

Original Research

Feasibility and Acceptability of a Peer Training Program to Deliver a Theory-Based Physical Activity Behavior Change Intervention to Inactive People Living With and Beyond Cancer: A Mixed Methods Study

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Abstract

Theory-based physical activity (PA) interventions include PA promotion strategies that can be delivered by exercise professionals, friends, family and peers. Peer-delivery presents a valuable opportunity for community implementation. Few peer-led PA interventions for people living with and beyond cancer (LWBC) report the feasibility of their peer mentor training methods. The purpose of this study was to assess the feasibility and acceptability of a peer mentor training program to deliver a behavioural PA intervention to inactive people LWBC using a mixed methods approach. Peer mentors (active people LWBC [≥ 90 min/week of PA]) participated in an online training program. Weeks 1 to 4 (Phase I) included knowledge and skill development (1-hour online module and 2-hour live workshop weekly). The Assessment phase (Phase II) explored peer mentor readiness ($\geq 80\%$ on a knowledge quiz and $\geq 3/5$ points [Satisfactory] on a mock role play). Feasibility was assessed using enrollment rates,



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retention rates, adherence, and semi-structured interviews. Acceptability was measured using a satisfaction questionnaire assessing level of agreement with several statements about training program components. Peer mentors ($N = 14$; $M_{\text{age}} = 65.4 \pm 10.7$ years) were diagnosed with primarily prostate (57.1%) or breast (21.4%) cancer. Enrollment and retention rates were 73.7% and 92.9%, respectively. Workshops and online modules had 100% and 87.5% adherence rates, respectively. Majority of peer mentors met readiness criteria for the knowledge quiz (92.3%) and mock role play (84.6%) on their first attempt, with 92.3% delivering the follow-up peer-led PA intervention. Peer mentor satisfaction scores ranged from 3.9 to 4.6 out of 5. Interviews generated themes around overall impressions, feedback on timing, structure, and content of the training program and mock role play, and peer mentor preparedness. Structured training for delivering peer-led PA interventions show promise; however, individualized support may be needed for some people LWBC to strengthen mentorship knowledge and skills.

Keywords

Physical activity; cancer; behaviour change; peer mentor; training program

1. Introduction

Physical inactivity is a persistent health concern for people living with and beyond cancer (LWBC). Social support (e.g., informational, emotional, appraisal) from healthcare or qualified exercise professionals (QEPs), friends, family members or peers is an important facilitator of PA behaviour change for people LWBC [1, 2]. As such, PA behaviour change interventions often involve connecting others, most commonly QEPs, to discuss strategies for the adoption of PA. PA behavioural interventions take a variety of formats, ranging in the duration, frequency and type of contact, setting, and level of supervision. Yet, PA interventions are often most effective with greater levels of supervision and structure [3]. With a growing population of people LWBC, and the high time and resource demands of PA behavioural interventions, reliance on QEPs for delivery can limit implementation [4-6]. Peer-delivered interventions represent an alternative to QEP-delivered interventions that is conducive to community implementation, and a unique opportunity for holistic benefits in health and well-being for participants and peer mentors alike [4-6].

Peer support is uniquely positioned between lay people (i.e., family, friends) and professionals as peers can deliver informational, appraisal, and emotional support for those LWBC from a position of mutual identification and knowledge from lived experience [7]. Peer mentoring is a strategy specifically informed from behavioural theory as nearly all approaches (e.g., social cognitive, humanistic, social-ecological, dual-process) for understanding PA behaviour recognize the importance of social constructs such as relatedness, social support, social norms, or connection [6, 8, 9]. Peers act as credible sources and role models for enhancing health behaviours in people LWBC [10]. Evidence from systematic reviews, randomized controlled trials, and pilot studies have provided support for peer-delivered interventions as an effective avenue for PA promotion in a variety of populations, including those LWBC [6, 11-14].

In peer mentoring, the role of the peers may be implicit (i.e., their presence in the intervention addresses the theoretical rationale for their inclusion; e.g., relatedness/belonging) or explicit to deliver behaviour change content in discussions (e.g., addressing barriers, revisiting goals). However, peers rarely have appropriate training for explicit theory and evidence-informed discussions. Theory-based interventions with strategic deployment of evidence-based behaviour change techniques (BCTs; e.g., goal setting, action and coping planning) through behavioural counselling are optimal for achieving sustained PA behaviour change [3, 15, 16]. With such complex interventions, peer training is critical.

Interventions with theory-based content require knowledge of effective BCTs and their application into an individual’s unique lifestyle, as well as counselling skills for eliciting individual motivations, motivational readiness, experiences, and opportunities for PA [17, 18]. Therefore, peer mentors require training to supplement their lived experiences and maintain fidelity in such a complex intervention [19]. However, it is critical to limit the professionalization of peers such that there is adequate balance of ‘peerness’ between mentors and intervention participants [7, 10].

Research on peer-led interventions primarily focuses on feasibility and efficacy for study participants, with limited description of peer mentor training methods and seldomly reporting any evaluation of the feasibility or efficacy of the training [12, 13, 20]. Given peer mentor training is critical to achieving the desired intervention effect and the high time commitment of peer mentoring, feasibility and acceptability of peer training should be understood and prioritized. The scarcity of peer training evaluations, paired with the substantial heterogeneity in their duration, type, format, and content makes synthesizing best practices for the design of peer-led PA intervention training difficult. Therefore, formal reports of peer training evaluations are crucial for advancing the development of peer-led PA interventions [21].

The purpose of this study was to examine the feasibility and acceptability of a 4-week, hybrid peer mentor training program delivered through a distance-based PA behavioural counselling intervention for people LWBC using a mixed methods approach. This peer-led intervention targeted the adoption and maintenance of PA through behavioural counselling informed by constructs within the Multi-process Action Control (M-PAC) framework [22]. Briefly, the M-PAC framework suggests that PA intention formation, adoption, and maintenance are a result of reflective (i.e., instrumental attitudes, affective judgements, perceived capability, perceived opportunity), regulatory (e.g., goal setting, action and coping planning) and reflexive (i.e., habit, identity) processes, respectively [22]. It was hypothesized that the training program is feasible and acceptable based on the success criteria determined a priori (Table 1).

