Evaluating the feasibility of a novel approach to increasing physical activity levels in breast cancer survivors: a RE-AIM analysis

by

Tanya Nicole Pullen

B.H.K., The University of British Columbia, 2015

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

in

THE COLLEGE OF GRADUATE STUDIES

(Interdisciplinary Graduate Studies)

THE UNIVERSITY OF BRITISH COLUMBIA

(Okanagan)

September 2017

© Tanya Nicole Pullen, 2017
The following individuals certify that they have read, and recommend to the College of Graduate Studies for acceptance, a thesis/dissertation entitled:

Evaluating the feasibility of a novel approach to increasing physical activity levels in breast cancer survivors: a RE-AIM analysis

submitted by Tanya Nicole Pullen in partial fulfillment of the requirements of

the degree of Master of Science.

Dr. Cristina Caperchione, School of Health and Exercise Sciences, UBC Okanagan

Supervisor

Dr. Heather Gainforth, School of Health and Exercise Sciences, UBC Okanagan

Supervisory Committee Member

Dr. Nelly Oelke, School of Nursing, UBC Okanagan

Supervisory Committee Member

Dr. Kathy Rush, School of Nursing, UBC Okanagan

University Examiner
Abstract

Translating research interventions into community practice is critical for improving population level health. Project MOVE, is an innovative real-world approach to increasing physical activity (PA) levels in breast cancer (BC) survivors. BC survivors were given the opportunity to develop and implement a PA program with the help of action grants (microgrants and financial incentives). Utilising action grants towards increasing PA in BC survivors is both innovative and unique to the BC related literature, thus evaluating this novel approach is warranted. This study evaluated the feasibility of Project MOVE in terms of acceptability, practicality and satisfaction utilising the RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework. A mixed-methods design was used to inform each RE-AIM dimension, via questionnaires (n=87), focus groups (n=10) and interviews (n=10). Reach was evaluated by the proportion of targeted individuals recruited. Effectiveness was evaluated by objective and perceived changes in PA. Adoption was evaluated by participant’s perceptions of process and acceptability to uptaking the program. Implementation was examined by barriers and facilitators to implementing the program as intended. Lastly, Maintenance was evaluated by participant retention and maintenance of PA. Assessments occurred at baseline and six months. The current study revealed that Project MOVE was well received by BC survivors. In terms of Reach, 82% of participants were BC survivors; Effectiveness, participants significantly increased PA levels from baseline to six months (p<0.001) and 72.3% felt Project MOVE helped increase PA levels; Adoption, 92.2% reported Project MOVE was highly appropriate for the BC survivor population and was accepted by 95.6% of BC survivors; Implementation, program focused on fitness rather than disease was important for engagement, leaders with BC and exercise expertise was essential.
to accommodate population specific barriers, and including other health education resources is warranted; Maintenance, participant retention was 83% at six months, 47% of participants reported they still engaged in PA together as a group and 87.5% were confident they would continue to be regularly active post-intervention. The present findings suggest Project MOVE is an acceptable and practical strategy for increasing PA among inactive BC survivors, particularly when it is delivered in a safe and supportive group environment.
Preface

Ethical approval for this project was obtained from the University of British Columbia Okanagan’s Behavioral Research Ethics Board (H14-02502).
# Table of Contents

Abstract........................................................................................................................... iii  
Preface.............................................................................................................................. v  
Table of Contents.......................................................................................................... vi  
List of Tables ................................................................................................................... ix  
List of Figures .................................................................................................................. x  
List of Abbreviations ....................................................................................................... xi  
Glossary ........................................................................................................................... xiii  
Acknowledgements ......................................................................................................... xviii  

## Chapter 1 Introduction................................................................................................ 1  
  1.1 Layout of Thesis........................................................................................................ 1  
  1.2 Overview................................................................................................................... 1  
  1.3 Purpose and Objectives............................................................................................. 4  
  1.4 Significance and Contribution to Research Literature............................................ 4  

## Chapter 2 Review of Literature................................................................................... 6  
  2.1 General Overview of Breast Cancer ....................................................................... 6  
  2.2 Incidence and Prevalence of Breast Cancer............................................................ 9  
  2.3 Risk Factors for Breast Cancer .............................................................................. 10  
  2.4 The Detrimental Effects of Breast Cancer and Related Treatment....................... 12  
    2.4.1 Impact of BC on Physical Health ....................................................................... 12  
    2.4.2 Impact of BC on Psychological Health .............................................................. 20  
  2.5 Physical Activity ...................................................................................................... 26  
  2.6 Barriers to Breast Cancer Survivors Being Physically Active............................... 30  
    2.6.1 Physical Barriers ................................................................................................. 31  
    2.6.2 Psychosocial Barriers ....................................................................................... 32  
    2.6.3 Environmental Barriers ....................................................................................... 33  
  2.7 Physical Activity for Breast Cancer Survivors ....................................................... 34  
  2.8 RE-AIM Framework ............................................................................................... 44  
    2.8.1 Using RE-AIM to Evaluate Community Programs ........................................... 48  
  2.9 Summary ................................................................................................................. 52
Chapter 6 Conclusions........................................................................................................ 120
6.1 Overview..................................................................................................................... 120
6.2 Strengths and Limitations ......................................................................................... 121
6.3 Future Direction and Recommendations ................................................................. 125
Appendices....................................................................................................................... 172
Appendix A: Demographics Form.................................................................................. 172
Appendix B: Breast Cancer Information Form................................................................. 174
Appendix C: Modified Godin Leisure Time Exercise Questionnaire .............................. 180
Appendix D: Accelerometer Instructions ........................................................................ 182
Appendix E: Accelerometer Wear Time Log ................................................................. 183
Appendix F: Program Evaluation ................................................................................... 185
Appendix G: Focus Group Guide .................................................................................... 188
Appendix H: Facilitator Interview Guide ....................................................................... 191
Appendix I: Project MOVE Recruitment Poster ............................................................. 193
List of Tables

Table 3.1. Methods and Outcome Measures for Each RE-AIM Dimension ....................70
Table 4.1. Demographics of Participants ........................................................................78
Table 4.2. Microgrant Application Status per Group for Each Round of Recruitment ......82
Table 4.3. Weekly Average Minutes of MVPA Measured with the Accelerometer .........84
Table 4.4. Weekly Average Minutes of MVPA Measured with the GLTEQ .................85
Table 4.5. Number of Website Views per Month and Year .........................................91
List of Figures

Figure 3.1. Flow Chart of Protocol for this Current Study ...........................................67
Figure 4.1. Sources of Recruitment ...........................................................................81
Figure 4.2. Accelerometer Recorded Weekly MVPA Levels by Those Meeting and Not
Meeting PA Guidelines ..........................................................................................83
Figure 4.3. Self-Reported Weekly MVPA by Those Meeting and Not Meeting PA
Guidelines ..............................................................................................................85
List of Abbreviations

ACSM: American College of Sports Medicine
BC: Breast Cancer
BCRL: Breast Cancer Related Lymphedema
BMI: Body Mass Index
CCSACCS: Canadian Cancer Society’s Advisory Committee on Cancer Statistics
CDC: Centre for Disease Control
CRF: Cancer Related Fatigue
DCIS: Ductal Carcinoma in Situ
GLTEQ: Godin Leisure Time Exercise Questionnaire
IBC: Inflammatory Breast Cancer
IPAQ: International Physical Activity Questionnaire
LCIS: Lobular Carcinoma in Situ
MET: Metabolic Equivalent Task
MRI: Magnetic Resonance Imaging
MVPA: Moderate-to-Vigorous Physical Activity
PA: Physical Activity
PAR: Physical Activity Recall
PCI: Perceived Cognitive Impairment
PMPS: Post Mastectomy Pain Syndrome
SES: Socio Economic Status
TNM: Tumor, Nodes, Metastasis
TTM: Transtheoretical Model
QoL: Quality of Life

VO₂: Volume of Oxygen
Glossary

Acceptability: How participants of an intervention react to the intervention (Bowen et al., 2009). In other words, the extent to which an idea, program, or intervention is perceived fair, appropriate, and reasonable (Kazdin, 1981).

Axillary web syndrome: May occur following breast cancer related surgery in which a palpable cord develops in the axilla region. The cord can feel like a rope or a tendon which becomes taut and painful during shoulder abduction (Moskovitz et al., 2001).

Benign: Cancer is considered non-invasive as cancerous cells are confined to the original location (Ebrahimi, Ebrahimi & Shamabadi, 2010).

Carcinoma: Also known as cancer, transpires when abnormal cells divide and rapidly grow, often forming a tumor (Canadian Breast Cancer Foundation, 2015).

Chemotherapy: A form of cancer treatment that involves using drugs to prevent or limit cancer cell growth (Sugerman, 2013).

Dissemination: Methods to influence target populations to receive, accept, and use information garnered from research interventions (Lomas, 1993).

Duct: Tube like structure that connects each lobe to the areola. The purpose is to drain fluid (i.e., milk) from the lobules to the nipple (Zucca-Matthes, Urban, & Vallejo, 2016).

Ductal carcinoma in situ: A premalignant generation of abnormal endothelial cells contained within the lumen of the mammary ducts and is a precursor of invasive breast cancer (Cowell et al., 2013).

Feasibility: The assessment of whether or not research findings and ideas can be formed to be relevant and sustainable (Bowen et al., 2009).
**Hyperaesthesia:** Extreme acute pain evoked by touch as well as hot or cold temperature

(Tasmuth, von Smitten, & Kalso, 1996)

**Infiltrative:** Cancer that has spread from the original location and has started to grow in nearby tissues. Also known as invasive cancer (Cowell et al., 2013).

**Inflammatory breast cancer (IBC):** The most virulent form of breast cancer. It is characterised by redness, pain and inflammation on the surface of the breast

(Woodward & Cristofanilli, 2009).

**Intercostobrachial neuralgia:** Commonly occurs following surgical removal of axillary lymph nodes. Severed/damaged nerves, as a result of surgery, creates severe pain

(Wisotzky, Saini & Kao, 2016).

**In situ:** Cancer that has stayed in the original location of development and has not traveled to other areas of the body (Canadian Cancer Society, 2015).

**Lobule:** An area of the breast that consists of clusters of alveoli that contain mammary secretory epithelial cells. Lobules are connected to small ducts which carry fluid from the lobule to the areola (Tobon & Salazar, 1975).

**Lobular carcinoma in situ:** A type of breast cancer that originates in the terminal duct lobule and is a marker for an increased risk of breast cancer (Bartella et al., 2007).

