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ORIGINAL RESEARCH

Utilizing RE-AIM to examine the translational potential of Project MOVE, a novel intervention for increasing physical activity levels in breast cancer survivors

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Abstract

Translating effective research into community practice is critical for improving breast cancer (BC) survivor health. The purpose of this study is to utilize the RE-AIM framework to evaluate the translational potential of Project MOVE, an innovative intervention focused on increasing physical activity (PA) in BC survivors. A mixed-methods design, including a self-report questionnaire, accelerometry, focus groups, and interviews, was used to inform each RE-AIM dimension. *Reach* was evaluated by the representativeness of participants. *Effectiveness* was reflected by change in PA levels and perceptions of satisfaction and acceptability. *Adoption* was examined using participants' perceived barriers/facilitators to program uptake. *Implementation* was examined by participants' perceived barriers/facilitators to implementing the program. *Maintenance* was assessed by participant retention. Assessments occurred at baseline and 6-months. Mixed analysis of variance and content analysis were used to analyze the data. A total of 87 participants participated in Project MOVE and were demographically comparable to similar studies (Reach). Participants indicated high levels of program satisfaction (88%) and previously inactive survivors' significantly increased PA levels from baseline to 6-month follow-up (Effectiveness). Participants reported that a program focused on PA rather than disease helped them overcome barriers to PA (Adoption) and having leaders with BC and exercise expertise was essential to accommodate population specific barriers (Implementation). At 6-months, participant retention was 83% (Maintenance). Project MOVE is an acceptable, practical, and effective program for engaging BC survivors in PA and has the potential to be highly transferable to other populations and regions.

Keywords

Cancer, Women, Physical activity, RE-AIM, Microgrants, Health promotion

Implications

Practice: To improve the translational nature of community-based PA programs, implementing programs that are tailored to the needs and preferences of BC survivors and that offer an opportunity for autonomy building are necessary.

Policy: Evidence-based data highlighting the process of translating effective interventions from controlled research trials into the community are critical for improving population level health.

Research: Future experimental research (e.g., RCT) should be undertaken to understand the direct impact of the Project MOVE intervention model.

INTRODUCTION

Breast cancer (BC) is the most commonly diagnosed cancer and second leading cause of cancer related death in women world-wide [1]. Those diagnosed with BC often experience short- and long-term physical (e.g., pain, fatigue, weight gain, lymphedema) and psychological (e.g., depression, anxiety, reduced self-esteem) side effects associated with the disease and related treatments [2–4]. Physical activity (PA) is a safe, nonpharmaceutical and cost-effective way to optimize recovery, manage side effects, and improve overall health and quality of life (QoL) [5,6]. Moreover, evidence suggests that PA can reduce the risk of cancer reoccurrence and early mortality [7]. Despite the well-known benefits of PA on overall health, participation in and adherence to PA is low among BC survivors [2,8,9].

Community-based PA programs (e.g., dragon boating, yoga, group walking) have shown promise in increasing PA levels among BC survivors [10–12]; however, many of these programs do not always consider the specific needs or challenges BC survivors often face post BC treatment [13]. A recent innovation that has shown promise in facilitating PA behavior change is Project MOVE [14], a model that combines the use of microgrants and financial incentives to prompt and sustain PA among BC survivors.

Although there has been a significant investment towards planning, implementing, and testing interventions like Project MOVE and other BC specific PA interventions [15–17], little is known about how

these interventions are successfully disseminated or adapted into real-world community practice [18] for BC survivors. Understanding the process of translating effective interventions from controlled research trials into the community is critical for improving PA uptake and sustainability amongst this priority population [15,19]. A framework that has been commonly utilized to evaluate research translation is the RE-AIM framework [20].

The RE-AIM framework is a process evaluation framework that consists of five dimensions, including Reach, Effectiveness, Adoption, Implementation, and Maintenance. Reach is described as the absolute number and representativeness of individuals who participate in an intervention. Effectiveness refers to the effect of the intervention on the anticipated "real world" outcomes, whilst adoption is the proportion of individuals that uptake a program and implementation is described as the extent to which the intervention was delivered as intended. Lastly, maintenance refers to the extent to which the program and/or behaviors are sustained at least 6-months following program completion. Utilizing the RE-AIM framework, the purpose of the study was to examine the translational potential of the Project MOVE model into a real-world community setting.