Table 1 Peer mentor training program feasibility and acceptability success criteria.

Outcome	Success Criteria
Enrollment Rate	≥55%
Retention Rate	≥75%
Asynchronous Module Adherence	≥75% (i.e., 3 of 4 modules)
Synchronous Workshop Adherence	≥75% (i.e., 3 of 4 sessions)
Satisfaction with Training	Score ≥ 3.5 of 5 points

Note: Success criteria were guided by previously published peer-delivered intervention training programs [20, 21, 23, 24].

Secondary outcomes included examining the effect of the training program in changing peer mentors' knowledge and confidence with intervention delivery in a pre-post, within-subjects design. It was hypothesized that peer mentors' knowledge and confidence in delivering the intervention would increase following the training program compared to pre-training measures [20, 23].

2. Materials and Methods

2.1 Positioning of the Research

This research takes a pragmatist approach to addressing the research question [25]. This paradigmatic approach is outcome-centered, where methodology and methods are dictated by the research question at hand [25]. Pragmatism allows researchers to incorporate multiple methods needed to address the research question effectively and appropriately, and to mitigate the weaknesses of each individual approach when used independently [25]. This paradigmatic approach and objectives of the current research calls for a mixed methods evaluation, wherein quantitative methods are used for objective assessment of feasibility, acceptability, and training program success, and qualitative methods are used to compliment and expand on objective measures by exploring peer mentors' subjective experiences in the training program [25]. All stages of this work are informed by the experiences and knowledge of the research team in PA behavioural theory and its application in intervention design, exercise oncology, PA-specific behavioural counselling, and educational development.

2.2 Design

This study was a pre-post, concurrent nested mixed methods design, with quantitative and qualitative data collected in parallel [26]. Quantitative methods were the dominant method in the research, with qualitative methods allowing for the peer mentors' subjective experience to expand the researchers' understanding of the quantitative data. Quantitative questionnaires were completed before starting and immediately following completion of the training program. Qualitative semi-structured interviews for peer mentors were embedded at post-intervention to discuss their experiences in the training program and delivering the peer-led PA intervention to at least one participant. This study was approved by the University of Toronto Research Ethics board.

2.3 Peer Mentor Recruitment

Peer mentors were recruited through community cancer organizations across Canada with exercise programming and cancer support groups, and word of mouth (February 2023-June 2023). Eligibility criteria included (1) ≥ 18 years of age, (2) diagnosed with cancer of any type, (3) completed and not planning to receive primary treatment in the next 3 months, (4) meeting cancer-specific guidelines of ≥ 90 minutes/week of moderate-to-vigorous PA (MVPA) for at least 6 months [27], (5) willing to act as a peer mentor for 1-2 participants, and (6) had internet access and a webcam. Given feasibility is the primary outcome, no formal sample size was required for this study [28]. Sample size was based on the exploratory nature of the study understanding various peer mentor perspectives on the feasibility of the training program and to estimate peer mentor enrollment and retention rates. All peer mentors provided informed consent.

2.4 Peer Mentor Training Program

Adult learning is most effective when it is personally relevant, autonomous, informal, interactional, and balanced with personal roles and responsibilities [29]. The training program was developed with these considerations in mind. Peer mentors participated in a 4-week, online training program consisting of two phases. Phase I (weeks 1-4) was the Knowledge and Skill Building phase, while Phase II (week 5) was the Assessment phase, assessing peer mentor readiness to deliver the intervention to participants. Both phases included asynchronous, self-directed components and synchronous, face-to-face components.

2.4.1 Phase I: Knowledge and Skill Building

Online module curricula educated peer mentors on BCTs and intervention logistics. Group workshops were conducted over Zoom led by the PI (AT) and co-facilitated by another QEP (LV), focusing on hands-on skills training for leading one-on-one behavioural discussions regarding PA. The pedagogical approach to training emphasized peer mentor reflection and application of experiential knowledge towards future behavioural discussions through self-reflection and group discussion. Peer mentors were given access to an online course page (i.e., Quercus, a teaching and learning platform used by the University of Toronto), that housed all self-directed online modules, live workshop materials, sample behavioural counselling videos, intervention delivery materials (e.g., session checklists, behavioural counselling guide), and discussion forums for additional communication. Optional weekly office hours were hosted by the research team as additional support for behavioural counselling skills practice starting in Week 4 of the training program. Detailed weekly training program content is presented in Table S1.

2.4.2 Phase II: Peer Mentor Assessment

Week 5 of the training program assessed peer mentor readiness to deliver the PA behaviour change intervention to inactive people LWBC. This phase consisted of two components: an online knowledge quiz and standardized mock role play.

Knowledge was assessed using a 13-item online quiz comprised of researcher-generated items to evaluate the peer mentors' knowledge of critical aspects of PA participation for people LWBC, BCTs and logistics of delivering the intervention (see Supplementary Materials). Based on other peer mentoring studies [24], a score of $\geq 80\%$ ($\geq 11/13$ items) was deemed as demonstrating adequate knowledge and was required for participants to continue with peer mentor training, however this quiz could be taken multiple times.

Behavioural counselling skills were assessed using standardized mock role play [11, 30]. During this assessment, peer mentors led a 'mock participant' (i.e., a member of the research team) partially through two intervention sessions. Mock role plays were observed by one of the trainers who gave immediate verbal feedback to the peer mentor during the mock role play session. Verbal feedback was provided at the mid-way point of the role play (i.e., after partially delivering one session), and at the end. Role plays were also recorded and independently reviewed by two members of the research team (AT, LV or LT [supervisor]) using a scoring guide (see Supplementary Materials) to evaluate the peer mentor's performance on the following skills: (1) using previous experience to inform discussions, (2) use of BCTs, (3) responding to participant questions, (4)

providing emotional and informational PA support, and (5) handling resistance. Each criterion was rated on a scale of 1-5 (1-Poor, 2-Needs Improvement, 3-Satisfactory, 4-Good, 5-Exceptional), with higher scores indicating better performance. Peer mentors required a 'Satisfactory' score (i.e., ≥ 3) on each scoring item to be matched and work with participants in the subsequent intervention. Peer mentors were permitted to complete this mock role play as many times as desired to meet peer mentor readiness criteria.