**Lymphedema:** Swelling of an arm caused by lack of lymphatic drainage. This may occur following surgical removal or damage to lymph nodes (Das et al., 2015).

**Malignant:** Cancer is considered an invasive cancer as cancerous cells have spread to surrounding fatty and connective tissues from the original site. This type of cancer may lead to death if not detected and treated early (Ebrahimi, Ebrahimie, & Shamabadi, 2010).
**Mammography:** The gold standard imaging tool used to help detect the presence of cancer (Jalalian et al., 2013).

**Melanoma:** An invasive tumour of melanocytes. Melanocytes are cells that produce dark pigmentation predominantly on the skin (Berger, 2015)

**Metastasize:** Characterised as cancer that travels to other areas of the body (Leadbeater & Beaumont, 2015).

**Modifiable risk factor:** A risk factor that can be modified and is generally associated with lifestyle behaviors. Modifiable risk factors include physical activity levels, diet, tobacco, and alcohol consumption (Krishnamurthy, Soundara, & Ramshankar, 2016).

**Neuroma pain:** Pain that occurs following surgery. Generally, occurs where the nerve repairs itself and develops a palpable mass in the process (Li et al., 2012).

**Neuropathic pain:** A debilitating symptom in which severe pain arises from a lesion or disease affecting the somatosensory system (Reyes-Gibby et al., 2010).

**Non-modifiable risk factor:** A risk factor that cannot be changed such as age, sex, and family history (Krishnamurthy, Soundara, & Ramshankar, 2016).

**Nociceptive pain:** Pain from chemical, mechanical, or thermal stimuli due to primary lesions or disease of the somatosensory nervous system (Nijs et al., 2016).

**Non-Hodgkin lymphoma:** Cancer of the immune system. It encompasses a heterogeneous group of cancers arising from B lymphocytes and T lymphocytes or NK lymphocytes (Shankland, Armitage, & Hancock, 2012).
Paget disease: A rare disease of the breast that affects the nipple-areola complex (Lee et al., 2014). Signs include sensation and changes in the nipple or aerola appearance including burning eczema which progress to ulcers and erosion which may or may not occur simultaneously with an underlying palpable mass (Kanitakis, 2007).

Phantom breast pain: A phenomenon that occurs following a mastectomy where painful sensations occur where the breast used to be (Ahmed et al., 2014).

Physical activity: Body movements produced by skeletal muscles that creates energy expenditure above basal metabolic rate (Brunet et al., 2012)

Post Mastectomy Pain Syndrome: Characterised by pain following axillary lymph node dissection (Wisotzky, Saini & Kao, 2016).

Practicality: Extent to which the research study can be delivered when resources, time, and/or commitment are constrained. In other words, the functionality of a program that conveniently meets the needs of a target population (Bowen et al., 2009).

Quality of life: An individual’s physical and mental health perceptions – including health risks and conditions, functional status, social support, and socioeconomic status (Centres for Disease Control and Prevention, 2015).

Real-world approach: Moving interventions from controlled research environments into the realm of practical or actual experience (Rohrbach et al., 2006).

Sarcoma: A tumor that arises from abnormal mesenchymal cells. Tumors that develop from connective tissues such as bone, fat, muscle, or vascular tissues are classified as sarcomas (Skubitz & D'Adamo, 2007).
Translational impact: The process of ensuring effective and extensive use of science-based programs, practices, and policies (Wilson et al., 2011). Moving research from basic sciences into the realm of social or personal relevance and the impact of practices in the community (Sussman et al., 2006).

Triple negative breast cancer: A tumor that lacks a combination of estrogen receptor (ER), progesterone receptor (PR), and HER2 expression. Triple negative tumors account for approximately 15% of breast tumors and are detected more frequently through clinical examination (Chacon & Costanzo, 2010).

Tumor: Characterised by normal cells that undergo genetic and epigenetic changes. The abnormal cells multiply and grow together to form either a benign or malignant mass (Shipitsin et al., 2007).
Acknowledgements

First, I would like to thank my supervisor, Dr. Cristina Caperchione. Your support, guidance, and encouragement has helped me become a much better writer and researcher. Thank you for challenging me, believing in me, and helping me believe in myself. Secondly, I would also like to thank my committee members, Dr. Heather Gainforth and Dr. Nelly Oelke for your time, attention, and contributions to this project. Your perspectives and suggestions greatly furthered my thinking. To the PHAB Lab; Paul, thank you for your mentorship and support. You have also helped me become a better and more insightful writer. Kayla, so happy I got to share my Masters experience with you. We had many early mornings and late nights in the lab, but we got through it, with the help of coffee.

The last two years have been a grind but I couldn’t have done it without the love and support of my friends and family. To my parents, Nicole and Leigh, thank you for all the love and encouragement. You have made many sacrifices to help Trevor and I get to where we are today. Thank you for always looking out for us. To my brother, Trevor. Even though we are far away, we are closer than we’ve ever been. Thank you for always being there for me. I would also like to thank my loving husband, Nathan. We have shared an amazing journey side-by-side the last six years. I am proud of all that we’ve accomplished together thus far and I am looking forward to our future adventures.

Lastly, I would like to thank the Lotte & John Hecht Memorial Foundation Innovation Grant of the Canadian Cancer Society (grant #702913) for providing funding for this project.
Chapter 1 Introduction

1.1 Layout of Thesis

This thesis is formulated into six sections. Chapter one provides an overview of the project and introduces the purpose for the current study. Chapter two includes a review of the existing research literature that established the foundation for the current study. The literature review presents information pertaining to breast cancer (BC), the detrimental effects of the disease, the benefits of physical activity (PA) on BC survivor health, and the utilisation of the RE-AIM framework in evaluating the impact of health promotion interventions. Chapter three describes the methodology of the study, including the process evaluation guided by the RE-AIM framework. Chapters four and five comprise the results and discussion surrounding the results of the project. The sixth and final chapter includes a summary of the findings, discusses the strengths and limitations of the present research, and highlights future recommendations.

1.2 Overview

BC is a common disease that affects many Canadians. As Canada’s population continues to grow and age, the incidence of BC is expected to rise from 26,300 in 2017 to 31,250 in 2030 (Canadian Cancer Society’s Advisory Committee on Cancer Statistics [CCSACCS], 2017). Despite increasing numbers in BC diagnoses, early detection modalities and advanced treatment have helped prolong BC survivorship (Brunet et al., 2012). More women are surviving BC over 10-years (80%) which means there are a large and growing number of BC survivors who require continuous monitoring for risk of cancer recurrence, secondary cancers as well as physical and mental health comorbidities (Brunet et al., 2012; Kelly et al., 2011). Many survivors who have undergone BC treatment (e.g., chemotherapy, radiotherapy,
surgery, adjuvant therapy) experience short-term and long-term adverse side effects associated with the treatment (Brunet et al., 2012). The side effects of treatment are often deleterious to physical and psychosocial health which compromises quality of life (QoL) (Henry et al., 2008; Phillips et al., 2014; Wurz, St-Aubin, & Brunet, 2015). Physical (e.g., pain, fatigue, nausea, and lymphedema) and psychological (e.g., depression, anxiety, and cognitive impairment with treatment) side effects associated with treatment are often experienced by BC survivors which limits activities of daily living (Henry et al., 2008; Jones et al., 2015; Karabulu et al., 2010; Myers, Wick, & Klemp, 2015).

One way to mitigate the adverse side effects associated with cancer treatment is PA. PA is a safe, non-pharmaceutical and cost-effective way to optimise recovery, manage side effects and improve overall health and QoL (Lahart, Metsios, Nevill, & Carmichael, 2015; Lee et al., 2016; Loprinzi et al., 2012). Numerous studies have recognised the important role of PA in managing physical and psychological health. The benefits of regular PA following treatment include, but are not limited to, decreased cancer related fatigue, increased exercise capacity, reduced levels of pain, decreased levels of depression and anxiety and improved self-esteem (Lahart, Metsios, Nevill, & Carmichael, 2015; Phillips et al., 2014). Evidence also suggests that PA helps reduce the risk of cancer reoccurrence and early mortality (Lahart, Metsios, Nevill, & Carmichael, 2015; Phillips et al., 2014).

The American College of Sports Medicine (ACSM) and the Centre for Disease Control (CDC) currently recommend that BC survivors engage in at least 150 minutes of moderate intensity or at least 75 minutes of vigorous intensity aerobic-type activities and two sessions of muscle strengthening activities per week (Bourke et al., 2014; Schmitz et al., 2010). Despite the acclaimed benefits of PA, it is reported that less than 22% of Canadian BC
survivors perform sufficient levels of PA (Bellizzi et al., 2005; Courneya, Katzmarzyk, & Bacon, 2008; Neil, Gotay, & Campbell, 2014). Smith and Chagpar (2010), report a similar trend among American BC survivors as only 16.4% engage in 150 minutes of recommended PA. It is well-known that BC survivors who were once active before diagnosis do not return to pre-diagnosis activity levels (Phillips & McAuley, 2013; Sander et al., 2012). The decrease in PA levels are often a result of cancer and treatment related side effects that BC survivors commonly encounter. Research has highlighted several barriers that limit BC survivors from being physically active including physical (e.g., mobility limitations, pain, fatigue), psychological (e.g., anxiety, depression, fear of injury; lack of social support; lack of self-esteem) and environmental barriers (e.g., lack of facilities, insufficient social support) (Olson et al., 2014; Sander et al., 2012; Wurz, St-Aubin, & Brunet, 2015).

Community-based PA interventions have demonstrated effectiveness in increasing PA levels and reducing treatment related side effects (Cheifetz et al., 2014; Knobf et al., 2014; McLeroy et al., 2003). The community setting is an ideal environment for PA interventions as it is a cost-effective means to being physically active (Roux et al., 2008), increases levels of social support, and has been reported to produce high adherence rates (Courneya et al., 2008; Lee, Szuck, & Lau, 2016; Swenson, Missen, & Henly, 2010). Group-based community PA programs also provide BC survivors with an opportunity to be active with “similar others”, to experience PA in a natural environment, and to build confidence and independence for PA (Burke & Sabiston, 2010; Cramer et al., 2012; Robinson et al., 2016; Sabiston, McDonough, & Crocker, 2007).

Although there is significant investment in planning, implementing, and testing interventions, little is known about how these interventions are successfully disseminated
into real-world community practice (Rabin et al., 2006). Understanding the process of transferring effective interventions from controlled research trials into the community is critical for improving population level health (Dzewaltowski et al., 2004).

