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**An innovative approach for increasing physical activity among breast cancer survivors:
Rationale and study protocol for Project MOVE**

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1 ABSTRACT

2 **Introduction:** Physical activity is a cost-effective and non-pharmaceutical strategy that can help
3 mitigate the physical and psychological health challenges associated with breast cancer
4 survivorship. However, up to 70% of women breast cancer (BC) survivors are not meeting
5 minimum recommended physical activity guidelines for optimal health benefits. This project
6 aims to address this gap by utilizing an innovative approach to increase physical activity among
7 BC survivors through the use of Action Grants, a combination of microgrants (small amounts of
8 money awarded to groups of individuals to support a physical activity initiative) and financial
9 incentives. The purpose of this paper is to describe the rationale and protocol of this approach,
10 referred to as Project MOVE.

11 **Method and Analysis:** This study is a quasi-experimental pre-post design to determine the
12 feasibility of Project MOVE. Twelve groups of 8-12 adult women who are BC survivors
13 (N=132) were recruited for the study. Each group submitted a microgrant application outlining
14 their proposed physical activity initiative. Successful applicants were determined by a grant
15 review panel and informed of a financial incentive upon meeting their physical activity goals. An
16 evaluation of feasibility will be guided by the RE-AIM framework and assessed through focus
17 groups, interviews and project related reports. Physical activity will be assessed through
18 accelerometry and by self-report. Quality of life, motivation to exercise, and social connection
19 will also be assessed through self-report. Assessments will occur at baseline, six months and one
20 year.

21 **Ethics and dissemination:** Ethical approval was obtained from the University of British
22 Columbia's Behavioural Research Ethics Board (#H14-02502) and has been funded by the
23 Canadian Cancer Society Research Institute (Project number #702913). Study findings will be

1 disseminated widely through peer reviewed publications, academic conferences, local
2 community-based presentations, as well as partner organisations, including the Canadian Cancer
3 Society.

4 **Strengths and limitations of this study**

- 5 • Project MOVE presents a unique opportunity to study the effectiveness of a ‘bottom-up’,
6 community-based approach in a real world setting.
- 7 • The microgrant model can re-created and transferred to other cancer site populations,
8 helping to reduce health issues and enhance overall wellbeing for those with cancer.
- 9 • This study utilizes both objective and subjective measures of physical activity.
- 10 • Given the exploratory nature of this new and innovative approach, this study is limited in
11 examining cause in behaviour change.

1 INTRODUCTION

2 Breast cancer (BC) is the most common cancer among women worldwide [1]. For
3 example, in North America, Australia, and Europe approximately one in every eight women will
4 be diagnosed with BC in their lifetime [2-4]. With survival rates approaching 88%, there are
5 increasing numbers of women who require long-term surveillance and support to manage the
6 detrimental effects of treatment for BC. Specifically, morbidity, decline in functional status, and
7 disability that result from BC related treatments (i.e., surgery, chemotherapy, and/or radiation)
8 and/or subsequent health sequelae (i.e., anxiety related to prognosis and physical changes) are
9 significant concerns [5]. Physical activity (PA) is a cost-effective and non-pharmaceutical
10 strategy that can help mitigate the physical and psychological health challenges associated with
11 BC survivorship [6, 7]. PA is safe, effective, and feasible for most women diagnosed with BC [8-
12 11] and is associated with numerous health benefits among cancer survivors, including weight
13 loss or maintenance, reduction in pain and fatigue, reduced depression and anxiety, management
14 of post-treatment symptoms, improved social support, and reduced mortality [7, 12, 13].
15 However, up to 70% of BC survivors are not meeting the minimum recommended physical
16 activity guidelines (150 minute of moderate to vigorous) for optimal health benefits [14-16]. As
17 such, BC survivors are an important target for intervention research focused on ways to increase
18 PA.

19 Community-based intervention programs targeting women diagnosed with and treated for
20 BC (e.g., dragon boating, yoga, and hiking) offer women a chance to be active among “similar
21 others”, to experience PA in natural environments, to challenge themselves physically and
22 mentally and to build autonomy and confidence for PA [17-19]. However, these are exclusive
23 activities that are not easily practiced by, or of interest to, all women treated for BC. As such, the

1 development and implementation of new community-based programs that are targeted, inclusive
2 and of interest to a wider range of women are needed. One particular strategy which aims to do
3 this is the use of Action Grants, an innovative approach which combines the use of microgrants
4 and financial incentives to prompt and sustain PA and stimulate community action [20].

5 Microgrants, a strategy which originated from a loans program referred to as
6 microfinancing [21, 22], is a scheme in which a small amount of funds are awarded to successful
7 community-based applicants to develop and/or implement a community program. This model has
8 long been used to stimulate personal growth and improve access to basic social, health and
9 family services for people in developing countries who are from low-income communities [23,
10 24]. Although relatively unique to the health promotion field, a small number of evaluation
11 studies have shown that similar schemes can stimulate community health-related activities [20,
12 25-27]. For example, The Australian based WALK (Women's Active Living Kits) project [25]
13 awarded 48 community microgrants (up to \$1500 AUD) to establish women's walking groups
14 throughout Australia. The microgrants were successful in enabling women's engagement in PA
15 and created a group-oriented environment that women enjoyed because it provided support for
16 those who found it difficult to 'get moving', helped build confidence and provided an outlet for
17 social interaction [25]. Nonetheless, these earlier studies did not examine behaviour change nor
18 did they examine a supplementary strategy (such as financial incentives) as an additional tool for
19 increasing PA motivation. Economic theorists, in collaboration with health promotion
20 professionals, have indicated that financial incentives have had a positive effect on various health
21 behaviours and health outcomes including smoking cessation [28], weight reduction [29, 30] and
22 most recently PA behaviours [31-33]. A recent meta-analysis of randomized controlled trials
23 (RCTs) that provide financial incentives for the promotion of PA in adults, reported a significant

1 positive effect concerning PA session attendance, adherence and maintenance over a 6 month
2 period [33]. In addition, PA participation rates progressively increased in many of the RCTs after
3 incentives were withdrawn [33].

4 Within this context, Project MOVE utilises the Action Grant model as a strategy to make
5 physical activity more accessible (and enjoyable) for women who are BC survivors.
6 Specifically, BC survivors are encouraged to come together as a group (pre-existing or newly
7 formed), develop a physical activity initiative and apply for a small microgrant to support this
8 initiative. In addition to the microgrant, successful applicants are also informed of an additional
9 financial incentive contingent upon increasing their groups' physical activity. Thus, the
10 overarching aim of this study is to evaluate the feasibility of the Project MOVE Action Grant
11 model (microgrants + financial incentive), and estimate changes in physical activity motivation,
12 physical activity behaviour, and social relatedness in these groups. The specific objective of this
13 paper, is to describe the intervention design and methodological protocols of the Project MOVE
14 Action Grant Model.

16 **METHODS AND ANALYSIS**

17 **Study Design**

18 This study is based on a quasi-experimental pre-post design to determine the feasibility of
19 Project MOVE, an Action Grant program aimed at increasing physical activity and subsequently
20 reducing health complications faced by BC survivors. The study period extends from May 2015
21 to January 2017. Recruitment occurred in two phases: Phase 1 recruitment period began May
22 2015 through to July 2015, and Phase 2 recruitment period began September 2015 through to
23 November 2015. Baseline assessments for participants recruited during the first phase occurred
24 in September 2015. Baseline assessments for participants recruited in the second phase will

1 occur in January 2016. Six-month and one-year follow-up measures will be collected
2 accordingly in 2016. A process evaluation, guided by the RE-AIM framework and used to
3 determine feasibility, will also be undertaken at the six month and one year follow-up.
4 Participants recruited in Phase 1 provided written informed consent prior to baseline
5 assessments. Informed consent will also be obtained prior to baseline assessments from all
6 participants recruited in Phase 2. This study has been approved by the Behavioural Research
7 Ethics Board at the University of British Columbia (#H14-02502).

8 **Participants, recruitment and eligibility**

9 Groups of 8-12 adult (18 years +) women breast cancer (BC) survivors living in the
10 Okanagan region in British Columbia, Canada were recruited for the study. For the purpose of
11 this study, a survivor is defined based on the National Coalition for Cancer Survivorship as
12 someone who has lived with, through and beyond a cancer diagnosis [34]. Women who self-
13 defined themselves as a BC survivor were eligible to participate. Based on challenges faced with
14 recruiting groups consisting of all survivors, Project MOVE team members adjusted the
15 recruitment eligibility during the initial recruitment phase so that groups comprised of at least
16 50% BC survivors were eligible. Women living in the Okanagan who wished to participate but
17 were not breast cancer survivors were eligible providing there was space in the groups after all
18 interested breast cancer survivors were accommodated.

19 Participants were recruited from communities spanning approximately 200 kms across
20 the Okanagan Region and included rural and urban centres. A variety of recruitment techniques
21 were employed, including face-to-face meetings between researchers and community
22 stakeholders with existing connections to BC survivors (e.g., local health and fitness centres,
23 community activity centres, established community groups), news items in local print and radio

1 media, paid advertisements in local news media and online media, social media announcements
2 (Facebook and Twitter), and pamphlets and posters distributed to local businesses, community
3 centres and medical clinics. Also, a paid advertisement appeared on Facebook, targeting users
4 with various tags such as: Okanagan, cancer survivors, breast cancer, health and wellness, and
5 physical activity. Advertising tactics were designed to emphasize the benefits of physical activity
6 for cancer survivors, creating social relationships and support networks, and promoting
7 autonomy and empowerment by allowing women to create their own physical activity initiative.
8 Two public “drop in” information sessions (one during each recruitment phase) were also held at
9 a local community centre to allow prospective participants to meet the researchers, connect with
10 potential group members, and ask questions about the study. Based on the outcomes of Phase 1
11 recruitment, the research team focused on a more targeted approach in phase 2 placing greater
12 emphasis on face-to-face meetings with community stakeholders who had connections to local
13 BC survivors or community partners and who expressed interest in extending their current health
14 and fitness mandate to included tailored programs for BC survivors.

15 All recruitment approaches were aimed at building community awareness about Project
16 MOVE and provided detailed information about the Action Grants, including a brief introduction
17 outlining the purpose of the grants, sample ideas about eligible initiatives and important dates
18 concerning grant applications. All communication directed interested participants to the project
19 website (www.projectmove.ca) for more detailed information about the grants and the
20 submission process.

21 Application process

22 A project specific website was created in Spring of 2015 and contained information about
23 the program, BC and the importance of physical activity, contact information for the research

1 team, application guidelines, and step-by-step instructions for filling out the online application
2 forms. Hard copy application forms were made available upon request. Applications for Phase 1
3 recruitment were open for six weeks beginning June 1st through to July 15th 2015. Applications
4 for Phase 2 recruitment were open for four weeks beginning October 1st and closing November
5 1st 2015. In order to apply, each group designated a leader who acted as the primary contact and
6 was responsible for submitting the application and liaising with research staff and their
7 respective group members. The application form required each group leader to describe the
8 physical activity their group planned to do each week, explain how this activity would contribute
9 to increasing the group's overall physical activity levels and social connectedness, and to outline
10 a proposed budget and timeline. All submitted applications were initially screened for eligibility
11 by three research team members and those deemed eligible were then processed and distributed
12 to a Grant Review Panel for further evaluation.