METHODS

Design

This was an exploratory, mixed-methods, pre–post study design. A full description of the design and methodological protocol of Project MOVE have been reported previously [14].

Participants and recruitment

Participants were recruited as pre-existing (e.g., survivor support group) or newly formed groups of 8–12 adult (18+ years) female BC survivors living in the Okanagan region of British Columbia, Canada. Given the need for maximum sampling variation to test the innovative program, no exclusion criteria were set. Individual woman who were not able to form a group independently were asked to contact the research team who facilitated connections to join an existing group or lead a group. Support women (e.g., sisters, friends) were allowed to participate in the groups, with the condition that each group comprised of at least 50% BC survivors. A variety of recruitment methods were utilized including paid advertisements through local print, radio media and social media (e.g., Facebook, Online news), public information sessions, attendance at community events (e.g., Run for the Cure), and meetings with community stakeholders with existing connections to BC survivors (e.g., Canadian Cancer Society). Recruitment occurred in two phases, between May 2015 and November 2015. All participants completed written informed consent at baseline and verbal consent was renewed at 6-month follow-up.

Project MOVE intervention

In brief, Project MOVE [14] is an innovative intervention aimed at increasing PA levels in BC survivors by combining the use of microgrants and financial incentives. Groups of female BC survivors were invited to apply for a microgrant of up to $2000 CAD to design and implement their own PA initiative based on their needs and interests, and more importantly, to address any specific barriers that may have limited them from being active. Applications were then reviewed by a grant review panel which consisted of two members from the research team, a representative from the Canadian Cancer Society, and a female BC survivor (who was not part of a grant submission) from the community. Evaluation criteria included: (1) ability to engage BC survivor population; (2) facilitate social support; (3) describe project sustainability; (4) clearly state goals and objectives; (5) describe feasibility of implementation; and (6) describe the project's potential to engage the community. These criteria were ranked on a five point likert scale. Upon recommendation from the panel, microgrants were distributed to each successful applicant group (n = 10). At this time, successful applicant groups were also informed that if their group's combined PA increased at the 6-month follow-up (assessed by accelerometry), the group would be awarded a further $500 (i.e., financial incentive) to support/sustain the PA initiative or support a group social event. Although there were no time stipulations placed on PA initiative (i.e., interventions had to occur over a 3-month period) participants were required to provide a timeline within the application, knowing that the 6-month assessment would determine the distribution of the financial incentive. Each group had a designated leader who was responsible for submitting the microgrant application, communicating with the research team, organizing participants, and coordinating activities. Unsuccessful applicant groups were provided with feedback and encouraged to reapply/resubmit a revised application.

Measures and procedures

Data informing each RE-AIM dimension were collected at baseline and 6-month follow-up. Methods of data collection included accelerometry, self-report, focus groups, and interviews.

Physical activity

PA was assessed objectively by the ActiGraph GT3X™ accelerometer (ActiGraph, Pensacola, FL). The ActiGraph GT3X is considered the "gold standard" measure of PA in adults [21] and has shown validity and reliability compared with other commercial devices [22,23], including in populations of breast

cancer survivors [24]. Participants were instructed to wear the accelerometer during all waking hours for seven consecutive days after which time group leaders collected all accelerometers and returned them to the research team. The accelerometers were initialized to collect steps, wear time, inclination, and acceleration counts in tri-axial mode, using a 30-s epoch. Participants' data were included in the analyses if the wear time was at least 500 min on 4 or more days [25]. The Godin Leisure Time Exercise Questionnaire-GLTEQ [26] was used to assess self-reported PA levels. The GLTEQ is one of the most commonly used PA questionnaire in oncology studies [27]. It is a valid and reliable, four-item, self-report tool that assesses the frequency (e.g., number of PA occurrences) of strenuous, moderate, and mild PA in a typical week [27,28]. For this study, the GLTEQ was modified to include the average number of minutes per PA session to help determine if participants were meeting PA recommendations [29]. To determine participant PA levels for the week, the frequency of each intensity was multiplied by the average minutes per session. The total time spent in moderate and vigorous PA (MVPA) for the week was calculated (MVPA = Moderate activity + (Vigorous activity * 2). Participants who engaged in 150 min of MVPA were classified as adequately active, in accordance with the American College of Sports Medicine (ACSM) PA guidelines for cancer survivors [30].