1.3 Purpose and Objectives

The overarching purpose of this study was to evaluate the feasibility of a novel real-world intervention to increase PA levels in BC survivors.

The specific objectives of this study included:

1) Utilisation of the RE-AIM process evaluation framework to evaluate feasibility, in terms of practicality, acceptability, and satisfaction, of a community-based real-world intervention (i.e., use of microgrants + financial incentive) developed for BC survivors.

2) Assessment of participant perceptions concerning PA behaviours, experiences, and preferences as well as barriers and facilitators to engaging in PA.

3) Provision of evidence based recommendations for program refinement and future program dissemination.

1.4 Significance and Contribution to Research Literature

Although numerous PA interventions for BC survivors exist, very few have reported on the translational impact of these programs to community health promotion practice. Utilising the RE-AIM framework to systematically evaluate interventions is useful in outlining challenges, limitations and providing future recommendations to ensure the program will positively contribute to health promotion practice. This knowledge provides researchers and practitioners with the opportunity to refine programs to extend reach and support greater dissemination. Moreover, the current program outlined in this thesis provides
a real-world approach to improving the physical and psychosocial wellbeing of BC survivors in a model that has been used to help stimulate community-based health promotion initiatives in different health populations (e.g., other cancer populations, persons with diabetes, disability, and respiratory diseases) (Vines et al., 2011; Bobbitt-Cooke, 2005; Caperchione et al., 2010).
Chapter 2 Review of Literature

2.1 General Overview of Breast Cancer

BC is a complex heterogeneous disease that affects many women and few men. It has no single cause and is characterised by different biological and pathological features, clinical presentations and behaviours, which makes BC so diverse (Dieci et al., 2014). BC transpires when abnormal cells divide and rapidly grow in the breast, often forming a tumor (Canadian Breast Cancer Foundation, 2015). Cancer can also potentially spread beyond the breast to other areas of the body (i.e., metastasize) which raises concern because once the cancer spreads from the duct or lobule to other tissues it is considered invasive (i.e., infiltrative) (Cowell et al., 2013). If the cancer stays confined to the ducts or lobules in the breast, the cancer is considered non-invasive (i.e., in situ) (Canadian Cancer Society, 2015).

There are several types of invasive and non-invasive BCs that affect women. The most common type of BC is invasive ductal carcinoma which accounts for approximately 70-80% of all BC cases (Panis et al., 2012; Weigelt, Geyer, & Reis-Filho, 2010). This cancer begins formation in the breast ducts then spreads to nearby breast tissues or distant areas of the body (Canadian Cancer Society, 2015). The second most common type of BC is invasive lobular carcinoma and accounts for 5-10% of all BC cases (Bartella et al., 2007). This cancer forms in the lobules then, as with invasive ductal carcinoma, spreads to nearby breast tissue or distant areas of the body. Invasive lobular carcinoma is difficult to diagnose by mammography because it generally spreads as opposed to forming a mass or a lump; therefore, biopsy is a common diagnostic tool for this type of BC (Canadian Cancer Society, 2015; Bartella et al., 2007). Ductal carcinoma in situ (DCIS) is a common non-invasive early stage BC that is mostly treated successfully (Canadian Cancer Society, 2015). However,
roughly 30-50% of women with DCIS will develop invasive ductal carcinoma within ten years (Bartella et al., 2007). Lobular carcinoma in situ (LCIS) is not a true BC but rather a precursor to invasive carcinoma (Cowell et al., 2013). Women with LCIS have approximately 30% chance of developing invasive ductal or lobular carcinoma (Bartella et al., 2007). Less common BCs include inflammatory BC, Paget disease of the breast, Triple negative BC, non-Hodgkin lymphoma, sarcoma, carcinoma, and melanoma (Canadian Cancer Society, 2015).

BC is a serious disease that should not be taken lightly. Regular mammography screening everyone to two years from age 40-69 is important to catch the cancer in its early stages (Hirsch & Lyman, 2011; Lauby-Secretan et al., 2015). Additional BC screening methods include monthly breast self-examinations as well as clinical breast examinations performed by physicians, which have been reported to help detect small-size lesions (Khalili & Shahnazi, 2010). There are several signs and symptoms of BC that women should be aware of and report to their physician immediately. Common signs and symptoms of BC include finding a lump in the breast or armpit, breast pain or tenderness, changes in breast shape or size, skin changes (e.g., dimpling, redness, swelling, increased warmth, itchiness), and nipple changes (e.g., crusting, ulcers, unexpected discharge, bloody discharge, change in shape) (Canadian Cancer Society, 2015). Any suspicion of BC is often examined first with mammography as it is the gold standard for breast imaging and cancer detection (Jalalian et al., 2013). Other imaging techniques such as magnetic resonance imaging (MRI), sonography and ultrasound are often used in combination with mammography as they provide different screening images that better display abnormalities that the mammogram may not pick up (Whitman et al., 2006). A biopsy can also be performed to determine if the tumor is
cancerous (i.e., malignant) or non-cancerous (i.e., benign) (Lee et al., 2008). If the biopsy results are positive for malignancy then imaging is used to help stage the severity of the cancer (Canadian Breast Cancer Foundation, 2015).

The severity of the cancer is determined by the stage and grade at diagnosis. The grade is a prediction of how fast the cancer will grow and spread, while the stage describes how large the tumor is and the extent to which the cancer has spread (HealthLink BC, 2014; Yao et al., 2015). The most common staging system is the TNM (tumor, nodes and metastases) system (HealthLink BC, 2014; Escobar et al., 2007). The size of the tumor, number of lymph nodes involved, and degree of metastasis determines the severity of the cancer and is staged on a scale from 0 to 4 inclusively. A tumor that is small and has not metastasized is considered stage 0 or early stage cancer; the cancer is confined to the duct or lobules and has not spread to other breast tissues, lymph nodes or other areas of the body (Canadian Breast Cancer Foundation, 2015; Singletary & Connolly, 2006). Stage 0 cancer poses the greatest recovery outcome. Stage 1 cancer is characterised as a tumor size less than two centimetres in diameter and has not spread to the lymph nodes or distant areas of the body (Canadian Cancer Society, 2015; Singletary & Connolly, 2006). Cancer in stage 2-3 classifies the tumor to be between 0 and 5 centimetres diameter and possibly in the lymph nodes but has not travelled to distant areas of the body (Canadian Cancer Society, 2015; Singletary & Connolly, 2006). Cancer that has spread to the lymph nodes and other distant areas of the body, regardless of the tumor size, is classified as Stage 4 or advanced cancer and poses the most unfavourable outcome (Canadian Breast Cancer Foundation, 2015; Singletary & Connolly, 2006).
Regardless of the stage or type of cancer, a person is considered a BC survivor from the time of diagnosis until end of life (Centres for Disease Control, 2015; Clark & Stovall, 1996; Hewitt, Greenfield, & Stovall, 2006; Khan et al., 2012; Mullan, 1985; National Cancer Institute, 2005; Reuben, 2004). Several studies label a cancer survivor as someone who completes primary and systemic treatment (Little et al., 2002) or someone who is disease free for five years (Ganz, 2007; Rowland, 2007); however, identifying a person as a survivor of cancer through and beyond cancer diagnosis may provide a sense of empowerment, positive orientation and fosters pragmatic health beliefs and behaviours compared to being labelled as a cancer patient or victim (Deimling, Bowman & Wagner, 2007; Khan et al., 2012).

2.2 Incidence and Prevalence of Breast Cancer

BC is the most commonly diagnosed cancer and the second leading cause of cancer related death in Canadian women (Canadian Breast Cancer Foundation, 2015; Dumalaon-Canaria et al., 2014). The Canadian Cancer Society estimated 25,000 Canadian women were diagnosed with BC and 5,000 women died from the disease in 2015 (CCSACCS, 2015). The incidence of BC in Canada is predicted to rise to 31,255 in the year 2030 (CCSACCS, 2015). Although BC predominantly affects women, men can also develop BC with an estimated 220 diagnoses in 2015 (Canadian Breast Cancer Foundation, 2015). It is anticipated that one in nine Canadian women will be diagnosed with BC during their lifetime and this number is expected to grow as Canada’s population and the proportion of older adults continues to increase (CCSACCS, 2015). The incidence of BC in women increases with age as 52% of BC diagnoses occur in women 50-69 years and 30% of diagnoses occur in women over 69 years (Ban & Godellas, 2014; Canadian Breast Cancer Foundation, 2015; Dumalaon-Canaria et al., 2014). Despite increasing incidence rates, more people are surviving BC. Due to
advancements in technology, medicine and early detection, mortality rates have decreased by 44% since 1989 and survival rates have increased to 87% five years post diagnosis (Canadian Breast Cancer Foundation, 2015; Wurz, St-Aubin, & Brunet, 2015). Data from 2009 suggests that 157,000 Canadian women and 1,000 men who were diagnosed with cancer from years 1999-2009 are still living (Canadian Breast Cancer Foundation, 2015). The high prevalence and incidences are largely due to risk factors that predispose women to developing BC.