13 The Grant Review Panel consisted of 3 research team members, a representative from the
14 Canadian Cancer Society and a local BC survivor. Review panel members were allocated up to
15 4 applications each and required to review each grant and assess them based on the following
16 criteria: ability to engage target population (BC survivors) and facilitate social support, the
17 potential of project sustainability, the presence of clearly stated goals and objectives, feasibility
18 of implementation, and the project's potential to engage the community. The evaluation was
19 based on a 7-point scale, where 1 indicated no potential or ability and 7 indicated high potential
20 or ability. Reviewers were also asked to provide comments and notes to accompany their
21 evaluation.

22 Successful applicant groups were notified in August and November 2015 (phase 1 and
23 phase 2) and were informed of program obligations. These include the requirement of each group

1 member to participate in data collection and of the group leader to keep track of expenditures,
2 liaise with the research team, and provide a group photo and summary to appear on the Project
3 MOVE website. The group leader was asked to sign and return a letter of acceptance indicating
4 agreement to these terms. Unsuccessful applicants were also notified and provided feedback
5 outlining why they were not funded.

6 **Project MOVE Intervention**

7 The microgrants served as a stimulus for women who are BC survivors to come together
8 as a group and propose an ongoing physical activity initiative (aka “intervention”) they believe to
9 be enjoyable and meaningful to them and that they could perform on a regular basis. The
10 microgrants provided groups with up to \$2000 to enable access to equipment, resources,
11 facilities, instruction or transportation that groups needed to implement their initiative. It is
12 important to note that there was no pre-determined intervention promoted or developed by the
13 researchers, instead each group was invited to design their own intervention. This allowed
14 groups to develop their own intervention based on their own needs and preferences, and more
15 importantly, to address any unique circumstances and specific barriers that may have limited
16 them from being active. Groups were encouraged via the website to contact members of the
17 research team for support with conceptualizing their project and with the application process.
18 Additionally, given the high number of emails received from individual women who were not
19 able to form a group independently, a section on the website for ‘Individual Expressions of
20 Interest’ was created. Through this forum individual women were invited to indicate their
21 preferred activities, best time of day to engage in activity and their contact information. The
22 research team then facilitated connections between these individual women and community

1 centres and partners with the capacity to provide facilities and expertise to lead a group. In this
2 way, steps were taken to accommodate all interested women.

3 In addition, each group was also informed that if they meet their group goals for
4 increasing physical activity, they will have an opportunity to receive an additional \$500
5 (financial incentive) at 6 months post baseline. This will be determined by physical activity
6 outcome measures (accelerometry and GLTEQ) assessed at 6 months (Phase 1 groups: March
7 2016 and Phase 2 groups: June 2016). Approximately 1 month post baseline, a brief email will
8 be sent to all group leaders asking about group progress and encouraging them to contact the
9 Project MOVE team with any questions or concerns. The email will also include a reminder
10 about the financial incentive available and that this will be determined once 6 months data
11 collection was complete. Figure 1 provides a flow summary of the progression of Project
12 MOVE.

13 **Outcome Measures**

14 Assessments will be conducted at baseline (these have already been collected for Phase 1
15 groups: Phase 2 groups will undergo baseline assessments in January 2016), 6 months and 1 year
16 post-baseline. Once successful groups return their signed acceptance form, a research team
17 member will contact the primary contact person to organise a baseline data collection day, time
18 and place convenient for all group members. Dependent on the group, baseline data collection
19 may take place at a local community centre, a cancer treatment centre and at the homes of the
20 group leaders. If a group member cannot attend the group session, a research team member will
21 organise a separate time with the individual to collect their baseline data. This will occur within
22 one week of the group baseline data assessment time. Baseline assessments will include the
23 collection of demographic, anthropometric and BC specific information, as well as objective and

1 subjective measures of physical activity, quality of life, motivation to exercise, levels of social
 2 support and connectedness to others. All measures are described in further detail below. In
 3 addition, Table 1 provides a summary of measures and data collection time points.

7 **Table 1.** Summary of measures and data collection time points

Outcome Measures	Collection points
Demographics (self-report)	0 (baseline only)
Breast cancer information (self-report)	0, 6 and 12 months
Anthropometrics (self-report)	0, 6 and 12 months
Physical activity (accelerometry & self-report)	0, 6 and 12 months
Sedentary behaviour ((accelerometry & self-report)	0, 6 and 12 months
Quality of life (self-report)	0, 6 and 12 months
Motivation to exercise (self-report)	0, 6 and 12 months
Social support (self-report)	0, 6 and 12 months
Process Evaluation Measures	
Focus groups and interviews	6 months
Project reports and Website usage (google analytics)	12 months

10 Demographics, Anthropometrics, and Breast Cancer Information

11 Demographic variables include date of birth, ethnicity, education, marital status and
 12 employment. Self-report height and weight will be collected to calculate BMI. Questions related

1 to BC will include date of most recent diagnosis, stage of breast cancer at diagnosis, type of
2 treatment, date of last treatment received and menopausal status.

3 Physical Activity

4 Physical activity will be assessed objectively using an Actigraph GT3X™ accelerometer
5 (ActiGraph, Pensacola, FL) and by self-report using a modified version of the Godin Leisure-
6 Time Exercise Questionnaire (GLTEQ) [35]. All participants will be fitted with an ActiGraph
7 GT3X accelerometer at baseline assessment. Participants will be instructed to wear the
8 accelerometer, mounted on an elastic belt around the waist with the unit positioned over the right
9 hip, all day during all waking and non-water-based activities over a seven day period. The
10 accelerometers will be programmed to record steps, inclination, and acceleration counts in tri-
11 axial mode, using a 30-second epoch. Participants will be asked to fill out a daily log and record
12 what time the device was put on and taken off each day, as well as any circumstances which they
13 felt relevant to explain (e.g., illness or forgot to put it on). Participants will be asked to return
14 their accelerometers to their group leader after the 7-day period. A research team member will
15 pick up the accelerometers from group leaders.

16 The GLTEQ will be used to collect self-reported physical activity data from all
17 participants. It is a reliable and valid self-report tool [35, 36] which asks participants to indicate
18 the frequency and type of intensity (light, moderate, vigorous) of their physical activity sessions
19 and the duration (minutes) of these sessions [36, 37]. All responses will be converted to minutes.
20 PA levels will be calculated in accordance with the MET minutes [38] method. A cut-off point
21 of ≥ 600 MET minutes will then be used to dichotomize participants as “adequately active for
22 health benefit” or “inadequately active” [38, 39].

23 Sedentary Behaviour

1 Accelerometers will also be used to objectively assess sedentary behaviour using a 30
2 second epoch. In addition, sedentary behaviours will be assessed by self-report using The
3 Marshall Sitting Questionnaire [40]. This measure has demonstrated reliability and validity in the
4 adult population [40] and assesses time spent sitting on weekdays and weekend days at work,
5 traveling, and at home. Data from the sitting time questionnaire will be used to create an estimate
6 of total weekday and weekend-day sitting times ($\text{min}\cdot\text{d}^{-1}$) by summing the time reported in each
7 domain [40].

8 Quality of Life

9 Quality of life (QoL) will be assessed through the SF-36/RAND 36, a 36-item valid and
10 reliable tool used to measure overall quality of life across eight domains, including physical
11 functioning, bodily pain, role limitations due to physical health problems, role limitations due to
12 personal or emotional problems, emotional well-being, social functioning, energy/fatigue and
13 general health perceptions [41, 42]. RAND 36 was developed from the original commercial SF-
14 36 Medical Outcomes Study Survey [42] and has since been released license free from the
15 RAND Corporation. In terms of scoring protocol for the RAND 36, pre-coded numeric values
16 are assigned to each scale, and all items are then scored on a 0 to 100 range, with a high score
17 representing a more favorable health state. Additionally, items in each of the eight domains are
18 averaged together to create eight separate domain scores. Any items left blank are treated as
19 missing data and are used when calculating the scale scores [43].

20 Reasons for Engaging in Exercise

21 Motivation to engage in exercise will be captured via the Behavioral Regulation in
22 Exercise Questionnaire- version 3 (BREQ-3) [44, 45], a 24-item self-report measure adapted
23 from the original BREQ [46]. The BREQ-3 has been reported as valid and reliable [47, 48] and

1 measures external regulation (e.g., “I exercise because other people say I should”), introjected
2 regulation (e.g., “I feel guilty when I don’t exercise”), identified regulation (e.g., “I value the
3 benefits of exercise”) and intrinsic regulation (e.g., “I exercise because it’s fun”) of exercise
4 behavior based on Deci & Ryan's [49, 50] continuum conception of extrinsic and intrinsic
5 motivation. Participant responses are scored using an item aggregation approach [51]. This
6 involves summarizing participant responses by averaging the items of each individual subscale
7 into six unique scores.

8 Social Support

9 Social support will be assessed by the 6-item ‘Positive Relationship with Others’ subscale
10 of the Ryff Scales of Psychological Wellbeing [52, 53]. The Ryff Scales of Psychological Well-
11 Being is a theoretically grounded instrument that measures multiple facets of psychological well-
12 being and has been used in a variety of settings and samples [54-56]. The subscale presents
13 statements regarding one’s personal relationships with others. Participants will be asked to rate
14 statements on a scale of 1 to 6, with 1 indicating strong disagreement and 6 indicating strong
15 agreement.

16 Statistical analysis

17 Descriptive analyses will be completed and presented as means and standard deviations
18 (SD) for continuous variables and as frequencies and proportions for categorical data. Data
19 analysis of outcome variables including estimates of change in physical activity, motivation,
20 quality of life and social support will be examined using paired t-tests with Bonferroni correction
21 to adjust for the multiple tests. Residual change scores will be calculated in linear regression
22 models and Pearson correlation coefficients will be used to estimate covariance among change
23 scores. The level of significance (α) will be set at 0.05. As the primary outcome is feasibility, a

1 power calculation was not performed. Evaluation and analysis of feasibility is detailed in the
2 following section.

3 **Process Evaluation and analysis**

4 The feasibility of the Action Grant program will be evaluated using RE-AIM, a
5 comprehensive evaluation framework that captures both process and outcome data. RE-AIM is
6 widely used to evaluate health-related, and specifically PA, interventions [57-59] and is often
7 proposed as a framework for feasibility studies [60, 61]. RE-AIM includes five dimensions: 1)
8 *Reach*-proportion of the target population that are aware of and will potentially participate in the
9 intervention; 2) *Effectiveness*-an estimate of the extent to which the intervention achieves its
10 anticipated outcomes; 3) *Adoption*-proportion of settings, practices, and plans that adopt this
11 intervention; 4) *Implementation*-extent to which the intervention is implemented as intended; and
12 5) *Maintenance*-extent to which a program is sustained over time. Focus groups, with all groups
13 (N=12), and semi-structured interviews with a sub-sample of individuals (N=15) across all
14 groups will be undertaken at 6-month follow-up to gain understanding of participants'
15 perceptions concerning satisfaction and practicality of the Action Grant program, and to
16 understand the challenges/enablers associated with design, implementation and adoption of the
17 program, including feasibility parameters such as recruitment, accrual, adherence, and
18 acceptability of the program. Project related statistics, including website usage patterns (Google
19 Analytics-frequencies, means, etc.), as well as project reports concerning phone calls and emails
20 to the project office, number of grant applications received, enquiries concerning the project, etc.
21 will also be collected. Lastly, outcome assessments outlined above will be used to provide an
22 estimate of effectiveness. For example a change in physical activity behaviour assessed via

1 accelerometry and the GLTEQ will be used to provide an estimate of program effectiveness.