Program evaluation questionnaire

Program feasibility in terms of satisfaction, acceptability, and appropriateness of the Project MOVE intervention was evaluated via a 5-point Likert-scale questionnaire with 1 being "strongly disagree" and 5 being "strongly agree". Example questions included to "The Project MOVE program was appropriate for female BC survivors" and "I would recommend the Project MOVE program to other female BC survivors." Questions regarding participant's perceived confidence to engage in PA and continue to engage in PA were also included.

Focus groups

Focus groups with each of the Project MOVE groups (N = 10, ranging from 3 to 7 participants per group) were conducted at the 6-month follow-up by a co-investigator (TP) and ranged from 35 to 60 min in duration. All group members, including group leaders, were invited to participate. Questions were pre-determined and pertained to participants' experiences of Project MOVE specific to adoption, implementation, and maintenance. The focus groups were audio recorded with a digital SonyTM recorder (ICD-PX333) and transcribed verbatim. Some of the results from these focus groups have been reported previously [31].

Leader interviews

Semi-structured phone interviews were conducted by a trained research assistant (KF) with nine of the ten Project MOVE group leaders. Phone interviews occurred within 4 weeks after the 6-month follow-up data collection period and ranged from 15 to 30 min in duration. The semi-structured interviews consisted of asking leaders open ended questions pertaining to the microgrant application process, challenges and enablers to leading their group, and their perception of group member's experiences with Project MOVE. Phone interviews were recorded using the digital SonyTM recorder (ICD-PX333) and transcribed verbatim.

RE-AIM evaluation framework

Data analysis was guided by the RE-AIM framework [20], specifically addressing each of the five RE-AIM dimensions. Reach was assessed by the number of BC survivors recruited compared with the number of BC survivors living in the Okanagan. Reach was also assessed in terms of recruitment methods and population representativeness. The effectiveness of Project MOVE was evaluated by changes in PA from baseline to 6-month follow-up for all participants and between those meeting and not meeting guidelines, as well as perceptions of program satisfaction and acceptability. The barriers and facilitators to the uptake of Project MOVE reflected adoption. Furthermore, participants' perceptions of the barriers and facilitators to implementing the program as intended and suggestions for future implementation, reflected the implementation dimension. Lastly, maintenance was assessed by participant retention, perceptions of maintaining PA and facilitators and barriers to maintaining PA. Table 1 provides a detailed description of the methods used to assess each of the RE-AIM dimensions.

Analysis

Quantitative analysis

Change in PA (accelerometry and GLTEQ) was analyzed using repeated measures analysis of variance (ANOVA) across the two times points (baseline vs. 6-month) with weekly minutes of accelerometer MVPA as the dependent variable. Repeated measures mixed ANOVA was also conducted with meeting MVPA guidelines (meeting vs. not meeting) as the between-subjects variable, time as the within-subjects variables (baseline vs. 6-month follow-up) and weekly minutes of MVPA and GLTEQ measures, as the dependent variables. Accelerometry data were extracted in 60-s intervals [26]. Established cut-off points were used to calculate daily minutes of light (100–1,951 counts/min), moderate (1,952–5,724 counts/min) and vigorous (≥5,725 counts/min) PA [32]. MVPA was calculated by adding the daily minutes where counts met the criterion for MVPA intensities [26]. Participants who engaged in 150 min of MVPA were classified as sufficiently active, and those who engaged in less than 150 min of MVPA

Table 1 | Methods and outcome measures for each RE-AIM dimension

Dimension	Outcome measures	Methods
Reach	-Number and proportion of participants who are BC survivors	-Baseline questionnaire
	-Participant characteristics	-Baseline questionnaire
	-recruitment methods	-6-month program evaluation survey
Effectiveness	-Change in mean PA levels	-Accelerometery; GLTEQ
	-Perceptions of PA behavior	-6-month program evaluation survey
	-Perceived satisfaction and acceptability of the Project MOVE Program	-6-month program evaluation survey
Adoption	-Barriers and facilitators to BC survivors adopting the program	-Focus groups
Implementation	-Perception of microgrant application process -	-Leader interview
	-Barriers and facilitators to implementing PA strategies	-Focus groups; Leader interview
	-Considerations for future implementation	-Focus groups; Leader interview
Maintenance	-Participant retention	-Project documents
	-Perceptions of Maintaining PA	-6-month program evaluation survey
	-Facilitators and Barriers to Maintaining PA	-Focus Groups

were classified as insufficiently active [30]. The analysis included all available data using the intention-to-treat principle. Outliers were defined as ±3 standard deviations from the mean. The level of significance (α) was set at 0.05. All statistical analyses were conducted using IBM's Statistical Package for the Social Sciences (SPSS Version 21.0).