2.5 Peer-led Behaviour Change Intervention

Briefly, the goal of the peer-led behaviour change intervention was to increase PA participation of inactive people LWBC to meet cancer-specific PA guidelines (i.e., ≥ 90 min/week of MVPA; [27]). Participants were matched with peer mentors based on treatment received and preference for gender. Only peer mentors meeting peer readiness criteria were eligible to be matched with a participant. Week 1 of the intervention included an educational, group workshop hosted by a QEP to introduce participants to the PA guidelines for people LWBC, safety considerations, and how to make PA enjoyable. For the remaining 5 weeks of the intervention, participants met virtually with their matched peer mentor weekly for one-on-one discussions of personalized BCTs to adopt and maintain PA informed by the M-PAC framework [22]. Participants also received a PA workbook with information and activities to supplement weekly discussions. The intervention overview is presented in Table S2. An evaluation of this peer-led intervention will be reported in a separate manuscript [31].

2.6 Quantitative Measures

Prior to the first training workshop session, peer mentors completed a questionnaire assessing pertinent demographic (e.g., age, sex, employment status) and medical characteristics (e.g., body mass index, cancer type).

2.6.1 Primary Outcomes - Feasibility and Acceptability

A priori success criteria for primary outcomes are included in Table 1. Training program feasibility was assessed using the following indices: enrollment (i.e., number of peer mentors enrolled of those screened) and retention (i.e., number of peer mentors who completed the training program of those enrolled) rates, and adherence to the training program components (i.e., four online modules and four live workshops).

At post-training, peer mentors completed a 12-item researcher-generated satisfaction questionnaire adapted from previous peer-led interventions [20, 24]. Peer mentors were asked to rate feelings of satisfaction and burden of training program components including synchronous and asynchronous learning, navigating the course webpage and program materials, discussion forums, training program burden, and value of the training program for increasing knowledge and confidence of intervention delivery. Items were assessed on a 5-point Likert scale ranging from '1-Strongly disagree' to '5-Strongly agree', with higher scores indicating greater satisfaction with the training program. Three additional items were included to assess perspectives on the time commitment of the online modules, live workshops, and training program overall. Participants indicated whether they felt these components were '1-Too short', '2-Just right', or '3-Too long'.

2.6.2 Secondary Outcomes - Knowledge and Self-Efficacy for Intervention Delivery

Knowledge gained during the training program was measured using the 13-item peer mentor readiness quiz in Phase II of the training program. Self-efficacy for leading PA-related behavioural counselling was measured using a 6-item, researcher-generated questionnaire at pre-training and post-training. Peer mentors were asked to rate how confident they are on a scale of '1-not confident at all' to '5-extremely confident' [20] in the following areas: utilizing personal experiences in behavioural counselling, discussing BCTs, responding to participant questions, handling resistance, and monitoring, recording, and discussing PA participation of study participants.

2.7 Qualitative Measures

After delivering the intervention to a matched participant, peer mentors were asked to participate in a semi-structured interview with a member of the research team not involved with the training program delivery. Interviews were held and recorded through Zoom and were a mean of 37.6 minutes in duration. The interview guide addressed the peer mentors' experience in both the training program and delivering the peer-led PA intervention itself. The interview guide was developed to complement and expand upon the quantitative measures of feasibility, acceptability, and perceived outcomes of the training program. Example items addressing the training program included, "*What did you enjoy or not enjoy about the training program?*", "*What did you find most/least useful about the training program?*", and "*Do you feel like the training program adequately prepared you to deliver behavioural discussions surrounding physical activity?*". The complete interview guide is presented in the supplementary materials.

2.8 Ethics Statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the University of Toronto's Research Ethics Board (protocol # 43137; approved September 8, 2022). Informed consent was obtained from all individual participants involved in the study.

3. Data Analysis

This analysis utilized a concurrent, nested, parallel mixed methods design, wherein qualitative and quantitative data were collected and analyzed separately but simultaneously. Quantitative and qualitative data analyses separately used the foundational principles for data analysis of each respective method. Qualitative and quantitative methods were merged at multiple points throughout the research including in the methods, interpretation and reporting stages [32].

Quantitative data analysis included descriptive statistics to report peer mentor demographic and medical characteristics, feasibility (i.e., enrollment, retention, adherence) and acceptability (i.e., satisfaction) outcomes, and peer mentor readiness. Changes in knowledge and self-efficacy for intervention delivery were calculated as the mean difference from pre- to post-training. Results were interpreted using the direction of the effect and Cohen's *d* effect size [33]. Cohen's *d* was calculated for within-subjects by dividing the mean difference by the standard deviation of this difference. Effect size interpretations followed the recommendations of Cohen [33] which indicate

0.2, 0.5 and 0.8 as a small, medium and large effect, respectively. Intervention fidelity measures were reported using descriptive statistics of the proportion of fidelity checklist items that were discussed in each one-on-one session.

Peer mentor interviews were transcribed verbatim using OtterAI (www.otter.ai). OtterAI transcripts were checked and edited for accuracy. Qualitative methods aligned with a constructivist approach with assumptions that reality is socially constructed and individually interpreted. Despite individual interpretations of events, commonalities in experiences exist and can be identified through reflexive interactions with the participant and researcher. As such, Braun and Clark's [34] reflexive thematic analysis was used to analyze the qualitative data. The first author took the primary role in analyzing the qualitative data and the supervising team member played a secondary role recommending areas of expansion and refinement needed for themes. The first author (AT) read and re-read interview transcripts to familiarize themselves with the data, taking preliminary notes. A combined deductive and inductive approach to identify themes around the primary and secondary objectives of the research was used. This started with a deductive framework to guide the initial analysis and identification of data chunks related to feasibility (e.g., time commitment), acceptability (e.g., satisfaction with training program components), and peer mentor preparedness (e.g., knowledge, confidence in intervention delivery). As the analysis progressed, the inductive approaches were incorporated to search for common threads between peer mentor experiences that address feasibility, acceptability, and peer mentor preparedness, allowing new themes to be generated from the data which were not originally anticipated [35]. AT completed initial coding of transcripts and constructed preliminary themes and subthemes. Following initial theme generation, themes were presented to and discussed with the supervising research team member LT, who provided feedback on the relevancy and refinement of themes. Final themes and subthemes were generated and named by AT. Qualitative data analysis was organized using NVivo (Version 12.7.0).