2 Table 1 provides a summary of measures and data collection time points.

3 Data from the focus groups and interviews will be audio recorded to ensure accurate
4 transcription. The audio recording will be transcribed verbatim with all identifiable information
5 removed, and the recording will be deleted after transcription to ensure anonymity and
6 confidentiality. All data will be analyzed using thematic content analysis [62] to explore
7 participant satisfaction and enjoyment and to identify any challenges experienced during
8 program implementation as well as factors that may have facilitated implementation. To
9 enhance rigor, two members of the research team will independently identify and code
10 participant responses into relevant sub-themes. Once all coding has been completed, sub-themes
11 will be discussed among the two research team members to ensure bias is minimized. Any
12 disagreements or concerns that may arise during the analysis will be presented at this time and
13 further discussion will be carried out with the research team until consensus is reached.

15 RESULTS

16 Follow-up results concerning feasibility (process evaluation) and outcome measures will
17 be available in Fall 2016 (6 month follow-up) and Winter 2016 (1 year follow-up).

19 DISCUSSION

20 The current intervention model presents a unique opportunity to study the effectiveness
21 of an innovative ‘real world’, community- based approach for increasing physical activity among
22 women BC survivors. Engaging women in preventive health measures, such as physical activity,
23 can be challenging. Research indicates that this is in part due to circumstances following BC

1 treatment, in which survivors are often faced with pain, fatigue, and weight gain, as well as low
2 self-esteem and social isolation [10, 12, 13]. As such, BC survivors are an important target for
3 intervention research focused on ways to increase physical activity. However, in order to engage
4 this particular segment of the population, these types of initiatives must be developed in a way
5 that enhances and fosters autonomy and confidence and meets the specific needs and interests of
6 these women. Project MOVE is conceptualized to accommodate and address these
7 considerations. Specifically, it supports groups of women to design and implement community-
8 based physical activity initiatives from the “bottom up”– meaning designed and implemented by
9 BC survivors for BC survivors. Most importantly, the process of design and implementation has
10 the potential to promote a sense of empowerment and ownership for women, providing them
11 with the opportunity to optimize their own strengths and knowledge aimed at reducing health
12 concerns that often emerge post BC treatment.

13 A further unique aspect of this feasibility trial is that it will be conducted in a real-world
14 setting, influenced by naturally occurring external variables that are not always apparent in
15 laboratory or tightly controlled RCT settings. Although RCTs are often considered the gold
16 standard of trial design due to their ability to provide valuable information concerning efficacy
17 and internal validity and their ability to minimize the impact of selection and information biases
18 and control for confounding variables [63, 64], they can be challenged on the grounds of external
19 validity [65, 66]. This is not to say that RCTs are not important or necessary, indeed they are an
20 essential part of the research process as a sufficiently powered, methodologically sound design is
21 vital to maximizing internal validity and providing an indication of efficacy. However, prior to
22 undertaking an RCT in a community or population level setting, it is necessary to investigate the
23 feasibility and acceptability of an intervention under normal, everyday conditions in order to

1 identify and address potential variables or circumstances that may impact the future
2 transferability of the intervention to public health/health promotion practice [61, 67-69]. The
3 unique design of this trial allows for the examination of intervention components in a real-world
4 setting providing us with the opportunity to examine a number of feasibility parameters such as
5 various methods of identifying/recruiting participants, practicality of delivery, standard deviation
6 of the outcome measures to estimate sample size, participant acceptability and satisfaction with
7 the intervention model [70], all of which are important considerations prior to carrying out a
8 sufficiently powered RCT.

9 In conclusion, the knowledge gained from the current study protocol will provide
10 important insights into the successes and challenges associated with an Action Grants approach
11 to physical activity interventions targeting BC survivors. Lessons learned from this study will
12 facilitate further study refinement and inform protocol approaches that encompass a ‘bottom-up’
13 philosophy. Importantly, this approach could ultimately extend the delivery of PA interventions
14 for diverse populations of cancer survivors because it has the potential to capture a wide range of
15 interests and needs. Researchers interested in developing and testing new and innovative
16 intervention approaches will be able to use this detailed protocol as a resource for study
17 replication concerning other cancer specific sites or cancer prevention initiatives.

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12 **CONTRIBUTIONS**

13 CMC, CS, JLB, KLC, NDE, SLE, and CG conceived the project and procured project funding.

14 CMC and MIC are leading the coordination of the study. CMC, CS, JLB, KLC, NDE, SLE, and

15 CG assisted with protocol design. MIC is managing the project including data collection with

16 assistance from RT. CC, MIC, and RT drafted the manuscript and all authors read, edited, and

17 approved the final manuscript.

18

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22

23 **COMPETING INTERESTS**

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1 The authors declare they have no competing interests.

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3 **ETHICAL APPROVAL**

4 Ethical approval was obtained from the Behavioural Research Ethics Board at the University of
5 British Columbia (#H14-02502).

For peer review only

1 REFERENCES

- 2 1. Ferlay J, Soerjomataram I, Evrik M, *et al.* *Cancer incidence and mortality worldwide*.
3 Lyon, FR: International Agency for Research on Cancer 2014.
- 4 2. Canadian Cancer Society. What is breast cancer? Toronto: Canadian Cancer Society;
5 2011 [cited 2015 October 31]; Available from: [http://www.cancer.ca/en/cancer-](http://www.cancer.ca/en/cancer-information/cancer-type/breast/breast-cancer/?region=en)
6 [information/cancer-type/breast/breast-cancer/?region=en](http://www.cancer.ca/en/cancer-information/cancer-type/breast/breast-cancer/?region=en).
- 7 3. Cancer Research UK. Breast Cancer Statistics. 2012 [cited 2015 November 16];
8 Available from: [http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-](http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/breast-cancer)
9 [by-cancer-type/breast-cancer](http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/breast-cancer)
- 10 4. Australian Institute of Health and Welfare (AIHW). Cancer in Australia: an overview,
11 Cancer series no. 78. Cat. no. CAN 75. Canberra 2014.
- 12 5. Demark-Wahnefried W, Aziz NM, Rowland JH, *et al.* Riding the crest of the teachable
13 moment: promoting long-term health after the diagnosis of cancer. *J Clin Oncol*
14 2005;23(24):5814-30.
- 15 6. Courneya KS, Friedenreich CM. Physical activity and cancer control. *Semin Oncol Nurs*
16 2007;23(4):242-52.
- 17 7. Kim J, Choi WJ, Jeong SH. The effects of physical activity on breast cancer survivors
18 after diagnosis. *J Cancer Prev* 2013;18(3):193-200.
- 19 8. Holmes MD, Chen WY, Feskanich D, *et al.* Physical activity and survival after breast
20 cancer diagnosis. *JAMA* 2005;293(20):2479-86.
- 21 9. Ibrahim EM, Al-Homaidh A. Physical activity and survival after breast cancer diagnosis:
22 meta-analysis of published studies. *Med Oncol* 2011;28(3):753-65.
- 23 10. Schmitz KH, Courneya KS, Matthews C, *et al.* American College of Sports Medicine
24 roundtable on exercise guidelines for cancer survivors. *Med Sci Sports Exerc* 2010;42(7):1409-
25 26.
- 26 11. Rock CL, Doyle C, Demark-Wahnefried W, *et al.* Nutrition and physical activity
27 guidelines for cancer survivors. *CA Cancer J Clin* 2012;62(4):243-74.
- 28 12. Sabiston CM, Brunet J, Burke S. Pain, movement, and mind: does physical activity
29 mediate the relationship between pain and mental health among survivors of breast cancer? *Clin*
30 *J Pain* 2012;28(6):489-95.
- 31 13. Fong DY, Ho JW, Hui BP, *et al.* Physical activity for cancer survivors: meta-analysis of
32 randomised controlled trials. *BMJ* 2012;344:e70.
- 33 14. Lynch BM, Dunstan DW, Healy GN, *et al.* Objectively measured physical activity and
34 sedentary time of breast cancer survivors, and associations with adiposity: findings from
35 NHANES (2003-2006). *Cancer Causes Control* 2010;21(2):283-8.
- 36 15. Bellizzi KM, Rowland JH, Jeffery DD, *et al.* Health behaviors of cancer survivors:
37 examining opportunities for cancer control intervention. *J Clin Oncol* 2005;23(34):8884-93.
- 38 16. Blanchard CM, Courneya KS, Stein K. Cancer survivors' adherence to lifestyle behavior
39 recommendations and associations with health-related quality of life: results from the American
40 Cancer Society's SCS-II. *J Clin Oncol* 2008;26(13):2198-204.
- 41 17. Sabiston CM, McDonough MH, Crocker PR. Psychosocial experiences of breast cancer
42 survivors involved in a dragon boat program: exploring links to positive psychological growth. *J*
43 *Sport Exerc Psychol* 2007;29(4):419-38.

- 1 18. Burke S, Sabiston C. Exploring breast cancer survivors' experiences of subjective well-being during an attempt to scale Mt. Kilimanjaro: An interpretive phenomenological study. *Qual Res Sport Exer* 2010;2:1-16.
- 2 19. Cramer H, Lange S, Klose P, *et al.* Yoga for breast cancer patients and survivors: a systematic review and meta-analysis. *BMC Cancer* 2012;12:412.
- 3 20. Bobbitt-Cooke M. Energizing community health improvement: the promise of microgrants. *Prev Chronic Dis* 2005;2Spec.no:A16.
- 4 21. Consultative Group to Assist the Poor (CGAP). Microfinancing. 2015 [cited 2015 October 31]; Available from: <http://www.microfinancegateway.org/library>.
- 5 22. Foster-Fishman PG, Fitzgerald K, Brandell C, *et al.* Mobilizing residents for action: the role of small wins and strategic supports. *Am J Community Psychol* 2006;38(3-4):143-52.
- 6 23. Hartwig KA, Bobbitt-Cooke M, Zaharek MM, *et al.* The value of microgrants for community-based health promotion: two models for practice and policy. *J Public Health Manag Pract* 2006;12(1):90-6.
- 7 24. Gbezo B. Microcredit in West Africa: how small loans make a big impact on poverty. *World Work* 1999;31:13-5.
- 8 25. Caperchione C, Mummery WK, Joyner K. WALK Community Grants Scheme: lessons learned in developing and administering a health promotion microgrants program. *Health Promot Pract* 2010;11(5):637-44.
- 9 26. Collie-Akers V, Schultz JA, Carson V, *et al.* Evaluating mobilization strategies with neighborhood and faith organizations to reduce risk for health disparities. *Health Promot Pract* 2009;10(2 Suppl):118S-27S.
- 10 27. Schmidt M, Ploch T, Harting J, *et al.* Micro grants as a stimulus for community action in residential health programmes: a case study. *Health Promot Int* 2009;24(3):234-42.
- 11 28. Volpp KG, Gurmankin Levy A, Asch DA, *et al.* A randomized controlled trial of financial incentives for smoking cessation. *Cancer Epidemiol Biomarkers Prev* 2006;15(1):12-8.
- 12 29. Volpp KG, John LK, Troxel AB, *et al.* Financial incentive-based approaches for weight loss: a randomized trial. *JAMA* 2008;300(22):2631-7.
- 13 30. Finkelstein EA, Linnan LA, Tate DF, *et al.* A pilot study testing the effect of different levels of financial incentives on weight loss among overweight employees. *J Occup Environ Med* 2007;49(9):981-9.
- 14 31. Finkelstein EA, Brown DS, Brown DR, *et al.* A randomized study of financial incentives to increase physical activity among sedentary older adults. *Prev Med* 2008;47(2):182-7.
- 15 32. Farooqui MA, Tan YT, Bilger M, *et al.* Effects of financial incentives on motivating physical activity among older adults: results from a discrete choice experiment. *BMC Public Health* 2014;14:141.
- 16 33. Mitchell MS, Goodman JM, Alter DA, *et al.* Financial incentives for exercise adherence in adults: systematic review and meta-analysis. *Am J Prev Med* 2013;45(5):658-67.
- 17 34. Survivorship Ncfc. Defining Cancer Survivorship. <http://www.canceradvocacy.org/news/defining-cancer-survivorship/2014>.
- 18 35. Godin G, Jobin J, Bouillon J. Assessment of leisure time exercise behavior by self-report: a concurrent validity study. *Can J Public Health* 1986;77(5):359-62.
- 19 36. Godin G, Shephard RJ. A simple method to assess exercise behavior in the community. *Can J Appl Sport Sci* 1985;10(3):141-6.
- 20 37. Blacklock RE, Rhodes RE, Brown SG. Relationship between regular walking, physical activity, and health-related quality of life. *J Phys Act Health* 2007;4(2):138-52.