Qualitative analysis

A content analysis [33] was conducted deductively for all focus group and interview data. Each of the dimensions of the RE-AIM framework were used as coding categories. All data were reviewed and independently coded into appropriate RE-AIM dimensions by two research team members using NVivo11. Coded data were reviewed and compared within each category of the RE-AIM framework to identify common as well as contrasting ideas and experiences. Descriptive summaries for each category along with illustrative quotes were developed from these data and discussed among the two researchers to ensure bias was minimized. No discrepancies arose during analysis and consensus was reached by both researchers.

RESULTS

Reach

Number and proportion of BC survivors

A total of 87 participants took part in baseline assessments. The sample included 71 BC survivors (82%), 3 other cancer survivors (4%), and 13 healthy individuals (15%) providing social support (e.g., sister, mother, friend). The British Columbia Cancer Agency reported that as of 2017, 4,300 BC survivors live in the Okanagan Region. Of those survivors, 71 participated in Project MOVE.

Sources of recruitment

The primary sources of recruitment included word of mouth from a family member or friend (28%), referrals from a cancer related organization (26%), or a Project MOVE researcher (22%) and print media (18%).

Participant characteristics

The average age of participants was 59.0 ± 8.8 years old and the majority were white (94%). BC survivor participants were 9.0 ± 8.2 years postdiagnosis. Other characteristics of the study sample are presented in Table 2.

Effectiveness

Changes in physical activity

Based on accelerometer results, at baseline, one participant had insufficient wear time and at 6-month follow-up four participants had insufficient wear time. The number of participants meeting physical activity guidelines increased from 49 at baseline to 56, though chi-square analysis shows that the number of participants meeting guidelines between the two time points was not significantly different than expected. (p = .36). After the removal of one outlier, repeated measures ANOVA showed no significant differences between baseline and 6-month follow-up on weekly MVPA ($F(1, 86) = 2.08$, p = .15) for all participants. Furthermore, mixed ANOVA indicated no significant main effect between time points on weekly MVPA ($F(1, 85) = 2.95$, p = .09, partial eta^2 = .034); however, a significant interaction was found between those meeting MVPA guidelines at baseline and those not meeting weekly MVPA between time points ($F(1,85) = 5.60$, p = .02, partial eta^2 = .06). Follow-up t-tests showed that those not meeting MVPA at baseline had significantly higher weekly MVPA at follow-up compared with baseline ($t(38) = 3.73$, p = .001). However, those meeting MVPA at baseline showed no significant differences between baseline and 6-month follow-up ($t(47)$= .414, p = .68) on weekly MVPA.

Table 2 | Participant characteristics (n = 87)

Variable	Participant %, (n)
Age (years)[a]	
35–44	4.6 (4)
45–54	23.0 (20)
55–64	41.4 (36)
65–74	24.1 (21)
75–84	1.1 (1)
Ethnicity[b]	
White	94.3 (82)
Asian	3.4 (3)
Black	1.1 (1)
Education[c]	
High school or less	1.1 (1)
High school diploma	9.2 (8)
Some postsecondary without diploma or degree	19.5 (17)
College or technical diploma or certificate	39.1 (34)
University Degree	25.3 (22)
Other	4.6 (4)
Martial Status[d]	
Married or living with a life partner	69 (60)
Living alone	23.0 (20)
Widowed	6.9 (6)
Employment[e]	
Full time work	29.9 (26)
Part time work	14.9 (13)
Caring for family/managing household	4.6 (4)
Unemployed	2.3 (2)
Recovering from illness/disability	8.0 (7)
Retired	34.5 (30)
Other	4.6 (4)
BC staging	
Stage 0	6.9 (6)
Stage I	14.9 (13)
Stage II	24.1 (21)
Stage III	14.9 (13)
Stage IV	8.0 (7)
Unknown	12.6 (11)
BC treatment[f]	
Lymph or axillary node dissection	66.7 (58)
Radiotherapy	54.0 (47)
Chemotherapy	51.7 (45)
Lumpectomy	47.1 (41)
Reconstructive surgery	31.0 (27)
Hormonal Therapy	28.7 (25)
Single Mastectomy	28.8 (25)
Double Mastectomy	20.7 (18)
Other	4.6 (4)
Menopause status	
Pre-menopausal	8.0 (7)
Going through menopause	10.3 (9)
Postmenopausal	65.5 (57)
No response	16.2 (14)