3.1 Mixed Methods Analysis

Methods were integrated through merging at multiple time points in the research. In the methods phase, merging occurred through developing interview questions that targeted similar objectives as the quantitative measures to allow for exploration of peer mentor experiences with several components of the training program [32]. Quantitative and qualitative results are first reported using a contiguous approach, where the results from the different methods are reported separately [32]. Following independent analyses, quantitative and qualitative data were merged through narrative weaving in the interpretation of both types of data through common themes [32]. For example, all quantitative indices of feasibility and acceptability were further explored within the qualitative data to understand peer mentors' subjective experiences around each of the indices. Merging continues in the discussion through narrative weaving interpreting both quantitative and qualitative data concurrently with existing data [32].

4. Results

4.1 Peer Mentor Characteristics

Complete demographic, medical, and behavioural characteristics of peer mentors are presented in Table 2. Briefly, peer mentors were mixed genders (men: $n = 8$; 57.1%) with a mean age of $65.4 \pm$

10.7 years. Peer mentors were diagnosed with prostate (n = 8; 57.1%), breast (n = 3; 21.4%), or multiple (n = 3; 21.4%) cancers at a localized stage (n = 14; 100.0%). Peer mentors were a mean of 83.0 ± 99.7 months since their diagnosis, with only 21.4% (n = 3) actively receiving a form of maintenance treatment. All peer mentors met cancer-specific PA guidelines (≥90 minutes/week of MVPA) and 71.4% (n = 10) also met resistance training guidelines (≥2 days/week) [27]. Peer mentors engaged in a mean of 348.6 ± 201.9 minutes/week of MVPA and 95.0 ± 130.8 minutes/week of resistance training.

Table 2 Peer mentor characteristics (N = 14).

Variable	M ± SD or n (%)
<u>Demographic</u>	
Age	65.4 ± 10.7
Sex	
Male	8 (57.1)
Female	6 (42.9)
Marital status	
Married	10 (71.4)
Divorced	2 (14.3)
Common-law	1 (7.1)
Single	1 (7.1)
Education	
Some university	1 (7.1)
Completed university	6 (42.9)
Some graduate school	1 (7.1)
Completed graduate school	6 (42.9)
Employment	
Retired	7 (50.0)
Part-time	4 (28.6)
Full-time	3 (21.4)
Ethnicity	
White	13 (92.9)
South Asian	1 (7.1)
<u>Medical</u>	
Body Mass Index (kg/m ²)	24.7 ± 2.6
Number of comorbidities	
0	2 (14.3)
1	6 (42.9)
2-4	6 (42.9)
Smoking Behaviours	
Never smoked	8 (57.1)
Ex-smoker	5 (35.7)
Occasional smoker	1 (7.1)
Drinking Behaviours	

Never drink	3 (21.4)
2-3 times per month	2 (14.3)
Once per week	2 (14.3)
2-3 times per week	4 (28.6)
4-6 times per week	3 (21.4)
<u>Clinical</u>	
Cancer type	
Prostate	8 (57.1)
Breast	3 (21.4)
Multiple	3 (21.4)
Months since diagnosis	83.0 ± 99.7
Stage	
Localized	14 (100.0)
<u>Treatment</u>	
Received surgery	12 (85.7)
Received chemotherapy	3 (21.4)
Received radiation	9 (64.3)
Received immunotherapy	2 (14.3)
Received hormone therapy	7 (50.0)
Months since last treatment	50.6 ± 71.2
Treatment status	
Not receiving treatment	11 (78.6)
Still receiving maintenance treatments	3 (21.4)
<u>Physical activity participation</u>	
Light intensity	174.6 ± 191.5
Moderate intensity	163.9 ± 101.6
Vigorous intensity	184.6 ± 185.8
Moderate-to-vigorous intensity	348.6 ± 201.9
Resistance training	95.0 ± 130.8
Meeting physical activity guidelines	
Aerobic (cancer-specific [≥90 min/week])	14 (100.0)
Aerobic (general [≥150 min/week])	12 (85.7)
Resistance training (≥2 days/week)	10 (71.4)

4.2 Primary Outcomes - Feasibility and Acceptability

Peer mentor flow through the study is presented in Figure 1. Nineteen people LWBC were screened for eligibility. Of this, 14 were enrolled in the training program for an enrollment rate of 73.7%. Of the 14 enrolled, 13 completed both Phases I and II of the training program for a 92.9% retention rate. All enrolled peer mentors ($N = 14$) completed post-training questionnaires. Peer mentors were recruited from local support groups (50.0%), community postings (28.6%), and research group website/connections (21.4%). Peer mentors completed a mean of 3.5 ± 0.8 of four self-directed modules (adherence = 87.5%). Adherence to the live workshops was 100%.