- 1 38. Brown WJ, Bauman AE. Comparison of estimates of population levels of physical
2 activity using two measures. *Aust N Z J Public Health* 2000;24(5):520-5.
- 3 39. Plotnikoff RC, Johnson ST, Loucaides CA, *et al.* Population-based estimates of physical
4 activity for adults with type 2 diabetes: a cautionary tale of potential confounding by weight
5 status. *J Obes* 2011;2011.
- 6 40. Marshall AL, Miller YD, Burton NW, *et al.* Measuring total and domain-specific sitting:
7 a study of reliability and validity. *Med Sci Sports Exerc* 2010;42(6):1094-102.
- 8 41. Hays RD, Morales LS. The RAND-36 measure of health-related quality of life. *Ann Med*
9 2001;33(5):350-7.
- 10 42. Ware JE, Jr., Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I.
11 Conceptual framework and item selection. *Med Care* 1992;30(6):473-83.
- 12 43. Hays RD, Sherbourne CD, Mazel RM. The RAND 36-Item Health Survey 1.0. *Health*
13 *Econ* 1993;2(3):217-27.
- 14 44. Markland D, Tobin V. A modification to the behavioural regulation in exercise
15 questionnaire to include an assessment of amotivation. *J Sport Exercise Psy* 2004;26(2):191-6.
- 16 45. Wilson PM, Rodgers WM, Loitz CC, *et al.* "It's who I am...really!" The importance of
17 integrated regulation in exercise contexts. *J Biobehav Res* 2006;11:79-104.
- 18 46. Mullan E, Markland D, Ingledw DK. A graded conceptualization of self-determination
19 in the regulation of exercise behavior: Development of a measure using confirmatory factor
20 analytic procedures. *Pers Individ Dif* 1997;23:745-52.
- 21 47. Duncan LR, Hall CR, Wilson PM, *et al.* Exercise motivation: a cross-sectional analysis
22 examining its relationships with frequency, intensity, and duration of exercise. *Int J Behav Nutr*
23 *Phys Act* 2010;7:7.
- 24 48. Sicilia A, Saenz-Alvarez P, Gonzales-Cutre D, *et al.* Exercise motivation and social
25 physique anxiety in adolescents. *Psychologica Belgica* 2014;54.
- 26 49. Deci EL, Ryan RM. *Intrinsic motivation and self-determination in human behavior*. New
27 York: Plenum; 1985.
- 28 50. Ryan RM, Deci EL. The "what" and "why" of goal pursuits: Human needs and the self-
29 determination of behavior. *Psychol Inq* 2001;11:227-68.
- 30 51. Wilson PM, Sabiston CM, Mack DM, *et al.* On the nature and function of scoring
31 protocols used in exercise motivation research: An empirical study of the behavioral regulation
32 in exercise questionnaire. *Psych Sport Exer* 2013;13:614-22.
- 33 52. Ryff CD. Happiness is everything, or is it? Explorations on the emaning of psychological
34 well-being. *J Pers Soc Psychol* 1989;57:1069-81.
- 35 53. Ryff CD. Beyond Ponce de Leon and life satisfaction: New directions in quest of
36 successful aging. *Int J Behav Dev* 1989;12:35-55.
- 37 54. Clark PJ, Marshall VW, Ryff CD, *et al.* Measuring psychological well-being in the
38 Canadian study of health and aging. *Int Psychogeriatr* 2001;13(Suppl.1):79-90.
- 39 55. Sweet JA, Bumpass LL. *The national survey of families and households - Waves 1 and 2:*
40 *Data description and documentation*. <http://www.ssc.wisc.edu/nsfh/home.htm> 1996.
- 41 56. Fava GA, Ruini C, Rafanelli C, *et al.* Well-being therapy of generalized anxiety disorder.
42 *Psychother Psychosom* 2005;74(1):26-30.
- 43 57. Caperchione CM, Duncan M, Kolt GS, *et al.* Examining an Australian physical activity
44 and nutrition intervention using RE-AIM. *Health Promot Int* 2015.

- 1
2
3 1 58. Phillips SM, Alfano CM, Perna FM, *et al.* Accelerating translation of physical activity
4 2 and cancer survivorship research into practice: recommendations for a more integrated and
5 3 collaborative approach. *Cancer Epidemiol Biomarkers Prev* 2014;23(5):687-99.
6 4 59. Folta SC, Seguin RA, Chui KK, *et al.* National Dissemination of StrongWomen-Healthy
7 5 Hearts: A Community-Based Program to Reduce Risk of Cardiovascular Disease Among Midlife
8 6 and Older Women. *Am J Public Health* 2015;105(12):2578-85.
9 7 60. Bowen DJ, Kreuter M, Spring B, *et al.* How we design feasibility studies. *Am J Prev Med*
10 8 2009;36(5):452-7.
11 9 61. Green LW, Glasgow RE. Evaluating the relevance, generalization, and applicability of
12 10 research: issues in external validation and translation methodology. *Eval Health Prof*
13 11 2006;29(1):126-53.
14 12 62. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psych*
15 13 2006;3(2):77-101.
16 14 63. Courneya KS. Efficacy, effectiveness, and behavior change trials in exercise research. *Int*
17 15 *J Behav Nutr Phys Act* 2010;7:81.
18 16 64. Moher D, Schulz KF, Altman DG. The CONSORT statement: revised recommendations
19 17 for improving the quality of reports of parallel-group randomised trials. *Lancet*
20 18 2001;357(9263):1191-4.
21 19 65. Victora CG, Habicht JP, Bryce J. Evidence-based public health: moving beyond
22 20 randomized trials. *Am J Public Health* 2004;94(3):400-5.
23 21 66. Fortin M, Dionne J, Pinho G, *et al.* Randomized controlled trials: do they have external
24 22 validity for patients with multiple comorbidities? *Ann Fam Med* 2006;4(2):104-8.
25 23 67. Caperchione CM, Kolt GS, Savage TN, *et al.* WALK 2.0: examining the effectiveness of
26 24 Web 2.0 features to increase physical activity in a 'real world' setting: an ecological trial. *BMJ*
27 25 *Open* 2014;4(10):e006374.
28 26 68. Antikainen I, Ellis R. A RE-AIM evaluation of theory-based physical activity
29 27 interventions. *J Sport Exerc Psychol* 2011;33(2):198-214.
30 28 69. Cohen DJ, Crabtree BF, Etz RS, *et al.* Fidelity versus flexibility: translating evidence-
31 29 based research into practice. *Am J Prev Med* 2008;35(5 Suppl):S381-9.
32 30 70. Arain M, Campbell MJ, Cooper CL, *et al.* What is a pilot or feasibility study? A review
33 31 of current practice and editorial policy. *BMC Med Res Methodol* 2010;10:67.
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An innovative approach for increasing physical activity among breast cancer survivors: Protocol for Project MOVE, a quasi-experimental study

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Manuscripts

**An innovative approach for increasing physical activity among breast cancer survivors:
Protocol for Project MOVE, a quasi-experimental study**

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41 ABSTRACT

42 **Introduction:** Physical activity is a cost-effective and non-pharmaceutical strategy that can help
43 mitigate the physical and psychological health challenges associated with breast cancer
44 survivorship. However, up to 70% of women breast cancer survivors are not meeting minimum
45 recommended physical activity guidelines. Project MOVE is an innovative approach to increase
46 physical activity among breast cancer survivors through the use of Action Grants, a combination
47 of microgrants (small amounts of money awarded to groups of individuals to support a physical
48 activity initiative) and financial incentives. The purpose of this paper is to describe the rationale
49 and protocol of Project MOVE.

50 **Method and Analysis:** A quasi-experimental pre-post design will be utilised. Twelve groups of
51 8-12 adult women who are breast cancer survivors (N=132) were recruited for the study via face-
52 to-face meetings with breast cancer related stakeholders, local print and radio media, social
53 media, and pamphlets and posters at community organisations and medical clinics. Each group
54 submitted a microgrant application outlining their proposed physical activity initiative.
55 Successful applicants were determined by a grant review panel and informed of a financial
56 incentive upon meeting their physical activity goals. An evaluation of feasibility will be guided
57 by the RE-AIM framework and assessed through focus groups, interviews and project related
58 reports. Physical activity will be assessed through accelerometry and by self-report. Quality of
59 life, motivation to exercise, and social connection will also be assessed through self-report.
60 Assessments will occur at baseline, six months and one year.

61 **Ethics and dissemination:** Ethical approval was obtained from the University of British
62 Columbia's Behavioural Research Ethics Board (#H14-02502) and has been funded by the
63 Canadian Cancer Society Research Institute (Project number #702913). Study findings will be

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3 64 disseminated widely through peer reviewed publications, academic conferences, local
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5 65 community-based presentations, as well as partner organisations, including the Canadian Cancer
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11 12 13 68 **Strengths and limitations of this study**

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15 69 • Project MOVE presents a unique opportunity to study the effectiveness of a ‘bottom-up’,
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17 70 community-based approach in a real world setting.
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20 71 • The microgrant model can re-created and transferred to other cancer site populations,
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22 72 helping to reduce health issues and enhance overall wellbeing for those with cancer.
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25 73 • This study utilizes both objective and subjective measures of physical activity.
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27 74 • Given the exploratory nature of this new and innovative approach, this study is limited in
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29 75 examining cause in behaviour change.
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77 INTRODUCTION

78 Breast cancer (BC) is the most common cancer among women worldwide [1]. For
79 example, in North America, Australia, and Europe approximately one in every eight women will
80 be diagnosed with BC in their lifetime [2-4]. With survival rates approaching 88%, there are
81 increasing numbers of women who require long-term surveillance and support to manage the
82 detrimental effects of treatment for BC. Specifically, morbidity, decline in functional status, and
83 disability that result from the disease itself, BC related treatments (i.e., surgery, chemotherapy,
84 and/or radiation) and/or subsequent health sequelae (i.e., anxiety related to prognosis and
85 physical changes) are significant concerns [5]. Physical activity is a cost-effective and non-
86 pharmaceutical strategy that can help mitigate the physical and psychological health challenges
87 associated with BC survivorship [6, 7]. Physical activity is safe, effective, and feasible for most
88 women diagnosed with BC [8-11] and is associated with numerous health benefits among cancer
89 survivors, including weight loss or maintenance, reduction in pain and fatigue, reduced
90 depression and anxiety, management of post-treatment symptoms, improved social support, and
91 reduced mortality [7, 12, 13]. However, up to 70% of BC survivors are not meeting the
92 minimum recommended physical activity guidelines (150 minute of moderate to vigorous) for
93 optimal health benefits [14-16]. As such, BC survivors are an important target for intervention
94 research focused on ways to increase physical activity.