2.3 Risk Factors for Breast Cancer

BC is a multifactorial disease comprising of genetic and/or non-genetic variables (Krishnamurthy, Soundara, & Ramshankar, 2016; Weigelt, Geyer, & Reis-Filho, 2010). There are specific non-modifiable and modifiable risk factors that increase the odds of developing the disease. Non-modifiable risk factors are characteristics that cannot be changed (e.g., human biology) such as age, sex, genetics, family history, dense breasts, early age menarche, late menopause, race, culture, socioeconomic status (SES), family history, and personal history (Kaminska et al., 2015; Krishnamurthy, Soundara, & Ramshankar, 2016). Despite the inability to modify these factors, it is important to mitigate these risk factors by encouraging healthy behaviours (e.g., PA, healthy eating) to reduce the risk of developing BC (Ban & Godellas, 2014; Krishnamurthy, Soundara, & Ramshankar, 2016). Modifiable risk factors are factors that can be changed (e.g., lifestyle behaviours) (Krishnamurthy, Soundara, & Ramshankar, 2016). Modifiable risk factors include physical inactivity, obesity, smoking, high alcohol consumption, unhealthy eating, hormone replacement therapies, environmental conditions, and women who have pregnancies after the age of 30 or never experience childbearing (Albrektsen et al., 2005; Chie et al., 2000; Dieterich et al., 2014; Dumalaon-Canaria et al., 2014; Kaminska et al., 2015; Yang et al., 2011). Although the risk
for developing BC can be greatly reduced by modifying lifestyle behaviours to include more PA and healthy eating, long-term positive behaviour change remains to be a challenge (Kohler et al., 2016). The World Health Organization (WHO) indicates 30-40% of cancer deaths could be prevented by modifying lifestyle-related risk factors such as being physically active, eating a healthy diet, maintaining a healthy weight, and abstaining from tobacco and alcohol use (Bode & Dong, 2009; Petersen, 2009). Approximately 23% of BC cases in post-menopausal women have been attributed to obesity, while physical inactivity accounted for 16.5% of BC cases (Parkin et al., 2011). In regards to physical inactivity and the risk for developing BC, several other studies report similar findings. Catsburg et al. (2014), reported that Canadian women (N=3,320) who were less active (e.g., 3 metabolic equivalent task [MET] hours per week) had a 21% increased risk for developing BC compared to Canadian women who were more active (30.9 MET hours per week) (p<0.005). Similarly, Ekenga, Parks and Sandler (2015), investigated occupational PA levels in women (N=45,373) from the United States and Peurto Rico. Women who had sedentary occupations (i.e., primarily sitting jobs with some walking and/or standing) were compared to women with active occupations (i.e., active or laborious jobs that induced sweating or increased heart rate). The results revealed women with sedentary occupations had a 28% greater risk of developing BC compared to women with active occupations. In regard to obesity, which is associated with an imbalance of caloric intake and energy expenditure, Catsburg et al. (2014) investigated the associations of anthropometric measurements and the risk for BC in Canadian women. They found that post-menopausal women who gained at least 15.9 kgs since the age of 20 were at a 39% greater risk for developing BC.
Although women may be predisposed to developing BC because of family history or genetics, living a healthy lifestyle can greatly reduce the risk for developing BC (Catsburg et al., 2014; Forshee, Storey, & Ritenbaugh, 2003). Therefore, bringing awareness to the modifiable risk factors outlined above may help prevent and reduce the incidence of new and recurring BC cases (Dieterich et al., 2014). Unfortunately, a large number of survivors still develop the disease and experience long-term physical and psychological detriments associated with BC and related treatments.

2.4 The Detrimental Effects of Breast Cancer and Related Treatment

It has been reported that BC survivors suffer a variety of outcomes following diagnosis such as pain, lymphedema, dyspnoea, weight gain, reduced exercise capacity, fatigue, depression and anxiety (Jones et al., 2015; Liu et al., 2009; Karabulu et al., 2010); all of which decrease survivors’ ability to perform daily activities (Karabulu et al., 2010). Over the course of treatment there is a further decline in QoL as many BC survivors experience treatment related side effects that hinder physical and psychological health (Henry et al., 2008; Wurz, St-Aubin, & Brunet, 2015). In many cases, the adverse physical and psychological outcomes associated with treatment persist for years following treatment (Fann et al., 2008; Singh, Singh, & Mhetre, 2012).

2.4.1 Impact of BC on Physical Health

Pain. A common symptom reported by BC survivors is persistent pain following BC treatment (Andersen & Kehlet, 2013; Gärtner et al., 2009). As many as 10-60% of BC survivors experience chronic pain following surgery which hinders physical functioning and diminishes QoL (Andersen & Kehlet, 2011; Gärtner et al., 2009). BC patients who undergo surgery (e.g., mastectomy, breast conserving surgery, lymph node removal) may experience
nerve damage causing persistent pain beyond the normal healing time of three months (Andersen & Kehlet, 2011; Gärtner et al., 2009). This condition is known as pain syndrome or Post Mastectomy Pain Syndrome (PMPS). PMPS is a neuropathic pain condition caused by surgical lesions resulting in intercostobrachial neuralgia, neuroma pain, or phantom breast pain (Fabro et al., 2012). BC survivors with PMPS following surgery commonly feel a burning or shooting pain with the feeling of pressure or numbness localised in the axilla (i.e., armpit), medial upper arm, breast and/or chest wall (Fabro et al., 2012).

Fabro et al. (2012), evaluated the incidence of pain syndromes in BC survivors (N=203; M_{age}=59±13 years) eight months following surgery (i.e., mastectomy or axillary lymphadenectomy) and found that 52.9% of BC survivors reported pain syndrome. Of those that reported pain syndrome, 52.6% experienced hyperaesthesia when palpating the inner arm or axilla, 3.2% experienced phantom breast pain, 17.4% presented with axillary web syndrome, and 27.2% experienced pain during the shoulder tests. Similarly, Thomas-MacLean et al. (2008) evaluated the incidence of pain, specifically arm pain, in Canadian BC survivors (N=347) who were six to twelve months post-surgery. Survivors completed the Short-Form McGill Pain Questionnaire (MPQ-SF); a self-report tool to evaluate sensory changes such as pain, tenderness, aching, and heaviness. Participants (39%) reported they experienced some pain while 18% reported discomforting or distressing pain six to twelve months post-surgery. Additionally, Gärtner et al. (2009) examined the intensity and location of pain and sensory disturbance in Danish women (N=3253) who received surgery or adjuvant therapy to treat BC. They found that 1529 women experienced some level of pain one to three years post-treatment, of which 198 reported severe pain, 596 reported moderate pain and 734 reported light pain. In the same study, 1882 women experienced sensory
disturbances; approximately 66% of the sensory disturbance complaints stemmed from discomfort in the axilla region, followed by 43% reporting discomfort in the breast area, then the affected side of the body reported by 30%.

BC patients who receive chemotherapy or adjuvant therapy may also experience pain related to the treatment. Women undergoing chemotherapy and/or radiotherapy frequently report nociceptive and neuropathic pain (Karabulu et al., 2010; Reyes-Gibby et al., 2010; Spichiger et al., 2011; Yamagishi et al., 2009). Karabulu et al. (2010), evaluated the prevalence and severity of symptoms in Turkish cancer patients. All the cancer survivor participants (N=287) from the medical oncology clinic in Turkey received either chemotherapy, radiotherapy or adjuvant therapy. Subjects were given the M.D. Anderson Symptom Inventory (MDASI) to assess the severity of cancer related symptoms on a scale of 1-10. The MDASI assesses multiple cancer related symptoms in adults, including pain, and how it interferes with daily living. Approximately 87.8% of participants reported pain on average 2.9 ± 2.5 years since diagnosis. Of the women who reported pain, 20.5% reported moderate pain and 39.7% reported severe pain. Similarly, a study by Ivanova et al. (2005) also used the MDASI to evaluate symptom severity of cancer in women. They reported that common symptoms, including pain, interfered with work the most and general activity, followed closely by mood, enjoyment of life and walking. Similarly, Reyes-Gibby et al. (2010) investigated neuropathic pain in BC survivors (N=240; M_{age}=58±16 years; Time since BC diagnosis = 9±2.1 years). The Self-Report Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS) was used to assess neuropathic pain. Approximately 108 BC survivors reported pain within the week with feelings of “numbness” (n=47), “pins and needles” (n=45) and “hot/burning” sensations (n=48).
Managing pain is important for BC survivors as it has been reported to lead to other detriments including cancer-related fatigue, lower levels of physical function, depression and reduced QoL (Cantarero-Villaneuva et al., 2012; Green et al., 2011).

**Lymphedema.** Lymphedema is a debilitating treatment related side effect that affects approximately 20% of BC survivors (Petrek et al., 2001). It consists of accumulation of lymph fluid subcutaneously causing chronic swelling and discomfort in the ipsilateral arm or hand of the treatment area (Lane, Jespersen, & McKenzie, 2005). The onset of BC related lymphedema (BCRL) commonly occurs within the first three years of treatment (Jonsson & Johansson, 2009) however there is a 50% chance that a BC survivor will develop BCRL up to 20 years post treatment (Petrek et al., 2001). BCRL is most prevalent in women who have received axillary surgery (Jonsson & Johansson, 2014). Other forms of treatment such as radiotherapy and chemotherapy also increase the risk for developing lymphedema (Das et al., 2015; Jonsson & Johansson, 2014).

Das et al. (2015), investigated the association between treatment related risk factors and developing lymphedema in BC survivors (N=199). BC survivors participated in a long-term QoL study to assess survival and QoL. BC survivors were contacted 12-15 years post-diagnosis to complete a standardised questionnaire. Of the 199 women who participated in the study, 43 reported physician-diagnosed lymphedema. The risk for developing BCRL was associated with axillary lymph node dissection, tamoxifen use, and overweight women who were on tamoxifen. The risk for lymphedema was greatest in overweight and obese women (BMI>25 kg/m²) who were treated with tamoxifen (p<0.05). Common lymphedema symptoms reported by BC survivors included burning pain (n=13), numbness (n=29), tightness (n=33), tension (n=17), heaviness (n=22), hardness (n=15), loss of mobility (n=12),
loss of strength (n=25) and decreased range of motion (n=17). It was also reported that BCRL negatively impacted activities of daily living and made common duties such as cooking, fitness and sports activities, house cleaning, driving, gardening, sleeping, and other activities more difficult.

Although there is no cure for BCRL, swelling can be managed by skin care treatments, manual lymphatic drainage, pneumatic pumping, and compression sleeves (Erickson et al., 2001; Pain & Purushotham, 2000). BCRL induces great pain that has been reported to limit functional use of the arm, create psychosocial maladjustment, and increase psychological distress compared to BC survivors without BCRL (Tobin, Lacey, Meyer, & Mortimer, 1993). Many of these factors contribute to diminished physical and psychosocial health, and QoL (Beaulac et al., 2002).

Weight gain. Weight gain following diagnosis is common in BC survivors (Atalay & Küçük, 2015; Wurz et al., 2015). Managing body weight and limiting weight gain is important because increased fat mass following diagnosis has been associated with increased risk for BC recurrence within five years and a 60% chance of mortality over 10 years compared to survivors of healthy weight (Chlebowski, Aiello, & McTiernan, 2002; Goodwin & Boyd, 1990). For example, Chen et al. (2010) evaluated weight changes in BC survivors (N=5042) at diagnosis to six months and 18 months post-diagnosis. The study found that weight increased from diagnosis to six months (10.0±3.7 kg; p<0.001) and 18 months (1.7±4.4 kg; p<0.001) post-diagnosis, respectively. BC survivors that had a BMI greater than 30 kg/m² had greater mortality rates than women between 18.5 kg/m² and 25 kg/m². It was also revealed that women who gained more than 5 kgs since diagnosis had higher all-cause mortality and cancer specific mortality rates than BC survivors who maintained their weight.
Consistent with other research, BC survivors gain an average of 2.9-4.4 kgs. with one third of survivors gaining 5 kgs. following chemotherapy (Demark-Wahnefried & Rock, 2003; Lankester et al., 2002).