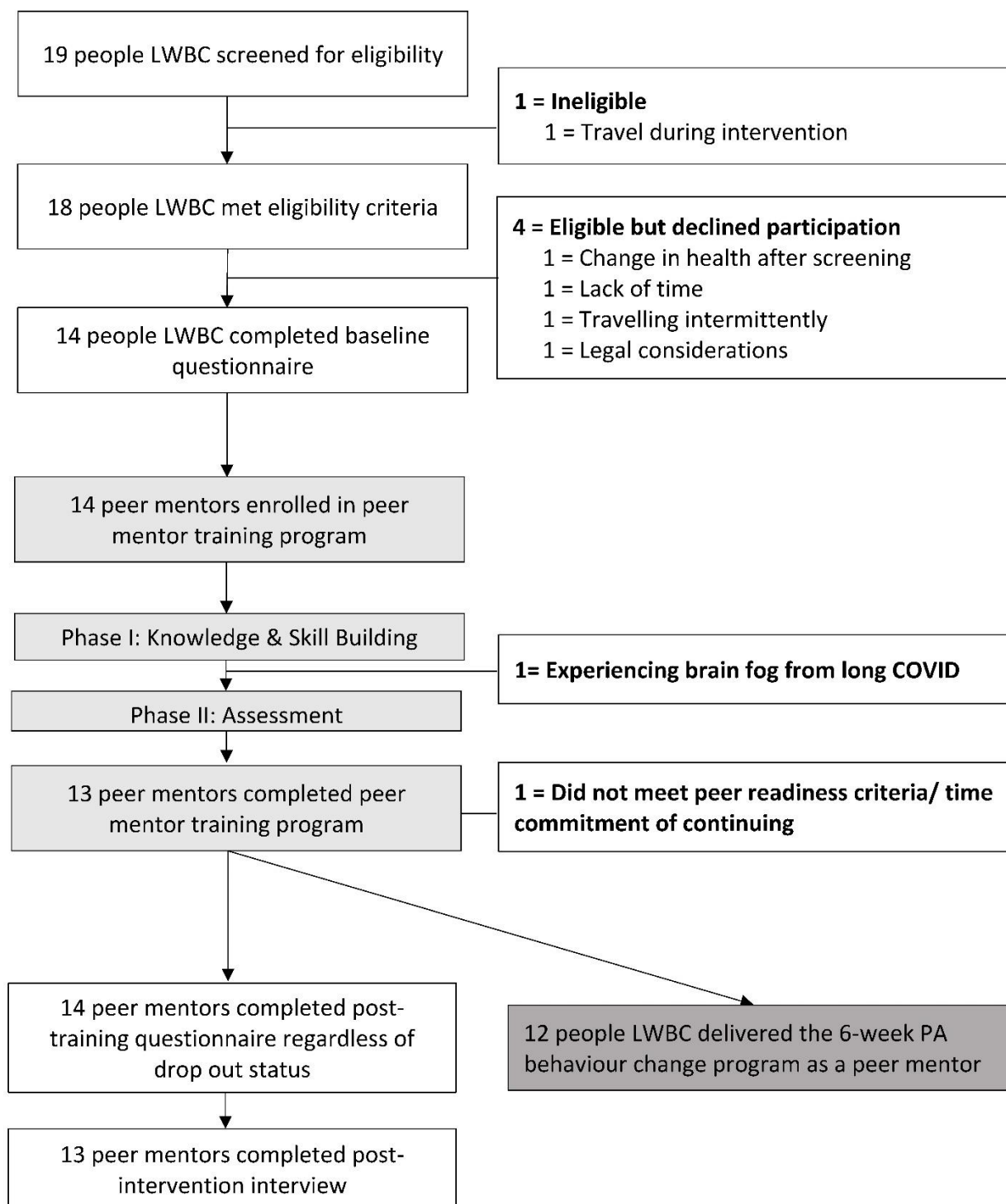


Figure 1 Diagram of peer mentor flow through the study.

All but one peer mentor met peer readiness criteria for knowledge on the first attempt (92.3%). Most peer mentors (n = 11; 84.6%) met the criteria for the mock role play on the first attempt. One peer mentor who completed the training program discontinued their participation after not meeting mock role play readiness criteria. Therefore, 92.3% (n = 12) of peer mentors who completed both Phases I and II (N = 13) of the training program met peer mentor readiness criteria for both knowledge and behavioural counselling skills and delivered the peer-led intervention to participants.

Peer mentor satisfaction with the training program is reported in Table 3. Since no satisfaction questions addressed the peer readiness assessments, all peer mentors who completed the Knowledge and Skill Building phase (Phase I; $N = 14$) of the training program (Weeks 1-4) were included in the satisfaction analysis. Across items, mean peer mentor satisfaction scores ranged from 3.9 to 4.6 out of 5 points with higher scores indicating greater satisfaction with the training program. Most peer mentors rated overall training program length (i.e., 5-weeks; 92.9%), asynchronous module length (i.e., estimated 1 hour/week; 85.7%), and synchronous workshop length (i.e., 2 hours/week; 78.6%) as ‘2-Just Right’.

Table 3 Peer mentor satisfaction with the training program derived from a researcher-generated questionnaire ($N = 14$).

Questionnaire Item	Likert-scale Rating M ± SD
<u>Training program components*</u>	
1. I enjoyed the weekly training workshops	4.4 ± 0.5
2. The training program increased my knowledge of physical activity and behaviour change strategies.	4.5 ± 0.7
3. The asynchronous, self-paced training modules were useful for learning intervention content (e.g., physical activity, strategies to increase physical activity).	4.2 ± 0.8
4. The synchronous live workshops were useful for developing and practicing skills to lead behavioural discussions.	4.6 ± 0.6
5. All intervention materials were easy to access and follow.	3.9 ± 1.1
6. The behavioural counselling guide and week by week programming materials are useful and clear in outlining weekly peer mentor duties.	4.4 ± 0.7
7. I thought the use of discussion forums between peer mentors were useful.	4.1 ± 0.9
8. This training program has increased my confidence in leading behavioural discussions around physical activity.	4.4 ± 0.6
9. The course page (Quercus) is easy to navigate.	4.0 ± 0.9
10. The mock role plays were useful for practicing my skills	4.5 ± 0.9
11. The training program did not interfere with my typical day to day activities	4.4 ± 1.2
12. I feel as though the training program has adequately prepared me to deliver intervention content.	4.1 ± 1.0
<u>Duration of training program**</u>	
13. Length of entire training program	2.1 ± 0.3
14. Weekly time spent on asynchronous, online training modules (estimated at 1 hour)	2.0 ± 0.4
15. Weekly time spent on synchronous, live workshops (2 hours)	2.1 ± 0.5

*Items scored on a scale of ‘1-Strongly Disagree’ to ‘5- Strongly Agree’.

**Items scored on a scale of ‘1-Too short’, ‘2-Just right’, ‘3-Too long’.

4.3 Secondary Outcomes - Preliminary Training Program Outcomes

Peer mentors’ knowledge of intervention content and delivery procedures improved from pre-training to post-training to a large effect ($M_{diff} = 1.69$ points; $d = 1.43$). Peer mentors’ self-efficacy for intervention delivery improved from pre-training to post-training for all participants to a large effect ($M_{diff} = 4.85$ points; $d = 1.47$).