95 Community-based intervention programs targeting women diagnosed with and treated for
96 BC (e.g., dragon boating, yoga, and hiking) offer women a chance to be active among “similar
97 others”, to experience physical activity in natural environments, to challenge themselves
98 physically and mentally and to build autonomy and confidence for physical activity [17-19].
99 However, these are exclusive activities that are not easily practiced by, or of interest to, all

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3 100 women treated for BC. As such, the development and implementation of new community-based
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5 101 programs that are targeted, inclusive and of interest to a wider range of women are needed. One
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8 102 particular strategy which aims to do this is the use of Action Grants, an innovative approach
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11 103 which combines the use of microgrants and financial incentives to prompt and sustain physical
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13 104 activity and stimulate community action [20].

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15 105 Microgrants, a strategy which originated from a loans program referred to as
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17 106 microfinancing [21, 22], is a scheme in which a small amount of funds are awarded to successful
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20 107 community-based applicants to develop and/or implement a community program. This model has
21
22 108 long been used to stimulate personal growth and improve access to basic social, health and
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24 109 family services for people in developing countries who are from low-income communities [23,
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27 110 24]. Although relatively unique to the health promotion field, a small number of evaluation
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29 111 studies have shown that similar schemes can stimulate community health-related activities [20,
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31 112 25-27]. For example, The Australian based WALK (Women's Active Living Kits) project [25]
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34 113 awarded 48 community microgrants (up to \$1500 AUD) to establish women's walking groups
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36 114 throughout Australia. The microgrants were successful in enabling women's engagement in
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38 115 physical activity and created a group-oriented environment that women enjoyed because it
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40 116 provided support for those who found it difficult to 'get moving', helped build confidence and
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42 117 provided an outlet for social interaction [25]. Nonetheless, these earlier studies did not examine
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44 118 behaviour change nor did they examine a supplementary strategy (such as financial incentives)
45
46 119 as an additional tool for increasing physical activity motivation. Economic theorists, in
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48 120 collaboration with health promotion professionals, have indicated that financial incentives have
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50 121 had a positive effect on various health behaviours and health outcomes including smoking
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52 122 cessation [28], weight reduction [29, 30] and most recently physical activity behaviours [31-33].
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3 123 A recent meta-analysis of randomized controlled trials (RCTs) that provide financial incentives
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5 124 for the promotion of physical activity in adults, reported a significant positive effect concerning
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8 125 physical activity session attendance, adherence and maintenance over a six month period [33]. In
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10 126 addition, physical activity participation rates progressively increased in many of the RCTs after
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12 127 incentives were withdrawn [33].
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15 128 Within this context, Project MOVE utilises the Action Grant model as a strategy to make
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17 129 physical activity more accessible (and enjoyable) for women who are BC survivors.
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19 130 Specifically, BC survivors are encouraged to come together as a group (pre-existing or newly
20
21 131 formed), develop a physical activity initiative and apply for a small microgrant to support this
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23 132 initiative. In addition to the microgrant, successful applicants are also informed of an additional
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25 133 financial incentive contingent upon increasing their groups' physical activity. Thus, the
26
27 134 overarching aim of this study is to evaluate the feasibility of the Project MOVE Action Grant
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29 135 model (microgrants + financial incentive), and estimate changes in physical activity motivation,
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31 136 physical activity behaviour, and social relatedness in these groups. The specific objective of this
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33 137 paper, is to describe the intervention design and methodological protocols of the Project MOVE
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35 138 Action Grant Model.
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43 140 **METHODS AND ANALYSIS**

44 141 **Study Design**

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46 142 This study is based on a quasi-experimental pre-post design to determine the feasibility of
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48 143 Project MOVE, an Action Grant program aimed at increasing physical activity and subsequently
49
50 144 reducing health complications faced by BC survivors. The study period extends from May 2015
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52 145 to January 2017. Recruitment occurred in two phases: Phase 1 recruitment period began May
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54 146 2015 through to July 2015, and Phase 2 recruitment period began September 2015 through to
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3 147 November 2015. Baseline assessments for participants recruited during the first phase occurred
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5 148 in September 2015. Baseline assessments for participants recruited in the second phase will
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8 149 occur in January 2016. Six-month and one-year follow-up measures will be collected
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10 150 accordingly in 2016. A process evaluation, guided by the RE-AIM framework and used to
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12 151 determine feasibility, will also be undertaken at the six month and one year follow-up.
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14 152 Participants recruited in Phase 1 provided written informed consent prior to baseline
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16 153 assessments. Informed consent will also be obtained prior to baseline assessments from all
17
18 154 participants recruited in Phase 2. This study has been approved by the Behavioural Research
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20 155 Ethics Board at the University of British Columbia (#H14-02502).

24 156 **Participants, recruitment and eligibility**

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27 157 Groups of 8-12 adult (18 years +) women BC survivors living in the Okanagan region in
28
29 158 British Columbia, Canada were recruited for the study. For the purpose of this study, a survivor
30
31 159 is defined based on the National Coalition for Cancer Survivorship as someone who has lived
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33 160 with, through and beyond a cancer diagnosis [34]. Women who self-defined themselves as a BC
34
35 161 survivor were eligible to participate. Based on challenges faced with recruiting groups
36
37 162 consisting of all survivors, Project MOVE team members adjusted the recruitment eligibility
38
39 163 during the initial recruitment phase so that groups comprised of at least 50% BC survivors were
40
41 164 eligible. Women living in the Okanagan who wished to participate but were not BC survivors
42
43 165 were eligible providing there was space in the groups after all interested BC survivors were
44
45 166 accommodated.

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49 167 Participants were recruited from communities spanning approximately 200 kms across
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51 168 the Okanagan Region and included rural and urban centres. A variety of recruitment techniques
52
53 169 were employed, including face-to-face meetings between researchers and community
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3 170 stakeholders with existing connections to BC survivors (e.g., local health and fitness centres,
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5 171 community activity centres, established community groups), news items in local print and radio
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7
8 172 media, paid advertisements in local news media and online media, social media announcements
9
10 173 (Facebook and Twitter), and pamphlets and posters distributed to local businesses, community
11
12 174 centres and medical clinics. Also, a paid advertisement appeared on Facebook, targeting users
13
14 175 with various tags such as: Okanagan, cancer survivors, breast cancer, health and wellness, and
15
16 176 physical activity. Advertising tactics were designed to emphasize the benefits of physical activity
17
18 177 for cancer survivors, creating social relationships and support networks, and promoting
19
20 178 autonomy and empowerment by allowing women to create their own physical activity initiative.
21
22 179 Two public “drop in” information sessions (one during each recruitment phase) were also held at
23
24 180 a local community centre to allow prospective participants to meet the researchers, connect with
25
26 181 potential group members, and ask questions about the study. Based on the outcomes of Phase 1
27
28 182 recruitment, the research team focused on a more targeted approach in phase 2 placing greater
29
30 183 emphasis on face-to-face meetings with community stakeholders who had connections to local
31
32 184 BC survivors or community partners and who expressed interest in extending their current health
33
34 185 and fitness mandate to included tailored programs for BC survivors.
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41 186 All recruitment approaches were aimed at building community awareness about Project
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43 187 MOVE and provided detailed information about the Action Grants, including a brief introduction
44
45 188 outlining the purpose of the grants, sample ideas about eligible initiatives and important dates
46
47 189 concerning grant applications. All communication directed interested participants to the project
48
49 190 website (www.projectmove.ca) for more detailed information about the grants and the
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51 191 submission process.
52

53 192 Application process
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3 193 A project specific website was created in Spring of 2015 and contained information about
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5
6 194 the program, BC and the importance of physical activity, contact information for the research
7
8 195 team, application guidelines, and step-by-step instructions for filling out the online application
9
10 196 forms. Hard copy application forms were made available upon request. Applications for Phase 1
11
12 197 recruitment were open for six weeks beginning June 1st through to July 15th 2015. Applications
13
14 198 for Phase 2 recruitment were open for four weeks beginning October 1st and closing November
15
16 199 1st 2015. In order to apply, each group designated a leader who acted as the primary contact and
17
18 200 was responsible for submitting the application and liaising with research staff and their
19
20 201 respective group members. The application form required each group leader to describe the
21
22 202 physical activity their group planned to do each week, explain how this activity would contribute
23
24 203 to increasing the group's overall physical activity levels and social connectedness, and to outline
25
26 204 a proposed budget and timeline. All submitted applications were initially screened for eligibility
27
28 205 by three research team members and those deemed eligible were then processed and distributed
29
30 206 to a Grant Review Panel for further evaluation.
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35

36 207 The Grant Review Panel consisted of 3 research team members, a representative from the
37
38 208 Canadian Cancer Society and a local BC survivor. Review panel members were allocated up to
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40 209 4 applications each and required to review each grant and assess them based on the following
41
42 210 criteria: ability to engage target population (BC survivors) and facilitate social support, the
43
44 211 potential of project sustainability, the presence of clearly stated goals and objectives, feasibility
45
46 212 of implementation, and the project's potential to engage the community. The evaluation was
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48 213 based on a 7-point scale, where 1 indicated no potential or ability and 7 indicated high potential
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50 214 or ability. Reviewers were also asked to provide comments and notes to accompany their
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52 215 evaluation.
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3 216 Successful applicant groups were notified in August and November 2015 (phase 1 and
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5 217 phase 2) and were informed of program obligations. These include the requirement of each group
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7
8 218 member to participate in data collection and of the group leader to keep track of expenditures,
9
10 219 liaise with the research team, and provide a group photo and summary to appear on the Project
11
12 220 MOVE website. The group leader was asked to sign and return a letter of acceptance indicating
13
14 221 agreement to these terms. Unsuccessful applicants were also notified and provided feedback
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16
17 222 outlining why they were not funded.
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19

20 223 **Project MOVE Intervention**

21
22 224 The microgrants served as a stimulus for women who are BC survivors to come together
23
24 225 as a group and propose an ongoing physical activity initiative (aka “intervention”) they believe to
25
26 226 be enjoyable and meaningful to them and that they could perform on a regular basis. The
27
28 227 microgrants provided groups with up to \$2000 to enable access to equipment, resources,
29
30 228 facilities, instruction or transportation that groups needed to implement their initiative. It is
31
32 229 important to note that there was no pre-determined intervention promoted or developed by the
33
34 230 researchers, instead each group was invited to design their own intervention. This allowed
35
36 231 groups to develop their own intervention based on their own needs and preferences, and more
37
38 232 importantly, to address any unique circumstances and specific barriers that may have limited
39
40 233 them from being active. Groups were encouraged via the website to contact members of the
41
42 234 research team for support with conceptualizing their project and with the application process.
43
44 235 Advice and/or information given by research team members, if contacted, was focused on
45
46 236 helping groups determine if their ideas were eligible for submission and assist them with
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48 237 transferring their ideas onto “paper” (i.e. the application form). The research team did not
49
50 238 provide initiative/program ideas to the participant groups, but rather guidance with further
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3 239 developing their already determined initiative/program idea. Additionally, given the high number
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6 240 of emails received from individual women who were not able to form a group independently, a
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8 241 section on the website for 'Individual Expressions of Interest' was created. Through this forum
9
10 242 individual women were invited to indicate their preferred activities, best time of day to engage in
11
12 243 activity and their contact information. The research team then facilitated connections between
13
14 244 these individual women and community centres and partners with the capacity to provide
15
16 245 facilities and expertise to lead a group. In this way, steps were taken to accommodate all
17
18 246 interested women.
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21
22 247 In addition, each group was also informed that if they meet their group goals (developed
23
24 248 in collaboration with the project team) for increasing physical activity, they will have an
25
26 249 opportunity to receive an additional \$500 financial incentive at six months post baseline. This
27
28 250 will be determined by a group mean increase in physical activity assessed by accelerometry at
29
30 251 six months (Phase 1 groups: March 2016 and Phase 2 groups: June 2016) follow-up. Dependent
31
32 252 on the agreed upon group goals, this may include an increase in group mean minutes of physical
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34 253 activity, an increase in physical activity sessions or a group mean increase in steps.
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36 254 Approximately one month post baseline, a brief email will be sent to all group leaders asking
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38 255 about group progress and encouraging them to contact the Project MOVE team with any
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40 256 questions or concerns. The email will also include a reminder about the financial incentive
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42 257 available and that this will be determined once six months data collection was complete. Figure 1
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44 258 provides a flow summary of the progression of Project MOVE.
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50 259 **Outcome Measures**