BC breast cancer

[a]five participants unresponsive; [b,c,d,e,h]one participant unresponsive; [f]participants indicated one or more options.

After the removal of two outliers repeated measures ANOVA showed a significant difference between time points on self-reported weekly MVPA (F(1,84) = 19.62, p < .001, partial eta^2 = .189). This result was repeated when mixed ANOVA indicated a significant main effect between time points on self-reported weekly MVPA (F(1,82) = 19.36, p < .001, partial eta^2 = .191). No significant interactions were found between those meeting MVPA guidelines at baseline and those not meeting weekly MPVA between time points (F(1,82) = .034, p = .853, partial eta^2 < .001) (see Table 3).

Perception of PA behavior

Findings from the self-report program evaluation data revealed that the majority of participants thought that Project MOVE was effective at helping them initiate PA (76%) and helped increase their current PA levels (72%).

Perceived satisfaction and acceptability of the Project MOVE program

Findings from the self-reported program evaluation questionnaire indicated that Project MOVE was effective in terms of program satisfaction and acceptability. Specifically, 88% of participants were satisfied with Project MOVE, 71% indicated that they learned new things about PA, 92% felt the program was appropriate for BC survivors, and 96% would recommend Project MOVE to other female BC survivors. Additionally, 94% of participants enjoyed being part of a Project MOVE group and 79% felt socially connected to the women in their group.

Adoption

Facilitators and barriers to program adoption

Factors influencing the uptake of Project MOVE related to perceived barriers and facilitators reported by focus group participants. The majority of participants reported that Project MOVE was easy to adopt, in part due to the nature of the groups. A number of participants explained that the small group size and supportive environment created within their groups made many feel more comfortable being active with other BC survivors. As indicated by one participant, "It was nice exercising with people who have gone through what you have gone through" (group 5, participant 3). Moreover, many indicated that belonging to a group that identified as PA group rather than a cancer support group, also played a role in program adoption because the group focused on moving beyond their cancer and towards a healthy future.

> I didn't want to join a support cancer group and just talk about our cancer. But I thought we have a connection in our Project MOVE group. It doesn't mean that we have to talk about cancer all the time (group 3, participant 3).

Participants also explained how the Project MOVE model enabled them to explore and take up activities without the financial burden generally

Table 3 | Weekly average minutes of MVPA

	All participants	Not meeting weekly MVPA[a]	Meeting weekly MVPA[b]
Time point	M (SD)	M (SD)	M (SD)
Accelerometry			
Baseline	183.25 (118.68)	75.69 (38.80)	270.63 (84.59)
6-month follow-up	198.82 (128.59)	118.87 (88.34)	263.78 (119.73)
GLTEQ			
Baseline	227.67 (177.21)	102.59 (141.87)	200.13 (192.78)
6-month follow-up	320.80 (252.14)	326.14 (194.23)	415.80 (254.36)

[a] $n = 39$, [b] $n = 47$

associated with PA programs. One participant explained: "For me Project MOVE was an introduction to things I never experienced before like yoga, circuit training and spin" (group 8, participant 5). Once participants found an activity they enjoyed through Project MOVE, they were more willing to invest their own money on a gym pass or an activity following program completion. Survivors also reported that the microgrant was very helpful in learning new exercises and utilizing the gym equipment; "Project MOVE gave us that little bit of funding to be able to put a group together and learn some skills which was very helpful" (group 1, participant 3).

Barriers to adoption were reflected in comments by some participants that there were unexpected challenges with some of the PA sessions/exercises due to BC related restrictions (i.e., not able to perform high intensity activities due to pain/fatigue). Fear of injury was also a concern, as noted by one survivor; "some of the exercises could have been slightly dangerous" (group 3, participant 1).