4.4 Qualitative Results

Thirteen peer mentors were interviewed. Of these 13 peer mentors, 2 dropped out during or immediately following the training program and were interviewed at the time of drop out. The remaining 11 peer mentors were interviewed after delivering the intervention. Five primary themes were generated from the qualitative interviews: (1) Peer mentors’ impressions of the training program, (2) Timing and structure of the training program, (3) Content and skill building phase, (4) Experiences and considerations for the standardized mock role play, and (5) Peer mentor preparedness. Themes, subthemes and illustrative quotes are presented in Table 4.

Table 4 Qualitative themes from peer mentor interviews.

Themes & Subthemes	Subthemes
1. Peer mentors’ impression of the training program	1a. Training program was interesting and informative 1b. Enjoyment of various aspects of the training program
2. Timing and structure of the training program	2a. High time commitment of training program 2b. Navigating online learning environment
3. Content of Knowledge and Skill Building Phase	3a. Self-directed learning of behaviour change techniques 3b. Value of practicing peer mentoring skills for leading behavioural discussions
4. Experiences in and considerations for the standardized mock role play	N/A
5. Peer mentor preparedness for delivering intervention	5a. Training program elements supporting one’s preparedness for intervention delivery 5b. Preparedness for discussions around coping with cancer and other life stressors 5c. Proposed resources for further support

In summary, peer mentors had favourable impressions of the training program, expressing strong feelings that this program was enjoyable, interesting, and informative. Peer mentors enjoyed learning from facilitators and connecting with other peer mentors. Peer mentors noted the high time commitment of the study, with mixed opinions on how the program could be delivered. Navigating the online course page and materials was challenging for several peer mentors, and many suggested reducing or discontinuing self-directed learning modules due to redundancy with the workshops. Overall, peer mentors felt well-prepared to deliver PA behavioural counselling to

participants and discuss coping with cancer. However, peer mentors' comfort with discussing their cancer diagnosis with participants was derived from their personal experience instead of the training program. Peer mentors suggested that booster sessions, access to more PA resources, examples of BCTs, and more information about their participant in advance would better support them in their role.

4.5 Integration of Quantitative and Qualitative Results

Four themes were generated from mixing of the independently analyzed quantitative and qualitative data; (1) feasibility, (2) usability, (3) satisfaction, and (4) preparedness. Each theme is derived from both the quantitative and qualitative results. Feasibility represents the practicality of the intervention from a priori indices and peer mentor experiences with the structure and time commitment of the training program. Usability includes peer mentors' ability to navigate the training program webpage and materials. Satisfaction includes peer mentor perceptions and opinions of participating in the training program. Preparedness includes changes in peer mentor knowledge and confidence, and peer mentor perceptions of preparedness. Table 5 depicts the organization of the integrated quantitative and qualitative results including the theme, its description and its quantitative and qualitative supporting evidence. Overall, qualitative data complemented and expanded upon quantitative data. Qualitative depictions of peer mentor experiences largely echoed and provided reasoning for high retention, adherence rates and satisfaction. Where quantitative and qualitative results diverged was in the reports of high time commitment, understanding challenges with course navigation, and the mock role play.

Table 5 Integrated quantitative and qualitative results from the peer mentor training program evaluation.

Integrated Findings	Quantitative Support	Qualitative Support
<p>1. Training Program Feasibility Despite a high time commitment for the peer mentors, the training program met feasibility indices. Peer mentors had individual preferences for training program delivery, but the duration of the training program as a whole and each of its components appear feasible.</p>	<p>Meeting a priori feasibility threshold</p> <ul style="list-style-type: none"> • Enrollment rate - 73.7% • Retention rate - 92.9% • Adherence to online modules and workshop - 87.5-100% • Satisfaction Items (≥ 3.5 points): <ul style="list-style-type: none"> • Interference with day-to-day activities <p>Duration of training program - 'Just Right' Duration of online modules and workshops - 'Just Right'</p>	<p>2a. High time commitment of the training program' <i>"You know, there was a fair number of hours investment. I don't know how many hours, but I know that during the training session, it probably was maybe like, five hours a week because I would spend the time doing the session before and doing the stuff before we went through it"</i></p> <p><i>"I think it's quite manageable"</i></p> <p><i>"I would have preferred it in one big chunk in one day, rather than spread out over week."</i></p>
<p>2. Training Program Usability Both self-directed modules and live workshops had excellent adherence, but navigating the online course page was challenging for peer mentors.</p>	<p>Meeting a priori feasibility threshold</p> <ul style="list-style-type: none"> • Adherence to online modules and workshop - 87.5-100% • Satisfaction Items (≥ 3.5 points): <ul style="list-style-type: none"> • Easy to access/follow materials • Easy to navigate Quercus 	<p>2b. Navigating online learning environment <i>"But sometimes I think even the way things were titled...it almost seemed a bit more complicated than it needed to be."</i></p> <p><i>"I struggled to find some of the information on the online portal that was set up for me, it seemed very...I don't know, convoluted to find the actual information."</i></p>
<p>3. Peer Mentor Satisfaction Peer mentors found the training program enjoyable and useful for increasing knowledge and skills for PA behavioural counselling. Adjustments</p>	<p><i>Enjoyable</i></p> <p>Meeting a priori feasibility threshold</p> <ul style="list-style-type: none"> • Retention rate - 92.9% • Adherence to online modules and workshop - 87.5-100% 	<p><i>Enjoyable</i></p> <p>1a. Training program was interesting and informative <i>"I enjoyed it. I found it interesting to learn all the different motivation things and the different things to</i></p>

to the mock role play are needed to better simulate one-on-one sessions with participants and peer mentors.

- Satisfaction Items (≥ 3.5 points):
 - Enjoyed workshops

Useful

Meeting a priori feasibility threshold

- Satisfaction Items (≥ 3.5 points):
 - Modules were useful
 - Workshops were useful
 - Intervention materials were useful and clear
 - Discussion forums were useful

encourage, and to stay away from and all that kind of stuff.”

1b. Enjoyment of various aspects of the training program

“What did I enjoy? I think first of all, listening to other peer mentors’ issues with cancer and with exercise, and how they overcame it, there was one or two quite remarkable stories. Everyone’s cancer journey is different.”

