friday, or 12 o’clock Tuesday, you might as well leave your car at home, because you cannot park.” (#3, FG3)
	Gym opening hours	“Sometimes, I would like to come more often, I would like to come two or three times a week but that is more difficult to do that was hard with the gym finishing at 5:30.” (#6, FG3)
	Weather conditions	“Well when you have had a day at work, because I cannot come in in the morning, you had a day at work, it is cold, it is snowing, it is raining, it is much easier to turn the way of the road then to come here.” (#4, FG3)
Habit	Regularity	“And when you have a dental you try to make it another day when you are not having the gym. To keep in your routine.” (#4, FG1)
Additional determinants	Information overload	“I do not think I got any information at the breast clinic. The really first time...when I was diagnosed, they gave me this big packet of all this information and I thought, oh yeah, right.” (#9, FG3)
	Awareness of existence of the program	“I am pretty sure I found out by accident, like I do not think it was something J*** [oncology nurse] told everybody.” (#4, FG3)
	Pro-activeness from oncology clinicians in referring process	“Because I mean I saw my oncologist for 18 months or whatever it was, he had plenty of time to be mentioning it.” (#5, FG3)
	Preconceived ideas about the EXPINKT™ program	
	Neutral	“I got no expectations, I mean, what if cancer pops up again tomorrow? Has the little bit of exercise I have done... if I had not done the exercise would it still have popped up? That’s what is constantly in the back of my mind.” (#6, FG2)
	Negative	“I was actually dreading coming here because it was a gym. I’m not a gym person, I have never done structured exercise. (...) I did not know whether I would fit in or whether it would be my thing.” (#1, FG1)
	Positive	“I want to go to the gym too because in my time there was not anything physical organized and I was very annoyed it was all about sinking and resting and meditating and sitting and drawing things and all that nonsense and coloured things to express yourself and it wasn’t a nice thing. So, I was very keen to do physical things.” (#4, FG1)

#1, 3-7, 9-12, 14, 16-17: Participant ID numbers; FG1: Focus Group 1; FG2: Focus Group 2; FG3: Focus Group 3; FG4: Focus Group 4.