Implementation

Perceptions of the microgrant application process

Based on the interviews, the majority of group leaders (7 or the 9) found the process of completing and submitting the microgrant application easy and straightforward, indicating that "The application process was pretty concise. It was not difficult to answer the questions" (group leader #4).

Facilitators and barriers to implementing Project MOVE initiatives

Participants strongly attested that having an organized leader with good communication was important for program implementation. One participant indicated that "without her [the leader] the program wouldn't have happened" (group 9, participant 4). Many participants agreed that this individual as vital to keeping the group engaged throughout the program.

In addition to the leader who organized the group and kept group members engaged, many Project MOVE groups (7 out of 10 groups) who used their microgrant funding to hire a fitness trainer indicated that having a professional fitness trainer to lead the PA sessions was valuable to program implementation. These trainers provided a wealth of knowledge and a sense of security with undertaking new activities and using various exercise equipment (e.g., spin bikes, free weights, TRX bands, etc.). Responses indicative to this included "She [the trainer] spent a lot of time on technique and doing exercises properly which was really good." (group 4, participant 4) and "The thing I found the most helpful here was the one-on-one attention. The instructors could fine tune what we were doing to our strengths and weaknesses" (group 1, participant 2). It was also important that the trainers had knowledge and expertise concerning BC and PA. Trainers with knowledge about BC were more likely to understand the mobility limitations BC survivors experience following treatment and were able to modify exercises to the fitness level and physical ability of the participants.

Considerations for future implementation

Participants firmly believed that goal setting was an important component to implementation, "Having some sort of goals at the start would really help motivate us" (group 10, participant 2). Additionally, many participants believed that providing input and being part of the decision-making process in terms of how the microgrant and financial incentive would be used would be an important element for program implementation. Another common recommendation from the focus groups was the inclusion of additional health education resources concerning nutrition, as many thought that healthy eating was also very important for BC survivors.

Maintenance

Participant retention

Participant retention from baseline to 6-month follow-up was 83%. Reasons for the drop-out included: deterioration of health ($n = 9$), could not be reached ($n = 2$), not interested ($n = 2$), and death ($n = 2$).

Perceptions of maintaining PA

Participants reported that Project MOVE helped them continue to be regularly active over 6-months

(76%) and instilled confidence to continue regular activity over the next 6-months (88%). Following the program, 47% participants reported that they continued PA with their group even though the program was over. The potential of receiving an additional $500 (financial incentive) motivated 77% of participants to maintain regular activity from baseline to 6-month follow-up.

Facilitators and barriers to maintaining PA

Some survivors explained that they had difficulty maintaining PA during Project MOVE as a result of treatment related side effects such as lymphedema and pain. Other participants reported that they were keen to maintain PA during and post-Project MOVE as a result of the positive health benefits they had experienced, for example "I can't believe how much better I've gotten. I couldn't stand up on the spin bike the first time. By the next class I was getting stronger" (group 7, participant 3).

Many participants mentioned they felt committed or accountable to their group, which helped them maintain PA throughout the program. They referred to the PA program like an appointment. One participant said: "If I'm expected somewhere, I'll be there. If nobody really cares, I don't either" (group 3, participant 4). The social support within the group environment was also motivating for participants to maintain PA. One participant explained how group comradery was important because it made participants feel valued by group members and enhanced commitment to attending the PA sessions. Many participants also reported that the $500 group incentive provided motivation to maintain activity so that they did not let their team down and risk not receiving the incentive. As highlighted by one participant: "It felt more like a team thing to me where I needed to show up to the PA sessions. And the $500 incentive was something we were working towards" (group 1, participant 4).

With the experience gained from Project MOVE, several women indicated that they continued to be active with group members, while others continued to seek individual opportunities for PA, once their formal Project MOVE group had ended. The most frequently reported PA included regular walking or hiking with group members and joining a gym or group fitness facility (e.g., yoga studio, spin studio, community center offering a variety of group fitness classes) with other group members or on their own.

DISCUSSION

More practical, real-world trials are warranted to enhance the dissemination and generalizability of PA initiatives for the BC population [14]. Based on the RE-AIM framework, the study findings support the translational potential of Project MOVE, an innovative intervention approach focused on increasing PA in BC survivors.