4. Experiences in and considerations for the standardized mock role play

“Being the goal was to mentor people with cancer, I think the training sessions that we did one on one with other mentors, to me, they were easier to conduct than the ones I conducted with the organizers, or the students at the university because I could relate to them better. And I felt like it was a better interviewing process.”

“I don’t know, like, maybe there’s a way of doing it without the report card system, like maybe they could just you know, ‘we notice that you’re maybe a little weak in this area?’”

Useful

3a. Self-directed learning of behaviour change techniques

"I didn't think the homework was totally necessary, because we were going to go through it in the discussion each week."

3b. Value of practicing peer mentoring skills for leading behavioural discussions

"During the training, you know, we had chances to practice it with other trainees, and then we had the sort of mock sessions that that your research team that arranged and monitored, so I think that was all, you know, important components to build skills and confidence in delivering the material."

"...maybe more mock work with the other mentors just to get a good range of personalities and things like that involved."

4. Peer Mentor Preparedness

The training program and intervention delivery materials adequately prepared peer mentors to deliver one-on-one PA behavioural counselling sessions to participants. Additional supports for peer mentors could provide further support during intervention delivery.

Meeting a priori feasibility threshold

- Satisfaction Items (≥ 3.5 points):
 - Increased knowledge
 - Increased confidence
 - Felt prepared

High peer mentor readiness rate - 92.3%

Increases in knowledge - $\uparrow d = 1.43$

Increases in confidence in intervention delivery - $\uparrow d = 1.47$

5a. Training program elements supporting one's preparedness for intervention delivery

"The training program, I thought was excellent. It was very good. I think there was a lot of work that was put into providing myself and the other mentors that were doing the training. There was an awful lot of information. It was, you know, provided in a condensed format, but I thought it was excellent. Like, they documented everything, even, you know, to the point of the outline, or the script things for when we did do the sessions with the participant. I thought those were really excellent."

5b. Preparedness for discussions around coping with cancer and other life stressors

"I'm very comfortable with medical stuff and things like that. Not everybody will be I guess, but I didn't think we needed to be prepared... it's a whole new vocabulary you learn when you're a cancer patient."

"It might be useful, especially if you are looking at ways to expand or enhance the training of mentors to include something on that emotional content because you know, everyone in the program is a cancer survivor, that's got lots of emotional issues with it all by itself. Even for somebody who's well mentally a cancer diagnosis is going to hit you emotionally."

5c. Proposed resources for further support

"Maybe have one kind of a refresher session if there's a gap...I think at least two months, but after two months between the training and end of the training program, and when people are getting assigned, you know...so like a two-hour session, or just a quick refresher."

5. Discussion

To our knowledge, this is the first study to apply a comprehensive approach to evaluating and reporting the feasibility and acceptability of a training program for peer mentors to deliver PA-related behavioural discussions and intervention content in cancer populations. Quantitative and qualitative results indicate the feasibility of this peer mentor training program through four aspects, general feasibility of intervention design, usability of the training program components, peer mentor satisfaction, and preparedness. This peer mentor training program was feasible and acceptable as it met all quantitative a priori success criteria (Table 1) for enrollment, retention, adherence, and peer mentor satisfaction. Qualitative data complemented and expanded on these quantitative results indicating areas for refinement of the training program. Furthermore, both quantitative and qualitative data indicated the success of the training program in equipping people LWBC with the skills and knowledge needed to deliver a theory-based peer-led PA behaviour change intervention. This suggests that online training programs consisting of live workshops and self-directed learning is a suitable method for training active people LWBC to deliver PA behaviour change interventions to inactive people LWBC, however several key aspects of feasibility warrant further discussion. The mixed methods provided for greater understanding of feasibility and acceptability than would have occurred with a single method alone. Adding qualitative data to complement the quantitative measures expanded our results and indicated few areas of slight dissonance between quantitative and qualitative data, highlighting the value of pragmatism in addressing the research question.

Given recruitment channels used in the current study, recruitment rates could not be obtained. However, recruitment success may be implied from the high enrollment rate (i.e., number enrolled of those screened; 73.7%) and peer mentor interest in the training program material. Enrollment rates for the current study are comparable to Pinto et al. [20], which is notable given the different peer mentor recruitment methods used across studies. Pinto et al. [20] recruited mentors by directly contacting existing peer supporters in an American Cancer Society support program for people diagnosed with breast cancer, whereas the current research primarily employed a more passive approach to recruitment with the research team contacting community cancer organizations to advertise the peer mentor recruitment materials. Other research in peer support services for people LWBC have shown similar support for passive approaches [21], however, a mixture of recruitment strategies is optimal for peer mentor recruitment in this population [36]. Given our passive approach to recruitment through community cancer organization postings, it is not surprising that people diagnosed with breast and prostate cancer were the only peer mentors enrolled due to higher prevalence and representation in community programs [37]. Additionally, though many community organizations approached service people LWBC of mixed cancer types, some were cancer-site specific primarily for people with breast and prostate cancer. This study managed to recruit a mixed sample of men and women peer mentors, which may be attributed to several reasons. First, a well-connected member of a prostate peer support network, who found our recruitment materials through passive recruitment by a community cancer organization, shared recruitment materials with a wide breadth of support groups and navigation services, and directly sent materials to people he felt may be a good fit for this peer mentor role. This speaks to the importance of having a 'champion' for the peer mentoring program for increasing representation and diversity of peer

mentors [38]. Secondly, providing support for other people LWBC to adopt PA, a behaviour of personal importance to peer mentors, may make peer mentoring in this context more attractive than traditional peer support roles.

A discrepancy between quantitative and qualitative results was shown around the training program time commitment. Participants discussed the high time commitment of the training program and intervention delivery; however, they rated the overall training program duration and that of each weekly component (i.e., online modules and workshops) as 'Just right'. Other peer mentoring interventions for people LWBC also had high peer mentor retention rates despite being a role that requires substantial time and dedication that exceeds what might be a typical volunteer time commitment [20, 36]. Additionally, peer mentors in general cancer support programs report enrolling to help others, and to pay it forward [20, 21, 23, 36], with similar sentiments expressed in peer mentor interviews for the current study. As such, peer mentors' dedication to helping others may justify the high time commitment. However, this may also be reflective of peer mentors' enjoyment of and satisfaction with the training program itself.