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53 260 Assessments will be conducted at baseline (these have already been collected for Phase 1
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55 261 groups: Phase 2 groups will undergo baseline assessments in January 2016), six months and one
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262 year post-baseline. Once successful groups return their signed acceptance form, a research team
 263 member will contact the primary contact person to organise a baseline data collection day, time
 264 and place convenient for all group members. Dependent on the group, baseline data collection
 265 may take place at a local community centre, a cancer treatment centre and at the homes of the
 266 group leaders. If a group member cannot attend the group session, a research team member will
 267 organise a separate time with the individual to collect their baseline data. This will occur within
 268 one week of the group baseline data assessment time. Baseline assessments will include the
 269 collection of demographic, anthropometric and BC specific information, as well as objective and
 270 subjective measures of physical activity, quality of life, motivation to exercise, levels of social
 271 support and connectedness to others. All measures are described in further detail below. In
 272 addition, Table 1 provides a summary of measures and data collection time points.

273 **Table 1.** Summary of measures and data collection time points
 274

Outcome Measures	Collection points
Demographics (self-report)	0 (baseline only)
BC information (self-report)	0, 6 and 12 months
Anthropometrics (self-report)	0, 6 and 12 months
Physical activity (accelerometry & self-report)	0, 6 and 12 months
Sedentary behaviour (accelerometry & self-report)	0, 6 and 12 months
Quality of life (self-report)	0, 6 and 12 months
Motivation to exercise (self-report)	0, 6 and 12 months
Social support (self-report)	0, 6 and 12 months
Process Evaluation Measures	
Focus groups and interviews	6 months

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3 Project reports and Website usage (google analytics) 12 months
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7
8 276 Demographics, Anthropometrics, and BC Information
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10 277 Demographic variables include date of birth, ethnicity, education, marital status and
11
12 278 employment. Self-report height and weight will be collected to calculate body mass index (BMI).

13 279 Questions related to BC will include date of most recent diagnosis, stage of BC at diagnosis, type
14
15 280 of treatment, date of last treatment received and menopausal status.
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20 281 Physical Activity
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22 282 Physical activity will be assessed objectively using an Actigraph GT3X™ accelerometer
23
24 283 (ActiGraph, Pensacola, FL) and by self-report using a modified version of the Godin Leisure-

25
26
27 284 Time Exercise Questionnaire (GLTEQ) [35]. All participants will be fitted with an ActiGraph

28
29 285 GT3X accelerometer at baseline assessment. Participants will be instructed to wear the
30
31 286 accelerometer, mounted on an elastic belt around the waist with the unit positioned over the right

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34 287 hip, all day during all waking and non-water-based activities over a seven day period. The
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36 288 accelerometers will be programmed to record steps, inclination, and acceleration counts in tri-

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39 289 axial mode, using a 60-second epoch [36, 37]. Participants will be asked to fill out a daily log
40
41 290 and record what time the device was put on and taken off each day, as well as any circumstances

42
43 291 which they felt relevant to explain (e.g., illness or forgot to put it on). Participants will be asked
44
45 292 to return their accelerometers to their group leader after the 7-day period. A research team

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47
48 293 member will pick up the accelerometers from group leaders.
49

50 294 The GLTEQ will be used to collect self-reported physical activity data from all
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52 295 participants. It is a reliable and valid self-report tool [35, 38] which asks participants to indicate

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55 296 the frequency and type of intensity (light, moderate, vigorous) of their physical activity sessions
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3 297 and the duration (minutes) of these sessions [38, 39]. All responses will be converted to minutes.
4
5 298 Physical activity levels will be calculated in accordance with the metabolic equivalent (MET)
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8 299 minutes [40] method. A cut-off point of ≥ 600 MET minutes will then be used to dichotomize
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11 300 participants as “adequately active for health benefit” or “inadequately active” [40, 41].
12

13 301 Sedentary Behaviour

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15 302 Accelerometers will also be used to objectively assess sedentary behaviour using a 30
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17 303 second epoch. In addition, sedentary behaviours will be assessed by self-report using The
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19
20 304 Marshall Sitting Questionnaire (MSQ) [42]. This measure has demonstrated reliability and
21
22 305 validity in the adult population [42] and assesses time spent sitting on weekdays and weekend
23
24 306 days at work, traveling, and at home. Data from the sitting time questionnaire will be used to
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26
27 307 create an estimate of total weekday and weekend-day sitting times (min-d^{-1}) by summing the
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29 308 time reported in each domain [42].
30

31 309 Quality of Life

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34 310 Quality of life (QoL) will be assessed through the SF 36 Medical Outcomes Study Survey
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36 311 (SF-36/RAND 36), a 36-item valid and reliable tool used to measure overall quality of life across
37
38 312 eight domains, including physical functioning, bodily pain, role limitations due to physical health
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40 313 problems, role limitations due to personal or emotional problems, emotional well-being, social
41
42 314 functioning, energy/fatigue and general health perceptions [43, 44]. RAND 36 was developed
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44 315 from the original commercial SF-36 [44] and has since been released license free from the
45
46 316 RAND Corporation. In terms of scoring protocol for the RAND 36, pre-coded numeric values
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48 317 are assigned to each scale, and all items are then scored on a 0 to 100 range, with a high score
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50 318 representing a more favorable health state. Additionally, items in each of the eight domains are
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3 319 averaged together to create eight separate domain scores. Any items left blank are treated as
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6 320 missing data and are used when calculating the scale scores [45].
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8 321 Reasons for Engaging in Exercise

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10 322 Motivation to engage in exercise will be captured via the Behavioral Regulation in
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12 323 Exercise Questionnaire- version 3 (BREQ-3) [46, 47], a 24-item self-report measure adapted
13
14 324 from the original BREQ [48].The BREQ-3 has been reported as valid and reliable [49, 50] and
15
16 325 measures external regulation (e.g., “I exercise because other people say I should”), introjected
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18 326 regulation (e.g., “I feel guilty when I don’t exercise”), identified regulation (e.g., “I value the
19
20 327 benefits of exercise”) and intrinsic regulation (e.g., “I exercise because it’s fun”) of exercise
21
22 328 behavior based on Deci & Ryan's [51, 52] continuum conception of extrinsic and intrinsic
23
24 329 motivation. Participant responses are scored using an item aggregation approach [53]. This
25
26 330 involves summarizing participant responses by averaging the items of each individual subscale
27
28 331 into six unique scores.
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33 332 Social Support

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35 333 Social support will be assessed by the 6-item ‘Positive Relationship with Others’ subscale
36
37 334 of the Ryff Scales of Psychological Wellbeing (RSPW) [54, 55]. The RSPW is a theoretically
38
39 335 grounded instrument that measures multiple facets of psychological well-being and has been
40
41 336 used in a variety of settings and samples [56-58]. The subscale presents statements regarding
42
43 337 one’s personal relationships with others. Participants will be asked to rate statements on a scale
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45 338 of 1 to 6, with 1 indicating strong disagreement and 6 indicating strong agreement.
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51 339 **Statistical analysis**

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53 340 Descriptive analyses will be completed and presented as means and standard deviations
54
55 341 (SD) for continuous variables and as frequencies and proportions for categorical data. Data
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3 342 analysis of outcome variables including estimates of change in physical activity, motivation,
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5 343 quality of life and social support will be examined using paired t-tests with Bonferroni correction
6
7
8 344 to adjust for the multiple tests. Residual change scores will be calculated in linear regression
9
10 345 models and Pearson correlation coefficients will be used to estimate covariance among change
11
12 346 scores. The level of significance (α) will be set at 0.05. As the primary outcome is feasibility, a
13
14 347 power calculation was not performed. Evaluation and analysis of feasibility is detailed in the
15
16 348 following section.

19 349 **Process Evaluation and analysis**

20 350 The feasibility of the Action Grant program will be evaluated using RE-AIM, a
21
22 351 comprehensive evaluation framework that captures both process and outcome data. RE-AIM is
23
24 352 widely used to evaluate health-related, and specifically physical activity, interventions [59-61]
25
26 353 and is often proposed as as a framework for feasibility studies [62, 63]. RE-AIM includes five
27
28 354 dimensions: 1) *Reach*-proportion of the target population that are aware of and will potentially
29
30 355 participate in the intervention; 2) *Effectiveness*-an estimate of the extent to which the
31
32 356 intervention achieves its anticipated outcomes; 3) *Adoption*-proportion of settings, practices, and
33
34 357 plans that adopt this intervention; 4) *Implementation*-extent to which the intervention is
35
36 358 implemented as intended; and 5) *Maintenance*-extent to which a program is sustained over time.
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38 359 Focus groups, with all groups (N=12), and semi-structured interviews with a sub-sample of
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40 360 individuals (N=15) across all groups will be undertaken at six month follow-up to gain
41
42 361 understanding of participants' perceptions concerning satisfaction and practicality of the Action
43
44 362 Grant program, and to understand the challenges/enablers associated with design,
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46 363 implementation and adoption of the program, including feasibility parameters such as
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48 364 recruitment, accrual, adherence, and acceptability of the program. Project related statistics,
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365 including website usage patterns (Google Analytics-frequencies, means, etc.), as well as project
 366 reports concerning phone calls and emails to the project office, number of grant applications
 367 received, enquiries concerning the project, etc. will also be collected. Lastly, outcome
 368 assessments outlined above will be used to provide an estimate of effectiveness. For example a
 369 change in physical activity behaviour assessed via accelerometry and the GLTEQ will be used to
 370 provide an estimate of program effectiveness. Table 2 provides a summary of RE-AIM
 371 measures.