Approximately 60% of survivors experience weight gain during or following adjuvant chemotherapy (Saxton et al., 2006; Vance et al., 2011). Keun et al. (2009) investigated the physiological effects of weight gain during adjuvant chemotherapy for early BC in postmenopausal women (N=21). Metabolic, cytokine, and appetite-related peptides were compared before and during treatment. Approximately 48% of BC survivors gained weight over the course of treatment. There was an average increase in body weight of 0.1 kg/wk and an average 6.4% (p<0.05) increase in body fat over 18 weeks. It has been also suggested the side effects associated with treatment, such as fatigue and psychological distress, may lead to poor diet choices and low levels of PA resulting in weight gain (Vance et al., 2011). However, there is insufficient research that reports changes in dietary intake pre- and post-treatment and weight gain in BC survivors (Vance et al., 2011). Numerous studies have documented reduced PA levels during and after treatment which suggests an explanation for weight gain post-diagnosis (Vance et al., 2011).

Patients who gain weight following treatment are more susceptible to serious health risks compared to those with a healthy body weight. Research by McTiernan et al. (2003), suggests that excessive adipose tissue increases circulating bioavailable estrogen, a tumor promoting hormone (McTiernan et al., 2003). Estrogen stimulates cell division which increases the potential for DNA mutation and the growth of estrogen dependent tumors (Vance et al., 2011). Therefore, excessive estrogen levels have been associated with greater chance of cancer occurrence and recurrence (Rock & Demark-Wahnefried, 2002). It is also
suggested that visceral adiposity increases insulin, insulin-like growth factors (IGF-I, IGF,II) and leptin which may be associated with cell proliferation and BC development (Carmichael, 2006; Carmichael & Bates, 2004). These results indicate the importance of living a healthy lifestyle to mitigate weight gain as many studies suggest that weight gain or obesity is an independent prognostic variable for worse BC outcomes (Chen et al., 2010; Demark-Wahnefried & Rock, 2003; Vance et al., 2011).

*Reduced exercise capacity.* Another common outcome from cancer treatment (e.g., chemotherapy, radiation) is diminished exercise capacity (Adamsen et al., 2006). PA levels in BC survivors often decline due to fatigue, depression, or physical ailments which negatively impact exercise capacity. Exercise capacity generally declines because in-treatment BC survivors do not have the energy to get up and engage in PA due to the treatment-related side effects, resulting in greater sedentary behaviours for years post treatment (Haas et al., 2012). BC survivors who have low cardiovascular fitness (below VO$_2$max of 8 METs or below 28mL•kg$^{-1}$•min$^{-1}$) have a three-fold increase in mortality (Peel et al., 2009). A study by Jones and colleagues (2012) revealed that BC survivors had a 22% lower VO$_2$ max compared to sedentary, aged-matched women who had not lived with cancer. Sedentary BC survivors often find it more difficult to climb stairs or walk far distances which can make activities of daily life problematic. According to Lucia et al. (2003), BC survivors undergoing chemotherapy quickly reach their maximum VO$_2$ just by performing simple leisure activities such as walking outside. Therefore, they can only do activities that are limited to few body movements which further creates detraining and decreased exercise capacity.
Fatigue. For many BC survivors cancer related fatigue (CRF) is a chronic, unpleasant, distressing, and life limiting occurrence that adversely affects physical, emotional, and/or cognitive abilities (Berger et al., 2010). CRF is identified as a subjective feeling of weakness, lack of energy, or tiredness that cannot be relieved by sleep or rest (Radbruch et al., 2008). It is a common symptom reported by 58% to 94% of BC survivors during treatment and 56% to 95% following adjuvant chemotherapy (de Jong et al., 2004). CRF has also been reported to persist up to five years following treatment affecting up to 30% of survivors (Bower et al., 2000; Servaes, Verhagen, & Bleijenberg, 2002). BC survivors who receive both chemotherapy and radiation are more likely to experience fatigue up to 10 years post treatment compared to survivors who receive radiation or chemotherapy alone (Bower et al., 2006). Approximately 28.4% of BC survivors who received both radiation and chemotherapy reported fatigue 10 years post diagnosis compared to 19.7% who received only radiation or chemotherapy. A longitudinal study by Bower et al. (2006) evaluated the prevalence and persistence of post-treatment fatigue in BC survivors (N=817). The study demonstrated that 35% of BC survivors reported severe levels of fatigue five years post-diagnosis and 34% reported severe levels of fatigue 10 years post-diagnosis. Fatigue was also associated with depression as BC survivors who experienced depression within one year post-treatment were at a greater risk for long term fatigue (Bower et al., 2006). Furthermore, CRF has commonly been reported to impair mood, social interaction, sleep, daily activities, and overall quality of life (Bower et al., 2002; Ganz et al., 2002). CRF induced by treatment may limit physical function, impede the ability to work and engage in social and leisure activities (Mock, St Ours, & Hall, 2007) which can lead to lower levels of
PA and induce muscle atrophy (Lucia, Earnest, & Perez, 2003). Therefore, when BC survivors exercise, fatigue is exacerbated due to low exercise capacity with detraining.

2.4.2 Impact of BC on Psychological Health

A BC diagnosis is a life altering event. Every individual has a different psychological response to the news of BC. The different psychological responses among women with BC can be attributed to differences in personality profiles, coping strategies, and availability of social support (Singh, Singh, & Mhetre, 2012). Most women will experience a myriad of emotions such as shock, fear of dying, anger, doubt and concern about the impact on family upon receiving BC diagnosis (Leedham & Ganz, 2009). These emotional responses often lead to depression, anxiety, fatigue, and mood disturbance (Cvetkovic & Nenadovic, 2016; Rabin et al., 2009; Singh, Singh, & Mhetre, 2012). Some women may experience a sense of relief knowing their suspicion of cancer has been confirmed and will be tended to through treatment. However, unfamiliarity with treatment and the adverse side effects associated with treatment often generates unfavourable emotional and psychological outcomes which deteriorates QoL (Canadian Breast Cancer Foundation, 2015; Jones et al., 2014). Completing treatment often augurs an expectation of returning to a “normal life” but psychological distresses, such as depression and anxiety, commonly persist for years following treatment (Hodgkinson et al., 2007).

Depression. Depression is the most common psychological disorder reported among BC survivors (Cvetkovic & Nenadovic, 2016; Tojal & Costa, 2015). It is an emotional state characterised by profound feelings of sorrow, worthlessness, negative thoughts, energy deprivation or lack of interest in activities (Cvetkovic & Nenadovic, 2016). It can be displayed emotionally (e.g., feeling sad, hopeless, suicidal) and physically (e.g., lack of
energy, lack of sleep, deprived appetite, bodily pain) (Singh, Singh, & Mhetre, 2012). It generally stems from mutual interactions between biological (e.g., genetic, biochemical), psychological (e.g., fear of deterioration and pain) and social factors (e.g., separation and isolation from loved ones) (Cvetkovic & Nenadovic, 2016). The onset of depression often occurs immediately following diagnosis and treatment, and can either decrease over time or persist for many years, impacting QoL (Tojal & Costa, 2015). Coping with a cancer diagnosis, the adverse effects of the disease, the invasive treatments along with the associated physical body changes can be extremely difficult for BC survivors (Tojal & Costa, 2015).

According to Stanton (2006), approximately 10-30% of survivors experience depressive disorders such as adjustment disorder, major depressive disorder and mood disorder with the highest risk up to a year following BC diagnosis. A similar trend was reported by Fann et al. (2008) where 41% of American women recently diagnosed with BC experienced distress and 11% experienced major depressive disorder. The greatest risk for depression is in the first year of diagnosis (Rowland, 1999) specifically among younger BC patients (Compas et al., 2009). Most women have concerns and fears about physical appearance such as hair loss from chemotherapy, disfigurement from surgery and weight gain or loss (Singh, Singh, & Mhetre, 2012). Women who receive chemotherapy, radiation or adjuvant therapy are more likely to be depressed compared to patients who do not receive these methods of treatment (Leedham & Ganz, 1999; Schagen et al., 1999; van Dam et al., 1998). The presence of persistent pain during and after treatment is a large contributor to depression (Cantarero-Villanueva et al., 2012). Stanton et al. (2000) also reported that age is inversely related to distress as younger women report more symptoms of depression than older women. Women with later stage cancer are more prone to depression (50%) compared
to women diagnosed with early stage cancer (11%) (Singh et al., 2012). It was also reported by Epping-Jordan and colleagues (1999), that women with less education had poorer psychological adjustment or coping strategies by avoiding emotions, thoughts, or information regarding cancer. Tojal and Costa (2015), examined the prevalence of depressive symptoms in BC survivors (n=150), using the Beck Depression Inventory and the Mini Mental Adjustment to Cancer Scale. The results indicated 56.5% of BC survivors reported significant symptoms of depression. Depression was positively correlated with feelings of helplessness/hopelessness (p<0.001) and anxious preoccupation (p<0.001) and was negatively correlated with less fighting spirit (p<0.001), and cognitive avoidance (p<0.001) (Tojal & Costa, 2015). Managing stress and depression is important because of the possible association between the psychological and biological disease processes (Compas & Leucken, 2002). As stress levels elevate persistently, the output of cortisol increases and compromises immune function in BC survivors (Compas & Leucken, 2002). Therefore, managing depression is important as depressive symptoms negatively affect physical functioning and comorbidity (Jones et al., 2015).