Peer mentor satisfaction, as determined by meeting quantitative a priori scores, aligned with peer mentors' positive impressions of the training program in the qualitative data. Peer mentors found the training program to be informative, interesting, and valued for reasons beyond helping others. Peer mentors had an interest in PA and enjoyed connecting with and hearing other peer mentors' experiences of being physically active following their cancer diagnosis. This connectedness may indicate another benefit of peer mentoring. Cancer support services for people LWBC that are centered around PA (e.g., dragon boating) are valued avenues for peer support without centering cancer as the focal point of these relationships [39-43]. Peer-to-peer connection through ones' interests like PA may be more attractive opportunities for peer support. Gender differences in health support seeking and provision are recognized [44], but understanding the gendered nuances of providing PA-related peer support can help in understanding the impact and mechanisms of peer-led PA interventions for peer mentors and participants.

Beyond enjoyment, this training program shows promise in preparing peer mentors for intervention delivery. This is evidenced by peer mentors' favourable perceptions of their readiness and confidence in delivery, as well as by meeting pre-determined objective measures of readiness. Knowledge and self-efficacy scores also improved from pre- to post-training to a large effect. Pinto et al. [20] reported no significant changes in self-efficacy scores following their training program or after intervention delivery; however, this is likely attributed to their recruitment of people diagnosed with breast cancer already providing peer support through the American Cancer Society. This comparison of recruitment strategies further highlights the feasibility of the current training program given its ability to prepare peer mentors to deliver the intervention despite very few having previous experience in providing peer support.

While the training program demonstrated feasibility and acceptability, areas of dissonance in quantitative and qualitative data indicate possible refinements for the training program. First, issues of usability may undermine the impact of the training program. Similar to other technologically driven interventions [45], future peer mentor training programs using digital mediums should test course page usability prior to roll out, consider their peer mentors' familiarity with technology, and preferences for accessing training program and intervention materials. Second, the interaction of self-directed learning and live workshops may be rethought. 'Flipped classroom' approaches where theoretical learning is completed independently, then applied in the classroom setting are identified

as effective pedagogical approaches [46]. While this format was taken in the current training program, workshops allocated time to reviewing module information before applying it. Reserving time in live workshops for more application of the module information as opposed to reviewing it may reduce redundancy and improve learning outcomes and peer mentor satisfaction. Other non-PA-related peer support training programs have found hybrid approaches that include independent self-study, followed by online discussion forums and face-to-face discussions of self-study information to be feasible and effective [24, 36]. Finally, research team members with no history of cancer served as mock participants, but redesigning role plays to have other peer mentors serve as the mock participant may resemble a real intervention session more closely, allowing for greater discussion of cancer-specific barriers. Further, more holistic descriptive feedback on key areas needing additional support may serve peer mentors better rather than a numerical scoring system.

Peer-led interventions show promise as a valuable avenue for PA behaviour change, scalability of such interventions should be considered early [47]. With effective training programs, peer mentors can ease the demands from QEPs within PA behaviour change interventions. Yet, this mode of intervention delivery does come with its own unique challenges (e.g., long term peer mentor retention, ongoing recruitment, longevity of training program outcomes) [48]. Though this work was developed and delivered in an academic research setting, community-based partnerships can expand the reach, diversity, and sustainability of peer-led interventions [49, 50]. Community cancer organizations can also inform intervention design by providing contextual insights into how the peer-led program can best meet the needs of their community [49, 50]. With demonstrated feasibility, acceptability and preliminary success, engaging community partnerships in the design and delivery of efficacy testing can streamline implementation pathways by ensuring feasible procedures for both research and community organizations at the outset [51]. Following demonstration of feasibility and acceptability of the peer-led intervention itself [31], leveraging the support of community organizations is an important next step in this research.

This study is not without its limitations. First, peer mentor interviews were conducted after delivering the intervention which was at least 6 weeks following the training program completion. Memory and recall may have impacted peer mentor perceptions of the training program. Second, themes were not presented back to peer mentors for reflection and refinement; therefore, researcher conclusions from qualitative data have not been verified by participants. Finally, enrolled peer mentors lacked heterogeneity in sociodemographic, medical and clinical characteristics (e.g., race, education level, cancer type) which may limit the translation of these results and those of the peer-led intervention to more diverse cancer population. Purposeful recruitment efforts to improve representation among peer mentors is needed in future work.

In conclusion, the intensive peer mentor training program was feasible and acceptable, with a promising impact on preparing active people LWBC to deliver a structured, theory-based PA behaviour change intervention. Though this training program employed a hybrid approach including online, self-directed learning modules and live group workshops, reorganization of the self-directed learning is needed to balance peer mentor satisfaction with effective knowledge delivery. Remotely delivered training programs should be designed with the target population's preferences, previous experience, existing knowledge, and familiarity with technology in mind. Peer-led PA behaviour change interventions are worthy intervention approaches; however, considerable work to optimize these approaches is needed. Peer-delivered PA interventions represent a relatively novel and underutilized method for the promotion of PA in clinical populations including people LWBC. Their

successful implementation on a widespread scale is dependent on effective and feasible training programs for peers to deliver intervention content that are strategic in ensuring the mutual relatedness of mentors is preserved.

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Author Contributions

AT, KAN, RR, CS and LT contributed to the conceptualization and design of the study, interpretation of the data, and drafting and revising the manuscript critically for important intellectual content. AT contributed to the interpretation of the data and drafting and revising the manuscript critically for important intellectual content. All authors have read and approved the final manuscript.

Competing Interests

The authors have declared that no competing interests exist.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author (LT) upon reasonable request.

Additional Materials

The following additional materials are uploaded at the page of this paper.

1. Table S1: Learning objectives of a training program for peer mentors to deliver physical activity behavioural discussions to inactive individuals living with and beyond cancer.
2. Knowledge Quiz Items.
3. Standardized Mock Role Play Scoring Items.
4. Table S2: Overview of the 6-week, peer-led PA behaviour change intervention.
5. Peer Mentor Semi-Structured Interview Guide.

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