372 **Table 2.** RE-AIM Process/Outcome Measures

Dimension	Methods	Process/Outcome Measures
Reach	Focus groups, interviews, project related statistics	-number and diversity of women's groups who apply for the microgrants -characteristics of applicants compared to non-applicants or target population -issues concerning recruitment and application process
Effectiveness	Accelerometry, GLTEQ, MSQ, BREQ-3, SF36, RSPW Focus groups, interviews	-changes in physical activity behaviour, sedentary behaviour, quality of life, motivations and social support
Adoption	Focus groups, interviews, project related statistics	-assessment of barriers and enablers to adoption of the program -website usage statistics (e.g., application views, registrations, logins, frequency of visits)
Implementation	Focus groups, interviews	-review of initiatives/programs developed by participants to examine if they were implemented as they were intended -assessment of barriers, challenges, enablers to implementing initiatives/programs -suggestions for future implementation
Maintenance	Accelerometry, GLTEQ, MSQ, BREQ-3, SF36, RSPW, Focus groups, interviews,	-is the initiative/program still occurring at 6 and 12 months -are participants still participating at 6 and 12 months (via the initiative/program, another program, or on their own) -have changes occurred and/or been maintained over 6 and 12 months in terms of physical activity, sedentary behaviour, motivations, quality of life, social support

	project related statistics	
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374 Data from the focus groups and interviews will be audio recorded to ensure accurate
375 transcription. The audio recording will be transcribed verbatim with all identifiable information
376 removed, and the recording will be deleted after transcription to ensure anonymity and
377 confidentiality. All data will be analyzed using thematic content analysis [64] to explore
378 participant satisfaction and enjoyment and to identify any challenges experienced during
379 program implementation as well as factors that may have facilitated implementation. To
380 enhance rigor, two members of the research team will independently identify and code
381 participant responses into relevant sub-themes. Once all coding has been completed, sub-themes
382 will be discussed among the two research team members to ensure bias is minimized. Any
383 disagreements or concerns that may arise during the analysis will be presented at this time and
384 further discussion will be carried out with the research team until consensus is reached.

385

386 RESULTS

387 Follow-up results concerning feasibility (process evaluation) and outcome measures will
388 be available in Fall 2016 (six month follow-up) and Winter 2016 (one year follow-up).

389

390 DISCUSSION

391 The current intervention model presents a unique opportunity to study the effectiveness
392 of an innovative ‘real world’, community- based approach for increasing physical activity among
393 women BC survivors. Engaging women in preventive health measures, such as physical activity,
394 can be challenging. Research indicates that this is in part due to circumstances following BC

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3 395 treatment, in which survivors are often faced with pain, fatigue, and weight gain, as well as low
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5 396 self-esteem and social isolation [10, 12, 13]. As such, BC survivors are an important target for
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8 397 intervention research focused on ways to increase physical activity. However, in order to engage
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10 398 this particular segment of the population, these types of initiatives must be developed in a way
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12 399 that enhances and fosters autonomy and confidence and meets the specific needs and interests of
13
14 400 these women. Project MOVE is conceptualized to accommodate and address these
15
16 401 considerations. Specifically, it supports groups of women to design and implement community-
17
18 402 based physical activity initiatives from the “bottom up”– meaning designed and implemented by
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20 403 BC survivors for BC survivors. Most importantly, the process of design and implementation has
21
22 404 the potential to promote a sense of empowerment and ownership for women, providing them
23
24 405 with the opportunity to optimize their own strengths and knowledge aimed at reducing health
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26 406 concerns that often emerge post BC treatment.

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29 407 A further unique aspect of this feasibility trial is that it will be conducted in a real-world
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31 408 setting, influenced by naturally occurring external variables that are not always apparent in
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33 409 laboratory or tightly controlled RCT settings. Although RCTs are often considered the gold
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35 410 standard of trial design due to their ability to provide valuable information concerning efficacy
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37 411 and internal validity and their ability to minimize the impact of selection and information biases
38
39 412 and control for confounding variables [65, 66], they can be challenged on the grounds of external
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41 413 validity [67, 68]. This is not to say that RCTs are not important or necessary, indeed they are an
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43 414 essential part of the research process as a sufficiently powered, methodologically sound design is
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45 415 vital to maximizing internal validity and providing an indication of efficacy. However, prior to
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47 416 undertaking an RCT in a community or population level setting, it is necessary to investigate the
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49 417 feasibility and acceptability of an intervention under normal, everyday conditions in order to
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3 418 identify and address potential variables or circumstances that may impact the future
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6 419 transferability of the intervention to public health/health promotion practice [63, 69-71]. The
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8 420 unique design of this trial allows for the examination of intervention components in a real-world
9
10 421 setting providing us with the opportunity to examine a number of feasibility parameters such as
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12 422 various methods of identifying/recruiting participants, practicality of delivery, standard deviation
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14 423 of the outcome measures to estimate sample size, participant acceptability and satisfaction with
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16 424 the intervention model [72], all of which are important considerations prior to carrying out a
17
18 425 sufficiently powered RCT.
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22 426 In conclusion, the knowledge gained from the current study protocol will provide
23
24 427 important insights into the successes and challenges associated with an Action Grants approach
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26 428 to physical activity interventions targeting BC survivors. Lessons learned from this study will
27
28 429 facilitate further study refinement and inform protocol approaches that encompass a ‘bottom-up’
29
30 430 philosophy. Importantly, this approach could ultimately extend the delivery of physical activity
31
32 431 interventions for diverse populations of cancer survivors because it has the potential to capture a
33
34 432 wide range of interests and needs. Researchers interested in developing and testing new and
35
36 433 innovative intervention approaches will be able to use this detailed protocol as a resource for
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38 434 study replication concerning other cancer specific sites or cancer prevention initiatives.
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28
29 452 **CONTRIBUTIONS**

30
31 453 CMC, CS, JLB, KLC, NDE, SLE, and CG conceived the project and procured project funding.

32
33 454 CMC and MIC are leading the coordination of the study. CMC, CS, JLB, KLC, NDE, SLE, and

34
35 455 CG assisted with protocol design. MIC is managing the project including data collection with

36
37 456 assistance from RT. CC, MIC, and RT drafted the manuscript and all authors read, edited, and

38
39 457 approved the final manuscript.

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44
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55 463 **COMPETING INTERESTS**

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3 464 The authors declare they have no competing interests.
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8 466 **ETHICAL APPROVAL**
9

10 467 Ethical approval was obtained from the Behavioural Research Ethics Board at the University of
11

12 468 British Columbia (#H14-02502).
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469 REFERENCES

- 470 1. Ferlay J, Soerjomataram I, Evrik M, *et al.* *Cancer incidence and mortality worldwide*.
471 Lyon, FR: International Agency for Research on Cancer 2014.
- 472 2. Canadian Cancer Society. What is breast cancer? Toronto: Canadian Cancer Society;
473 2011 [cited 2015 October 31]; Available from: [http://www.cancer.ca/en/cancer-](http://www.cancer.ca/en/cancer-information/cancer-type/breast/breast-cancer/?region=on)
474 [information/cancer-type/breast/breast-cancer/?region=on](http://www.cancer.ca/en/cancer-information/cancer-type/breast/breast-cancer/?region=on).
- 475 3. Cancer Research UK. Breast Cancer Statistics. 2012 [cited 2015 November 16];
476 Available from: [http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-](http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/breast-cancer)
477 [by-cancer-type/breast-cancer](http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/breast-cancer)
- 478 4. Australian Institute of Health and Welfare (AIHW). Cancer in Australia: an overview,
479 Cancer series no. 78. Cat. no. CAN 75. Canberra 2014.
- 480 5. Demark-Wahnefried W, Aziz NM, Rowland JH, *et al.* Riding the crest of the teachable
481 moment: promoting long-term health after the diagnosis of cancer. *J Clin Oncol*
482 2005;23(24):5814-30.
- 483 6. Courneya KS, Friedenreich CM. Physical activity and cancer control. *Semin Oncol Nurs*
484 2007;23(4):242-52.
- 485 7. Kim J, Choi WJ, Jeong SH. The effects of physical activity on breast cancer survivors
486 after diagnosis. *J Cancer Prev* 2013;18(3):193-200.
- 487 8. Holmes MD, Chen WY, Feskanich D, *et al.* Physical activity and survival after breast
488 cancer diagnosis. *JAMA* 2005;293(20):2479-86.
- 489 9. Ibrahim EM, Al-Homaidh A. Physical activity and survival after breast cancer diagnosis:
490 meta-analysis of published studies. *Med Oncol* 2011;28(3):753-65.
- 491 10. Schmitz KH, Courneya KS, Matthews C, *et al.* American College of Sports Medicine
492 roundtable on exercise guidelines for cancer survivors. *Med Sci Sports Exerc* 2010;42(7):1409-
493 26.
- 494 11. Rock CL, Doyle C, Demark-Wahnefried W, *et al.* Nutrition and physical activity
495 guidelines for cancer survivors. *CA Cancer J Clin* 2012;62(4):243-74.
- 496 12. Sabiston CM, Brunet J, Burke S. Pain, movement, and mind: does physical activity
497 mediate the relationship between pain and mental health among survivors of breast cancer? *Clin*
498 *J Pain* 2012;28(6):489-95.
- 499 13. Fong DY, Ho JW, Hui BP, *et al.* Physical activity for cancer survivors: meta-analysis of
500 randomised controlled trials. *BMJ* 2012;344:e70.
- 501 14. Lynch BM, Dunstan DW, Healy GN, *et al.* Objectively measured physical activity and
502 sedentary time of breast cancer survivors, and associations with adiposity: findings from
503 NHANES (2003-2006). *Cancer Causes Control* 2010;21(2):283-8.
- 504 15. Bellizzi KM, Rowland JH, Jeffery DD, *et al.* Health behaviors of cancer survivors:
505 examining opportunities for cancer control intervention. *J Clin Oncol* 2005;23(34):8884-93.
- 506 16. Blanchard CM, Courneya KS, Stein K. Cancer survivors' adherence to lifestyle behavior
507 recommendations and associations with health-related quality of life: results from the American
508 Cancer Society's SCS-II. *J Clin Oncol* 2008;26(13):2198-204.
- 509 17. Sabiston CM, McDonough MH, Crocker PR. Psychosocial experiences of breast cancer
510 survivors involved in a dragon boat program: exploring links to positive psychological growth. *J*
511 *Sport Exerc Psychol* 2007;29(4):419-38.