Anxiety. Many BC survivors experience anxiety, which is characterised as fearful anticipation of a threat or danger (Naus, Price, & Peter, 2005). In particular, anxiety is often associated with poor adjustment to BC and anxious preoccupation (Jones, Hadjistavropoulos, & Gullickson, 2014). It often occurs over the trajectory of cancer experiences such as during screening, at diagnosis, the commencement of treatment, concern about treatment side effects, and concern for cancer recurrence post-treatment. Anxiety may exist independently or commonly coexists with depression (Fatiregun et al., 2016). Greater levels of anxiety are associated with low levels of social support, demographic factors (e.g., younger age) and
socio-economic factors (e.g., poor financial situation) (Fatiregun et al., 2016; Ho et al., 2013). The feeling of not being in control of your health, not knowing the long-term outcome and the fear of dying are all contributors to anxiety (Canadian Breast Cancer Foundation, 2015; Jones, Hadjistavropoulos, & Gullickson, 2014). Most women encounter anxiety immediately prior to the beginning of surgery or chemotherapy as they are unfamiliar with cancer treatment (Jones, Hadjistavropoulos, & Gullickson, 2014; Leedham & Ganz, 1999). Rabin et al. (2009), report that approximately 48% of BC survivors experience clinically significant depression and anxiety following diagnosis which decreases QoL (Naus, Price, & Peter, 2005; Rajotte et al., 2012). The anxiety associated with cancer often remains high following cancer treatment (Ruiz et al., 1999). New or persistent symptoms can cause anxiety as patients may not be able to distinguish symptoms that are common or foreseeable and symptoms that are unusual or create concern (Jones et al., 2014; Leedham & Ganz, 1999). Anxiety can also impair cognitive function and the ability to process information (Hodgkinson et al., 2007; Leedham & Ganz, 1999). For example, Ando-Tanabe and colleagues (2014), evaluated the impact of chemotherapy and psychological stress on cognitive function in BC survivors (n=18) before and after chemotherapy compared with healthy controls (n=20). BC survivors completed several neuropsychological tests from the Wechsler Memory Scale (e.g., Logical memory I and II, Verbal paired associates I and II) and a psychological test called the Hospital Anxiety and Depression Scale. Ando-Tanabe et al. (2014) reported that change scores in the verbal memory test (p<0.05) and executive function test (p<0.05) were significantly negatively correlated with the change score for Hospital Anxiety and Depression Scale in BC survivors who received chemotherapy. This
suggests greater levels of psychological distress were associated with poor cognitive function.

Managing chronic stress and anxiety is important because it is associated with dysregulation of cortisol. An increase in cortisol production associated with stress may influence inflammation and immune function in ways that induce fatigue, depression, and increase the risk of cancer recurrence (Sephton et al., 2000; Thornton, Andersen, & Carson, 2008). Anxiety may increase feelings of pain related to cancer treatment, interfere with sleep, cause nausea, negatively affect activities of daily living and interfere with QoL (Baquytayan, 2012; Hopko et al., 2016). In support of this, Sarkar and colleagues (2015), investigated the relationship between fear of cancer recurrence, anxiety, supportive care needs, and utilization of the health care services in cancer patients (N=335). Subjects completed the Fear of Progression Questionnaire-Short Form, the General Anxiety Disorder Scale, and the Supportive Care Needs Survey. Anxiety contributed to unmet needs in physical and daily living (p<0.01). Survivors reported a high number of unmet supportive care needs, specifically in the domains of the health care system and information (p<0.001), as well as and psychology (p<0.001). Women who feared cancer reoccurrence significantly predicted unmet supportive care needs. The unmet needs included lack of information, followed by lack of psychological support, needs according to patient care and support, needs concerning PA and daily living and needs regarding sexuality. Ho and colleagues (2013), investigated the relationship between depression, anxiety and QoL (physical, emotional, social, and functional well-being) in BC survivors. Women undergoing adjuvant therapy (n=269) and women who have completed treatment for at least a year (n=148) completed the Hospital Anxiety and Depression Scale survey and the Functional Assessment of Cancer Therapy-
General. In treatment, BC survivors experienced greater levels of anxiety (Mean = 4.9±3.8) compared to post treatment survivors (Mean = 3.1±3.1). They also experienced lower levels of physical (p<0.001), emotional (p<0.001), and functional (p<0.001) well-being compared to post-treatment BC survivors.

*Cognitive impairment.* Many BC survivors report some degree of cognitive impairment following completion of chemotherapy (Collins et al., 2013). However, 17% to 34% of BC survivors report long-term cognitive impairment (Ahles & Saykin, 2007) up to 20 years following treatment (Koppelmans et al., 2012). Common cognitive changes include forgetfulness, absentmindedness, inability to focus during daily tasks, short-term memory, difficulty with reading comprehension and concentration (Hess & Insel, 2007; Myers, 2012).

Von Ah and Tallman (2015), explored cognitive performance (i.e., verbal memory, speed of processing, and executive functioning) and symptoms of depression, fatigue, anxiety, and sleep in post-treatment BC survivors (N=88; M_{age}=56.7±8.5 years; 5.3±4.1 years post-treatment) using the Functional Assessment of Cancer Therapy-Cognitive (FACT-Cog) scale. Approximately 94% of participants reported significant perceived cognitive impairment (PCI). PCI was associated with immediate and delayed verbal memory, depressive symptoms, fatigue, anxiety, and poor sleep quality. Similarly, Myers, Wick, & Klemp (2015), evaluated possible factors associated with perceived cognitive impairment (PCI) in BC survivors (n=317) compared to healthy controls (n=46). Participants completed the MD Anderson Symptom Inventory, Attentional Function Index, and Functional Assessment for Cancer Therapy-Cognition. The study revealed BC survivors reported PCI significantly more than the healthy controls (p<0.0001). BC survivors who recently competed treatment (<5 years) reported more attentional fatigue compared to the healthy
controls and BC survivors who have been out of treatment for years (>5 years). There was a significant correlation between neuropathy and PCI in BC survivors (p<0.0001). There was also a significant correlation for both PCI and Attentional Function Index (AFI) with fatigue (p<0.001), sleep disturbance (p<0.0001), and distress (p<0.0001) for BC survivors who were in the process of chemotherapy or completed chemotherapy.

Despite all the negative physical (e.g., pain, lymphedema, weight gain, reduced exercise capacity, fatigue) and psychological (e.g., depression, anxiety, cognitive impairment) detriments due to cancer and all the side effects associated with treatment, there is a way to mitigate these adverse effects. PA is a non-pharmaceutical means to managing the adverse physical and psychological effects associated with the disease and treatment, in addition to preventing BC and BC recurrence (Denmark-Wahnefried & Jones, 2008; Ibrahim & Al-Homaidh, 2011; Speck et al., 2010).

2.5 Physical Activity

PA is associated with the prevention and management of chronic disease and has been highly advocated for general health benefits (Hair et al., 2014; Nunan et al., 2013). In particular, many studies suggest PA can reduce BC mortality rates and recurrence (Ibrahim & Al-Homaidh, 2011; Wiggins & Simonavice, 2010) and improve the physical and psychosocial detriments often experienced by BC survivors (Christopher & Morrow, 2004; Ibrahim & Al-Homaidh, 2011; Holmes et al., 2005; Kim, Sim, Jeong, & Kim, 2010). More specifically, engaging in the recommended levels of PA (i.e., 150 minutes of mod-vigorous PA per week) regardless of type (i.e., aerobic, resistance, and flexibility), has been consistently reported in managing common side effects associated with BC and related treatments such as pain (Schmitz et al. 2009), lymphedema (Lane et al., 2005; Schmitz et al.
2009), body weight (Cadmus et al., 2009; Irwin et al., 2009), exercise capacity (Lucia, Earnest, & Perez, 2003), fatigue (Daley et al., 2007; Pinto et al., 2005), depression (Bower et al., 2012; Daley et al., 2007), anxiety (Schmitz et al., 2010), and cognitive impairment (Myers, Wick, & Klemp, 2014).

There are numerous types of aerobic (or endurance) activities that can improve physical and psychological wellbeing in BC survivors who have undergone treatment. Common aerobic activities, such as brisk walking, biking, swimming, and hiking, three to five times per week for 10-50 minutes, are reported to be effective at reducing percentage of body fat (Cadmus et al., 2009; Irwin et al., 2009), rates of depression (Daley et al., 2007; Segar et al., 1998), anxiety (Segar et al., 1998), and levels of fatigue (Daley et al., 2007; Pinto et al., 2005). These activities have also been effective at improving QoL (Courneya et al., 2003), self-esteem (Courneya et al., 2003; Fairey et al., 2005), physical and functional well-being (Courneya et al., 2003; Fairey et al., 2005), aerobic fitness (Daley et al., 2007), sleep quality (Payne et al., 2008), body esteem (Pinto et al., 2005), peak oxygen consumption (Courneya et al., 2003; Fairey et al., 2005) and peak power output (Courneya et al., Fairey et al., 2005). For instance, Yang, Chen and Li (2014), examined the efficacy of an aerobic exercise program on fatigue in Taiwanese BC survivors undergoing radiotherapy. Survivors assigned to the intervention group (n=28) participated in a six-week moderate intensity aerobic exercise program on a treadmill while women in the control group (n=30) received routine cancer care without an exercise program. Women in the aerobic exercise program had significantly lower levels of fatigue over time compared to women in the usual care group (p<0.0001). Another study by Rogers and colleagues (2015) examined the effects of the Better Exercise Adherence after Treatment for Cancer (BEAT Cancer) program, a behaviour
change intervention aimed at increasing PA levels, aerobic fitness and QoL in BC survivors. Survivors in the BEAT Cancer program underwent a three-month intervention comprised of three weekly supervised aerobic PA sessions, face-to-face counselling, and group discussions whereas survivors in the control group continued with usual cancer care. Survivors in the BEAT Cancer program had improved fitness (p<0.001) and QoL (p<0.001) compared to the usual care group. Furthermore, research by Daley et al. (2007) showed that light to moderate exercise three times per week for eight weeks was effective at improving QoL (p<0.05), depression (p<0.01), and aerobic fitness (p<0.001) in post treatment BC survivors who exercised (n=34) compared to the usual BC care control group (n=38).

It has been reported that resistance (or strength) exercises such as using free weights, machines, elastic bands or an individual’s own body weight, improve strength and overall well-being for BC survivors (De Luca et al., 2016). For example, Schmitz et al. (2009), assessed the effects of weight lifting (two times per week for 90 minutes for 13 weeks supervised; 39 weeks unsupervised) on lymphedema and strength in post-treatment BC survivors (n=141). At 12 months, BC survivors increased their strength compared to the control group (p<0.001) and had improvements in self-reported severity of lymphedema symptoms (p<0.05) and incidence of lymphedema exacerbations (p<0.05). Resistance exercises are also effective at improving psychological well-being. Ohira et al. (2006), evaluated changes in QoL and depressive symptoms in post treatment BC survivors (N=86; 4-36 months post treatment). BC survivors weight trained (i.e., free weights and resistance machines) two times per week for three months, in a supervised setting and were encouraged to continue to train on their own following the intervention. At the six-month follow-up, BC
survivors had improvements in physical (p<0.01) and psychosocial (p<0.05) QoL, muscle strength (p<0.01) and lean muscle mass (p<0.01).