The program was successful in reaching women with BC who were demographically comparable to those within the broader study region as reported by the British Columbia Cancer Agency, as well as in similar studies involving women with BC in terms of mean age, ethnicity, marital status, and education level [16,34,35]. Nevertheless, common within PA programs targeting BC survivors [25,26], challenges were experienced in recruiting BC survivors, despite utilizing various common recruitment strategies. Since participants self-referred to Project MOVE, we do not know exact reasons as to why more BC survivors did not inquire and/or sign up for the program. However, we can speculate that many BC survivors experience common barriers that limit their involvement in community-based PA including lack of self-confidence as well as lack of social support [36,37]. For instance, BC survivors are self-conscious of alterations in their body shape and appearance (i.e., removal of breasts, weight gain, hair loss) often preventing them from engaging in community-based PA programs [38]. Although there is no "gold-standard" recruitment strategy for this population, many researchers advocate using multiple recruitment methods (e.g., paid local print, online, and radio advertisements, posters, cancer registry) to increase reach [39–41]. Although Project MOVE included many of these methods, one strategy that has been suggested, but was not utilized, was the provincial cancer registry. This strategy should be considered in future research. Additionally, having research personnel physically present at local cancer clinics may also be more effective than posting recruitment flyers at clinics [42]. This provides researchers with an opportunity to directly engage with BC survivors and inform them about the intervention. Furthermore, our findings indicated that only a small proportion of the population was represented compared to the number of possible BC survivors living in the Central Okanagan region (approximately 4,300). However, this finding should be viewed with caution as this statistic represents multiple cities within the region, yet the majority of Project MOVE participants (95%) came from one major city within the Okanagan. This highlights a further reach challenge in trying to recruit individuals from regional cities and townships beyond major urban areas.

For community interventions to have a public health impact, they must be effective [20]. Project MOVE was an effective approach to increasing PA levels in BC survivors who were not meeting the recommended 150 min of weekly MVPA at baseline. Additionally, for those who were already meeting PA guidelines, Project MOVE may have been an important factor in maintaining PA. Unique to other health promotion studies utilizing the microgrant model, Project MOVE is the first program, to our knowledge, to objectively evaluate the effects of a microgrant program on behavior change in BC

survivors. As an additional indicator of effectiveness, participants reported high levels of program satisfaction and acceptability. Given the diverse strategies utilized by Project MOVE participants, these results suggest that when given the autonomy to develop their own approach, participants were able to implement effective strategies that met their diverse needs and interests. These results support the value of providing BC survivors with the ability to develop their own tailored PA programs, resulting in increased enjoyment and satisfaction, and greater potential of long-term PA maintenance [43,44]. The current study suggests that microgrants can act as a stimulus for positive behavior change in BC survivors, yet given the small sample size further experimental testing is required in order to understand the specific intervention components influencing behavior change.

Project MOVE was structured to empower BC survivors to design and implement their own PA program. This "bottom-up" approach was devised to support program adoption. Compared to traditional support groups where BC survivors meet to mostly discuss their experiences with BC and learn more about the disease, Project MOVE offered women the opportunity to decide whether or not they wanted to move away from a focus on BC alone and encouraged them to take control and define their own PA initiatives based on their specific needs and interest. This aligns well with the theoretical underpinnings of the self-determination theory [45] and theory of planned behavior [46], in which autonomy and behavioral control are key factors to behavior change. Further, smaller group sizes facilitated program adoption by fostering the development of comradery within groups. In line with previous research [38,47], the camaraderie and friendships gained from small groups were important motives for attending or adopting the PA sessions. Group-based PA can help survivors reduce feelings of isolation post-treatment and feel accepted and supported by "similar others" [47].

The microgrant was also an integral part to helping BC survivors adopt Project MOVE. Financial barriers are a common reason many BC survivors do not make PA a priority post-treatment [48]. But due to the funds provided through the microgrants, many BC survivors were given an opportunity to try new activities they had not considered or thought aligned with their capabilities. Project MOVE provided survivors the knowledge, confidence, and exposure to a wide variety of activities that facilitated adoption and are likely to build sustainability for PA participation [49].