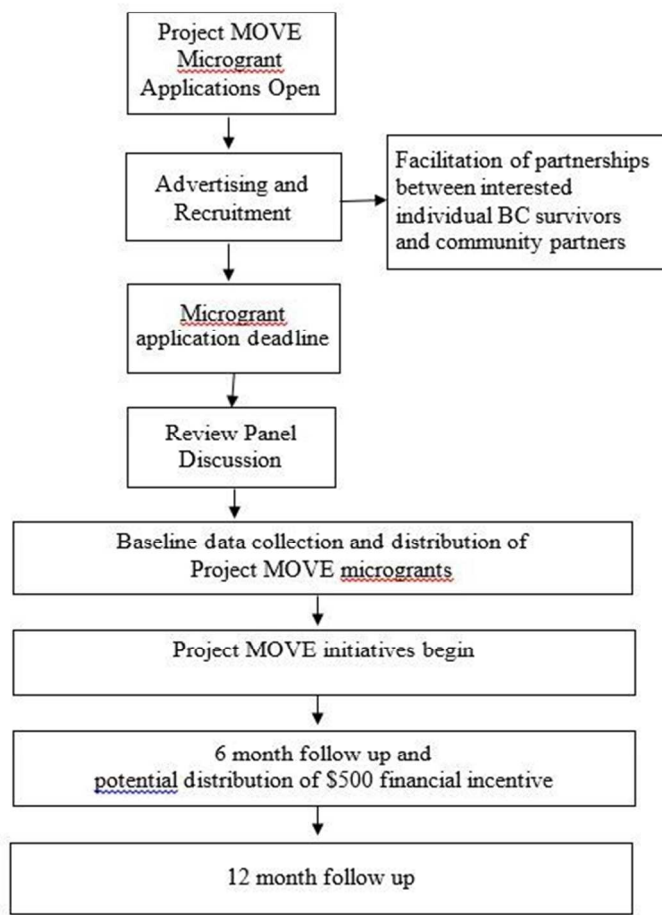
- 1
2
3 512 18. Burke S, Sabiston C. Exploring breast cancer survivors' experiences of subjective well-
4 513 being during an attempt to scale Mt. Kilimanjaro: An interpretive phenomenological study. *Qual*
5 514 *Res Sport Exer* 2010;2:1-16.
- 7 515 19. Cramer H, Lange S, Klose P, *et al.* Yoga for breast cancer patients and survivors: a
8 516 systematic review and meta-analysis. *BMC Cancer* 2012;12:412.
- 9 517 20. Bobbitt-Cooke M. Energizing community health improvement: the promise of
10 518 microgrants. *Prev Chronic Dis* 2005;2Spec.no:A16.
- 11 519 21. Consultative Group to Assist the Poor (CGAP). Microfinancing. 2015 [cited 2015
12 520 October 31]; Available from: <http://www.microfinancegateway.org/library>.
- 13 521 22. Foster-Fishman PG, Fitzgerald K, Brandell C, *et al.* Mobilizing residents for action: the
14 522 role of small wins and strategic supports. *Am J Community Psychol* 2006;38(3-4):143-52.
- 15 523 23. Hartwig KA, Bobbitt-Cooke M, Zaharek MM, *et al.* The value of microgrants for
16 524 community-based health promotion: two models for practice and policy. *J Public Health Manag*
17 525 *Pract* 2006;12(1):90-6.
- 18 526 24. Gbezo B. Microcredit in West Africa: how small loans make a big impact on poverty.
19 527 *World Work* 1999;31:13-5.
- 20 528 25. Caperchione C, Mummery WK, Joyner K. WALK Community Grants Scheme: lessons
21 529 learned in developing and administering a health promotion microgrants program. *Health*
22 530 *Promot Pract* 2010;11(5):637-44.
- 23 531 26. Collie-Akers V, Schultz JA, Carson V, *et al.* Evaluating mobilization strategies with
24 532 neighborhood and faith organizations to reduce risk for health disparities. *Health Promot Pract*
25 533 2009;10(2 Suppl):118S-27S.
- 26 534 27. Schmidt M, Ploch T, Harting J, *et al.* Micro grants as a stimulus for community action
27 535 in residential health programmes: a case study. *Health Promot Int* 2009;24(3):234-42.
- 28 536 28. Volpp KG, Gurmankin Levy A, Asch DA, *et al.* A randomized controlled trial of
29 537 financial incentives for smoking cessation. *Cancer Epidemiol Biomarkers Prev* 2006;15(1):12-8.
- 30 538 29. Volpp KG, John LK, Troxel AB, *et al.* Financial incentive-based approaches for weight
31 539 loss: a randomized trial. *JAMA* 2008;300(22):2631-7.
- 32 540 30. Finkelstein EA, Linnan LA, Tate DF, *et al.* A pilot study testing the effect of different
33 541 levels of financial incentives on weight loss among overweight employees. *J Occup Environ*
34 542 *Med* 2007;49(9):981-9.
- 35 543 31. Finkelstein EA, Brown DS, Brown DR, *et al.* A randomized study of financial incentives
36 544 to increase physical activity among sedentary older adults. *Prev Med* 2008;47(2):182-7.
- 37 545 32. Farooqui MA, Tan YT, Bilger M, *et al.* Effects of financial incentives on motivating
38 546 physical activity among older adults: results from a discrete choice experiment. *BMC Public*
39 547 *Health* 2014;14:141.
- 40 548 33. Mitchell MS, Goodman JM, Alter DA, *et al.* Financial incentives for exercise adherence
41 549 in adults: systematic review and meta-analysis. *Am J Prev Med* 2013;45(5):658-67.
- 42 550 34. National Coalition for Cancer Survivorship. Defining Cancer Survivorship.
43 551 <http://www.canceradvocacy.org/news/defining-cancer-survivorship/2014>.
- 44 552 35. Godin G, Jobin J, Bouillon J. Assessment of leisure time exercise behavior by self-report:
45 553 a concurrent validity study. *Can J Public Health* 1986;77(5):359-62.
- 46 554 36. Troiano RP, Berrigan D, Dodd KW, *et al.* Physical activity in the United States measured
47 555 by accelerometer. *Med Sci Sports Exerc* 2008;40(1):181-8.
- 48 556 37. Freedson PS, Melanson E, Sirard J. Calibration of the Computer Science and
49 557 Applications, Inc. accelerometer. *Med Sci Sports Exerc* 1998;30(5):777-81.

- 1
2
3 558 38. Godin G, Shephard RJ. A simple method to assess exercise behavior in the community.
4 559 *Can J Appl Sport Sci* 1985;10(3):141-6.
5 560 39. Blacklock RE, Rhodes RE, Brown SG. Relationship between regular walking, physical
6 561 activity, and health-related quality of life. *J Phys Act Health* 2007;4(2):138-52.
7 562 40. Brown WJ, Bauman AE. Comparison of estimates of population levels of physical
8 563 activity using two measures. *Aust N Z J Public Health* 2000;24(5):520-5.
9 564 41. Plotnikoff RC, Johnson ST, Loucaides CA, *et al.* Population-based estimates of physical
10 565 activity for adults with type 2 diabetes: a cautionary tale of potential confounding by weight
11 566 status. *J Obes* 2011;2011.
12 567 42. Marshall AL, Miller YD, Burton NW, *et al.* Measuring total and domain-specific sitting:
13 568 a study of reliability and validity. *Med Sci Sports Exerc* 2010;42(6):1094-102.
14 569 43. Hays RD, Morales LS. The RAND-36 measure of health-related quality of life. *Ann Med*
15 570 2001;33(5):350-7.
16 571 44. Ware JE, Jr., Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I.
17 572 Conceptual framework and item selection. *Med Care* 1992;30(6):473-83.
18 573 45. Hays RD, Sherbourne CD, Mazel RM. The RAND 36-Item Health Survey 1.0. *Health*
19 574 *Econ* 1993;2(3):217-27.
20 575 46. Markland D, Tobin V. A modification to the behavioural regulation in exercise
21 576 questionnaire to include an assessment of amotivation. *J Sport Exercise Psy* 2004;26(2):191-6.
22 577 47. Wilson PM, Rodgers WM, Loitz CC, *et al.* "It's who I am...really!" The importance of
23 578 integrated regulation in exercise contexts. *J Biobehav Res* 2006;11:79-104.
24 579 48. Mullan E, Markland D, Ingledw DK. A graded conceptualization of self-determination
25 580 in the regulation of exercise behavior: Development of a measure using confirmatory factor
26 581 analytic procedures. *Pers Individ Dif* 1997;23:745-52.
27 582 49. Duncan LR, Hall CR, Wilson PM, *et al.* Exercise motivation: a cross-sectional analysis
28 583 examining its relationships with frequency, intensity, and duration of exercise. *Int J Behav Nutr*
29 584 *Phys Act* 2010;7:7.
30 585 50. Sicilia A, Saenz-Alvarez P, Gonzales-Cutre D, *et al.* Exercise motivation and social
31 586 physique anxiety in adolescents. *Psychologica Belgica* 2014;54.
32 587 51. Deci EL, Ryan RM. *Intrinsic motivation and self-determination in human behavior*. New
33 588 York: Plenum; 1985.
34 589 52. Ryan RM, Deci EL. The "what" and "why" of goal pursuits: Human needs and the self-
35 590 determination of behavior. *Psychol Inq* 2001;11:227-68.
36 591 53. Wilson PM, Sabiston CM, Mack DM, *et al.* On the nature and function of scoring
37 592 protocols used in exercise motivation research: An empirical study of the behavioral regulation
38 593 in exercise questionnaire. *Psych Sport Exer* 2013;13:614-22.
39 594 54. Ryff CD. Happiness is everything, or is it? Explorations on the meaning of psychological
40 595 well-being. *J Pers Soc Psychol* 1989;57:1069-81.
41 596 55. Ryff CD. Beyond Ponce de Leon and life satisfaction: New directions in quest of
42 597 successful aging. *Int J Behav Dev* 1989;12:35-55.
43 598 56. Clark PJ, Marshall VW, Ryff CD, *et al.* Measuring psychological well-being in the
44 599 Canadian study of health and aging. *Int Psychogeriatr* 2001;13(Suppl.1):79-90.
45 600 57. Sweet JA, Bumpass LL. *The national survey of families and households - Waves 1 and 2:*
46 601 *Data description and documentation.* <http://www.ssc.wisc.edu/nsfh/home.htm> 1996.
47 602 58. Fava GA, Ruini C, Rafanelli C, *et al.* Well-being therapy of generalized anxiety disorder.
48 603 *Psychother Psychosom* 2005;74(1):26-30.

- 1
2
3 604 59. Caperchione CM, Duncan M, Kolt GS, *et al.* Examining an Australian physical activity
4 605 and nutrition intervention using RE-AIM. *Health Promot Int* 2016;31(2):1-9.
5 606 60. Phillips SM, Alfano CM, Perna FM, *et al.* Accelerating translation of physical activity
6 607 and cancer survivorship research into practice: recommendations for a more integrated and
7 608 collaborative approach. *Cancer Epidemiol Biomarkers Prev* 2014;23(5):687-99.
8 609 61. Folta SC, Seguin RA, Chui KK, *et al.* National Dissemination of StrongWomen-Healthy
9 610 Hearts: A Community-Based Program to Reduce Risk of Cardiovascular Disease Among Midlife
10 611 and Older Women. *Am J Public Health* 2015;105(12):2578-85.
11 612 62. Bowen DJ, Kreuter M, Spring B, *et al.* How we design feasibility studies. *Am J Prev Med*
12 613 2009;36(5):452-7.
13 614 63. Green LW, Glasgow RE. Evaluating the relevance, generalization, and applicability of
14 615 research: issues in external validation and translation methodology. *Eval Health Prof*
15 616 2006;29(1):126-53.
16 617 64. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psych*
17 618 2006;3(2):77-101.
18 619 65. Courneya KS. Efficacy, effectiveness, and behavior change trials in exercise research. *Int*
19 620 *J Behav Nutr Phys Act* 2010;7:81.
20 621 66. Moher D, Schulz KF, Altman DG. The CONSORT statement: revised recommendations
21 622 for improving the quality of reports of parallel-group randomised trials. *Lancet*
22 623 2001;357(9263):1191-4.
23 624 67. Victora CG, Habicht JP, Bryce J. Evidence-based public health: moving beyond
24 625 randomized trials. *Am J Public Health* 2004;94(3):400-5.
25 626 68. Fortin M, Dionne J, Pinho G, *et al.* Randomized controlled trials: do they have external
26 627 validity for patients with multiple comorbidities? *Ann Fam Med* 2006;4(2):104-8.
27 628 69. Caperchione CM, Kolt GS, Savage TN, *et al.* WALK 2.0: examining the effectiveness of
28 629 Web 2.0 features to increase physical activity in a 'real world' setting: an ecological trial. *BMJ*
29 630 *Open* 2014;4(10):e006374.
30 631 70. Antikainen I, Ellis R. A RE-AIM evaluation of theory-based physical activity
31 632 interventions. *J Sport Exerc Psychol* 2011;33(2):198-214.
32 633 71. Cohen DJ, Crabtree BF, Etz RS, *et al.* Fidelity versus flexibility: translating evidence-
33 634 based research into practice. *Am J Prev Med* 2008;35(5 Suppl):S381-9.
34 635 72. Arain M, Campbell MJ, Cooper CL, *et al.* What is a pilot or feasibility study? A review
35 636 of current practice and editorial policy. *BMC Med Res Methodol* 2010;10:67.
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Figure 1. Flow summary of protocol progression of Project MOVE



57x66mm (300 x 300 DPI)