Flexibility exercises, which encompass movements that lengthen muscles to increase range of motion around joints, are also beneficial to physical and psychological health of BC survivors (Brunet, Sabiston, & Meterissian, 2010; Mustian et al., 2006; Bower et al., 2012). For example, tai chi has been reported to be effective at improving overall QoL, self-esteem, aerobic capacity muscular strength, and flexibility in post-treatment BC survivors (Mage=52 years) (Mustian et al., 2004; Mustian et al., 2006). It has also been reported that yoga, another common flexibility activity for survivors, is effective at improving mental health, vitality, bodily pain, fatigue, and depressive symptoms (Bower et al., 2012; Speed-Andrews et al., 2010) in BC survivors. Bower et al. (2012), evaluated the feasibility of an Iyengar-based yoga intervention on persistent post-treatment fatigue. BC survivors were randomly allocated to a 12-week yoga program (n=16) or a 12-week health education program (control) (n=15). The yoga classes were 90 minutes long and were twice a week. All subjects completed the Fatigue Symptom Inventory, Beck-Depression Inventory, Perceived Stress Scale and the Pittsburgh Sleep Quality Index at baseline, two weeks post-intervention and three months post-intervention. The yoga program was effective at reducing the severity of fatigue in the yoga group compared to the control group (p<0.05). Additionally, the yoga group had more vigor (p<0.05), positive changes in depressive symptoms (p<0.05) and perceived less stress (p<0.05) compared to the control group.

Despite the health benefits associated with PA, many studies report that majority of BC survivors are not active enough to receive these health benefits following treatment (Harrison, Hayes, & Newman, 2009; Irwin et al., 2004; Rogers et al., 2011). BC survivors
are encouraged to engage in at least 150 minutes of moderate-to-vigorous PA (MVPA) weekly to receive the physical and psychological benefits outlined above, (Brunet, Sabiston, & Meterissian, 2012; Wurz et al., 2015) however, evidence indicates that fewer than 22% of Canadian BC survivors are meeting these recommended guidelines (Bellizzi et al., 2005; Courneya, Katzmarzyk, & Bacon, 2008; Neil, Gotay, & Campbell, 2014). A prospective study by Andrykowski, Beacham, & Jacobsen (2007) investigated PA levels in early staged BC patients (N=231) and found 70% of women met PA guidelines prior to diagnosis, however, following the first round of treatment only 39% of patients met the PA guidelines. This number further decreased to 15% following the second round of treatment. Moreover, two months following treatment only 41% reached recommended PA levels, further decreasing to 37% six-months post-treatment (Andrykowski, Beacham, & Jacobsen, 2007).

Decreased PA levels is often a result of specific barriers that BC survivors experience from the time of diagnosis which persist for many years post treatment. These barriers are often categorised as physical, psychological and environmental barriers, as outlined in the next section.

2.6 Barriers to Breast Cancer Survivors Being Physically Active

Despite the well-known benefits of PA on physical and psychosocial health, participation in and adherence to PA is low among BC survivors (Craig et al., 1999; Brunet et al., 2013). Evidence suggests that the low rate of participation is linked to many physical, psychological, and environmental barriers that BC survivors experience because of the disease and subsequent treatments (Leach et al., 2015; Wurz et al., 2015; St-Aubin, & Brunet, 2015; Crombie et al., 2004; Olsen et al., 2014).
2.6.1 Physical Barriers

Although treatment is imperative for recovery, the harsh effect of surgery, chemotherapy, radiation, and hormone therapy induces a myriad of physical limitations such as pain, lymphedema, musculoskeletal limitations, cardiopulmonary impairments, and nausea; all of which limit the ability to engage in PA (Crombie et al., 2004; Haas et al., 2012; Justine et al., 2013; Olson et al., 2014). Brunet et al. (2013), conducted focus groups to explore factors that influenced post-treatment BC survivors’ (n=9; Mage=55.3 years) ability to maintain a self-directed PA program. Findings indicated that survivors experienced mobility limitations due to the side effects associated with treatment that decreased adherence to PA. For example, one survivor reported that her shoulder problems, as a result of BC related surgery, limited her ability to perform PA. Another participant mentioned how she experiences severe pain due to breast reconstruction surgery which limits her ability to perform simple everyday tasks such as opening a door. In addition, many indicated that fatigue, pain, and lack of energy were also contributing factors to lack of PA adherence. Similar results were reported by Wurz and colleagues (2015), who found that BC survivors were unable to perform certain exercises due to being physically weak or having limited mobility from surgery. Women in the same study also reported that their shoulder was too stiff to perform certain movements which limited their ability to perform PA. Similar limitations were reported by subjects in a study by Branstrom and colleagues (2015). BC survivors who recently had surgery (N=726) completed a series of questionnaires pertaining to PA levels, QoL, psychological distress, and returning to work. It was reported that physical inactivity was attributed to not only physical symptoms such as pain (p<0.01) but also attributed to psychosocial barriers such as depression (p<0.05) and anxiety (p<0.01).
2.6.2 Psychosocial Barriers

Psychosocial barriers such as anxiety, mood, depression, low self-esteem, lack of motivation and lack of social support impact BC survivors’ ability to engage in PA (Crombie et al., 2004; Haas et al., 2012; Justine et al., 2013; Olson et al., 2014; Wurz, St-Aubin, & Brunet, 2015). Ventura et al. (2013), examined associations between factors and barriers to being physically active in post-treatment BC survivors (N=162; M\text{age}=48 years). Survivors self-reported that depression (p<0.01), perceived stress (p<0.01), emotional social support (p<0.01), instrumental social support (p<0.01), fatigue (p<0.01) and cognitive problems (p<0.05) all contributed as barriers to engaging in PA. Ergun et al. (2013), evaluated the effects of exercise on depression in a supervised group exercise program (aerobic exercise + resistance exercise + education), home based exercise program (aerobic exercise + education), and an educational program in BC survivors (M\text{age} 51.6±20.5; N=60). They found depression in the supervised exercise group significantly decreased over time (p<0.05) compared to the home-based group (p>0.05), and the education group (p>0.05). Considering lack of social support has also been reported to be a psychosocial barrier (Ventura et al., 2013), it was suggested the significant improvements in depression in the supervised group was due to increased social support from exercising as a group (Ergun et al., 2013). Similarly, Phillips and McAuley (2013) found BC survivors (N=1527) that had high levels of self-efficacy had greater levels of social support (p<0.05) and therefore greater levels of PA. At six-month follow-up, BC survivors who had an increase in self-efficacy also had greater levels of social support for exercise. In addition to social support, Brunet et al. (2013) reported that other psychosocial barriers to being physically active include lack of motivation, low levels of confidence, and lack of skill. Another barrier BC survivors
experience is lack of community programs tailored to cancer survivors (Haas et al., 2012). Many BC survivors do not feel comfortable or confident exercising in a gym with ‘healthy people’ in part due to lack of self-esteem. Self-esteem, characterised as the value and confidence in one’s self, can be diminished following treatment (Mustian et al., 2004). Common stressors, such as fear of cancer recurrence, feelings of poor autonomy, negative self-image and concern about the effect of the cancer on one’s family are common reasons why self-esteem decreases post-diagnosis (da Silva & dos Santos, 2010). Additionally, BC treatment (e.g., surgery) can impose physical changes such as losing one or both breasts, limiting physical mobility, adjusting to prosthesis or disfigurement (Bertero, 2002). These physical changes can negatively affect a woman’s body image and therefore self-esteem (Bertero, 2002; Mustian et al., 2004). Lack of social support from family and friends is another well-known barrier to PA (Emery et al., 2009; Mackenzie, 2015). One study examined the effects of marital support on long-term participation in PA. BC survivors in stable relationships were compared to those in distressed relationships. Women in stable relationships were more physically active than those in distressed relationships (Hayes, Johansson, Alfano, & Schmitz, 2011).

2.6.3. Environmental Barriers

Environmental barriers are factors outside of an individual’s internal control that limit participation in PA (Sallis, Bauman, & Pratt, 1998). Environmental barriers can include lack of or inadequate facilities and/or equipment, financial cost, transportation (e.g., long commutes), lack of safety (e.g., busy roads, poor lighting, no sidewalks), and extreme weather (Andajani et al., 2004; Chan & Ryan, 2009; Nies et al., 1999; Brunet et al. 2013). Specific to BC survivors, Brunet et al. (2013), found that many women felt that the expense
of joining gym and extreme weather conditions were two of the most common barriers reported by survivors in terms of environment factors. Additionally, Leach et al. (2015), indicated transportation also acted as a barrier. They found that BC survivors who lived closer (~12 km) to a community recreational facility attended more than half of the community exercise classes compared to those who lived farther away (~33km). Similarly, this was also reported by Hefferon et al. (2012), who examined the perceived barriers to PA in BC survivors and found that a common barrier was the lack of proximity to a convenient, safe and accessible recreation centre. Another barrier tied with accessibility to recreation centres was the cost to attend. The expense of gym memberships deterred women from attending recreation centres for exercise. Other common barriers reported by BC survivors included scheduling conflicts with other commitments, lack of time, and having other responsibilities or priorities (e.g. employment, traditional female care-giving roles) (Hefferon et al., 2013; Wurz et al., 2015).

Despite the physical, psychosocial and environmental barriers listed above, regular PA can manage or improve physical, mental and social well-being in BC survivors during and after treatment (Adkins, 2009). Community-based PA can instill confidence in conquering these barriers and provide a supportive social environment (Adkins, 2009).

2.7 Physical Activity for Breast Cancer Survivors

In order to obtain the physical and psychosocial benefits, while limiting the common PA barriers faced by BC survivors, researchers have suggested that group based community PA programs may be an ideal way to help BC survivors engage in PA following treatment (Wurz, St-Aubin, & Brunet, 2015). Community based interventions for BC survivors offer women an opportunity to be active among ‘similar others’ in a natural environment, build
autonomy, and confidence to challenge their physical and mental capability (Caperchione et al., 2016). This can provide the many physical health benefits associated with PA along with increased social connection, social support, enhance self-esteem, decreased psychological distress, and enhanced QoL (Bosworth et al. 2000; Christopher, & Morrow, 2004; Parker et al., 2002). Social support is a commonly reported reason for continued participation in a community PA program (Wurz et al., 2015). Having the support from friends, family, colleagues, and health professionals to be active is a big motivator to engaging in PA (Husebø et al., 2015). Many studies have reported that group based PA in the community is the preferred PA mode for women with BC because group based PA is often associated with increased social support (Husebø et al., 2015). It is also reported BC survivors find motivation and strong incentives to exercise with enhanced social support because they make new friends, share their cancer experience, and offer support to one another (Christopher & Morrow, 2004). There are many PA programs available to BC survivors in the community that are considered safe and effective towards improving physical and psychological health. More importantly, all of which can be done independently or in a group environment. Some activities that could benefit BC survivors include walking, aquatics, yoga, dragon boating, pole walking, and mixed-modality exercises.