Leaders who were organized and communicated openly with group members were important aspects to the effective implementation of Project MOVE. Although many interventions use trained research assistants to deliver program content, Project MOVE called upon BC survivors to take on the leadership role within their group because this was a more sustainable delivery option. This also empowered groups to design and implement their own PA sessions without researcher influence. Little research has been conducted on participant-led PA programs for BC survivors [50]. This may be because many BC survivors generally exercise under the supervision of research staff and professional personal [50]. For the translation of evidence-based research into public health practice, participants need to be involved in every aspect of the intervention, such as the case with Project MOVE. This not only increases external validity of the program, but also provides participants with the opportunity to deal with everyday situations or challenges that may arise (i.e., injury, death of a group member, increasing motivation), which is important for long-term sustainability [51,52]. One factor that should be considered prior to further translation is providing Project MOVE leaders with cancer and PA specific information or training. Given the unique physical and mental health challenges and issues often faced by BC survivors, it may be beneficial for these leaders to receive online or brief face-to-face information or training so they are able to provide group members with relevant information concerning PA for this particular population. The uniqueness of participant-led PA groups shows promise as an approach for increasing engagement and improving program implementation and sustainability, and thus warrants further attention.

Further to implementation, participants suggested that additional health resources would be beneficial, particularly concerning nutrition, how to engage in activities at home, and available community resources for BC survivors. Similar studies have supported this finding, recommending that educational materials addressing BC specific health promotion topics such as exercise, nutrition, sleep, pain and fatigue, should be part of oncology care given the important role they play before, during and post-treatment [53,54]. Programs such as Project MOVE may be a perfect opportunity to deliver this information given the focus is on health promoting behaviors, such as PA.

It has been reported that group-based PA programs are an effective way to encourage BC survivors to maintain activity as group settings can create a fun, motivational, and supportive environment [47]. Current evidence suggests that PA is beneficial for mitigating the adverse side effects associated with cancer and related treatments [30]. In addition, PA maintenance is important for sustaining the benefits of PA on physical and psychological health [5]. As many BC survivors in the study started to see positive health changes (e.g., body changes and less fatigue), it appeared that motivation to maintain PA during and postprogram was bolstered, as indicated in the focus group discussions. Many participants also indicated that the $500 financial incentive

motivated them to increase and maintain PA. It has been reported that an external incentive can reduce an individual's internal motivation and diminish the personal desire for behavior change as they become dependent on the reward [55]. However, financial incentives may be an important form of motivation to get participants started [56], with the intention of shifting participant' perceptions from external reinforcements (i.e., financial incentive) to other forms of internal motivation such as team cohesiveness or "doing it for the team" [57]. Findings from this study revealed that helping the team towards achieving the incentive and not letting the members of the team down facilitated PA maintenance and participant retention during the program, further supporting the notion that financial incentives may be a good starting point for program maintenance.

This study is not without its limitations. Although this study demonstrated that Project MOVE model holds very good potential for transferability, the findings presented in the current study reflect a specific population (BC survivors) and thus generalizability is limited. Secondly, the main focus of this study was the feasibility of this unique approach (microgrants + financial incentives) and thus specific data concerning the effectiveness of each separate PA initiative was not collected. Understanding if one PA initiative was more effective than another in changing and sustaining PA behavior would be helpful in the future development of intervention programs and thus warrants future investigation. Moreover, the exploratory nature of this feasibility study, the small sample size, and no control group, limited the ability to examine the direct impact of Project MOVE on behavior change. Future experimental testing in a sufficiently powered randomized control trial would help to determine true cause and effect of behavior change. Also, the focus groups were open to all group participants, including the group leaders, which may have influenced what participants felt comfortable with sharing during each session. Finally, although many efforts were made to reach a large proportion of BC survivors, recruitment proved to be challenging and warrants further examination of alternative strategies, such as face-to-face recruitment within cancer related settings. Despite these limitations of this study, the current results indicate that the Project MOVE model (microgrants + financial incentives) is an acceptable, practical, and effective approach for initiating and maintaining PA engagement within the BC population.

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Compliance with Ethical Standards

Conflict of Interest: All authors declare that they have no conflicts of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethical approval was obtained from the Behavioural Research Ethics Board at the University of British Columbia (#H14-02502). This article does not contain any studies with animals performed by any of the authors.

Informed Consent: Informed consent was obtained from all individual participants included in this study.

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