Walking. Walking is a cost-effective activity that most people can do. It is a low impact, whole body, aerobic exercise that many BC survivors can do individually or as a group. Walking is very good for introducing sedentary BC survivors to activity as it can improve oxidative capacity of the skeletal system without working vigorously (MacVicar, Winningham, & Nickel, 1989). Additionally, several studies report that walking is a good activity to manage fatigue and exercise capacity. Mock and colleagues (1997), found that BC
survivors undergoing radiotherapy (n=46) experienced significantly greater physical functioning (p<0.005) and less fatigue after walking weekly for six weeks compared to the usual BC care group. In another study, BC survivors in-treatment who walked for six weeks (n=35) had significantly greater exercise capacity (p<0.001), improved QoL (p<0.001), less fatigue (p<0.005), and less sleep disturbance (p<0.001) compared to those in the usual BC care group after the intervention (Wang et al., 2011). Further, Gokal et al. (2016) evaluated the effectiveness of a self-managed home based moderate intensity walking intervention on psychosocial health outcomes in BC survivors. In-treatment BC survivors were randomised into either the usual BC care control group (n=25) or the 12-week, moderate intensity walking group (n=25). Those in the walking group were given pedometers, an information booklet on PA, and were asked to keep a log of walking duration and intensity. Following the 12-week intervention, the walking group had improved levels of fatigue (p<0.05), self-esteem (p=0.00), and mood (p<0.05) compared to the usual BC care group.

*Pole walking.* An increasing form of PA that BC survivors are finding enjoyable and beneficial for their health is group-based pole walking. Following BC treatment (e.g., axillary surgery and radiotherapy) many women experience physical impairments such as loss in shoulder range of motion, weakened arm strength, and arm lymphedema (Jonsson & Johansson, 2009). Therefore, pole walking is commonly recommended to BC survivors with arm and shoulder limitations because it consists of walking with the addition of walking poles. Previous research advised against arm exercises or heavy arm loading in survivors with lymphedema, however, there is a growing body of literature indicating that arm exercises are completely safe and beneficial towards managing arm lymphedema and overall physical health in BC survivors (Jonsson & Johansson, 2009; Stefani et al., 2015). It is a
good aerobic activity that improves oxygen consumption, increases caloric expenditure, and increases heart rate (Church, Earnest, & Morss, 2002). Sprod et al. (2005), reported that upper body muscular endurance increased in BC survivors (n=6) who pole walked two times per week for eight weeks compared to BC survivors (n=6) who did not use poles and just performed aerobic exercise. Specifically, survivors who pole walked had better endurance as measured by the bench press (p<0.05) and the lat pull down (p<0.05) (Sprod et al., 2005). Jonsson & Johansson (2014), reported that BC survivors (M<sub>age</sub>=60.4±8.3 years; N=23) who pole walked three to five times per week for eight weeks had improved fitness levels compared to pre-intervention. They also reported that arm lymphedema did not worsen with exercise but decreased. To further support the benefits of pole walking, Fischer et al. (2015) examined the effects of a group based Nordic pole walking intervention. A group of BC survivors (n=23) completed 10 weekly one hour nordic pole walking sessions. Following the intervention, the results revealed that BC survivors reported a decrease in perceived shoulder symptom severity and fewer limitations to performing daily activities. BC survivors reported more energy after each session. Additionally, the effects of exercising as a group had positive effects on psychological health. The group-based program provided an opportunity for BC survivors to exercise together in a safe and supportive environment. Women focused on life after treatment, but were able to discuss their experience with cancer and treatment and easily identify with one another. The group-based program provided an opportunity for the women to gain a social network and build a social connection with one another, which enhanced social support.

Aquatics. Water activities are becoming more popular for BC survivors who have undergone surgery (Fernandez-Lao et al., 2013). Compared to land activities, the warm
temperature and the buoyancy of the water helps reduce muscle pain (Cantarero-Villaneuva et al., 2012) as there is less axial loading and stress placed on the muscles (Fernandez-Lao et al., 2013). Aquatic exercises are also known to be therapeutic and have been reported to be safe and effective in managing pain and reducing fatigue (Cramp & Daniel, 2008; Fong et al., 2012; Velthuis et al., 2010), and provide an opportunity for social interaction. For example, Cantarero-Villaneuva et al. (2012), examined an eight-week (three times per week) light aquatic group-based exercise program and found it was effective at reducing neck pain (p<0.001) and shoulder pain (p<0.05) over time in post-treatment BC survivors (Mage= 47.5 years; n=65) compared to the usual BC care control group. There were also significant decreases in total fatigue (p<0.001), depression (p<0.05), tension (p<0.05), anger (p<0.05) and mental fatigue (p<0.005) in the aquatic group compared to the usual BC care control group. Similarly, eight weeks (60-minute sessions three times per week) of aerobic and strength exercises in the pool reduced breast symptoms, including pain, in post-treatment BC survivors (Mage=48±7 years; N=33) (Fernandez-Lao et al., 2013). Furthermore, a study by Cuesta-Vargas et al. (2014), found that eight weeks of deep water running for one hour three times per week was effective at significantly improving health (p<0.05) and QoL (p<0.05) in BC survivors (Mage=47.97±9.66 years; n=44) compared to survivors instructed to carry on with daily activities. These studies support the claims that water exercises are safe and effective in managing BC related symptoms.

**Yoga.** BC diagnosis and treatment can be a very stressful time for survivors so promoting PA with a focus on relaxation to suppress anxiety/tension can be invaluable to patients. Many BC survivors perform yoga to cope with their disease because yoga is a low-impact activity that encompasses physical postures, breathing techniques, and
relaxation/meditation to bring together the mind, body, and spirit (Speed-Andrews et al., 2010). It is also physically beneficial as yoga increases muscular strength, flexibility, range of motion and energy through movements and poses (Danhauer et al., 2008). Iyengar yoga is an assisted form of yoga that involves using props and supports for those who are stiff, immobile, injured, and/or ill (Speed-Andrews et al., 2010). Speed-Andrews et al. (2010), reported that bodily pain improved (p<0.05) in BC survivors (M_{age} 54.8±5.3 years; N=24) after performing Iyengar yoga for six weeks (two times per week, 90 minutes per sessions). Carlson et al. (2007) investigated the effects of an eight-week mindfulness-based stress reduction encompassing yoga and found stress and salivary cortisol levels significantly decreased immediately after, six months, and 12 months post intervention. Another study revealed that anxiety, depression, stress, and salivary cortisol levels all significantly decreased following a three-week (one hour per session) yoga intervention in BC survivors undergoing radiotherapy (N=56) (Rao et al., 2009). Social, physical, and functional wellbeing all improved after 10 weekly yoga sessions in patients with early stage BC (Danhauer et al., 2008). A similar result was reported by Moadel et al. (2007), where BC survivors (N=14) had improved emotional wellbeing after 12 weekly yoga sessions. Furthermore, Culos-Reed et al. (2006), evaluated fitness, stress symptoms, mood states, and QoL in BC survivors (M_{age}=51.18 years; N=38) following a seven-week yoga program. Survivors in the yoga program had increased QoL scores (p<0.01), improved emotional function (p<0.05), improved mood (p<0.1). In regard to fitness, BC survivors who performed yoga were able to walk further (p<0.01) and had improved on the sit and reach test (p<0.05) over the course of seven weeks.
Dragon boating. Dragon boating involves strenuous use of the upper body muscles and is considered an appropriate form of exercise for BC survivors as it is non-weight bearing, safe, strenuous, and repetitive (McKenzie, 1998; Stefani et al., 2015). It is suggested that activities that involve the upper body and arms activate skeletal muscle which helps circulate lymph (Viru & Viru, 1993), stimulate the immune system (Pedersen & Bruunsgaard, 1995) and improve sympathetic tone of the lymph vessels (Roddie, 1990). Specifically, the paddling which activates the upper body muscles during dragon boating is very beneficial for muscular strength, managing lymphedema and improving the cardiovascular system (Stefani et al., 2015). A study conducted by Lane et al. (2005), found arm volume and circumference increased in BC survivors ($M_{age}=52.4\pm6.8$ years; $n=16$) following a 12-week (two sessions per week) dragon boat program. Initially, it was thought that an increase in arm volume and circumference was associated with an increase in subcutaneous lymph buildup but the increase was attributed to muscle hypertrophy from the aerobic and resistance training (Lane et al., 2005).

Blanchard et al. (2001), evaluated the acute effects of exercise on anxiety in BC survivors ($N=34$; $M_{age}=50.5\pm6.6$ years) who participated in a dragon boat program. They found survivors with low pre-exercise state anxiety experienced a non-significant increase in state anxiety whereas those who experienced high pre-exercise state anxiety experienced a significant decrease following acute exercise (Blanchard et al., 2001). They suggested exercise provides a distraction from stressful daily routines creating an anxiolytic effect (Blanchard et al., 2001). It was also suggested that the increase in self-efficacy in turn reduced anxiety (Blanchard et al., 2001). Research has shown BC survivors involved with dragon boating takes the mind off cancer and are able to cope with emotional stress as there
is a shared sense of accomplishment to overcome a challenge in a new environment (Sabiston et al., 2007). Survivors in a dragon boat program explained how peer interaction in dragon boating is different from a support group (Sabiston et al., 2007). Survivors claimed they were able to move on with their lives following treatment because dragon boating provided an opportunity for social disclosure and extra support in the context of PA (Sabiston et al., 2007). As a result of enhanced social support, BC survivors were better able to cope with stress (Sabiston et al., 2007).

Furthermore, McDonough, Sabiston, and Crocker (2008), interviewed BC survivors (N=14) from a dragon boat team at the beginning and the end of the dragon boat season. The pre-season interview covered questions related to motivation to engage in PA, body image, social support, and why survivors got involved in the program. The second interview consisted of questions regarding their experience and if their experience met their expectations. The majority of survivors reported positive changes in their physical appearance and felt comfortable with their body image. Some survivors felt stronger, had higher levels of energy and endurance which was critical for daily tasks and dragon boating. There were also two dominant themes expressed in how teammates provided social support: (1) women had implicit understanding of the BC experience, and (2) survivors shared first-hand information about their BC experience. Dragon boating provided a different aspect of support compared to a support group setting, as discussing BC was not the primary focus during dragon boating.

Similarly, other studies have reported that survivors who participate in dragon boating experience feelings of camaraderie (Mitchell & Nielsen, 2002), renewed health (Parry, 2008),
improved self-confidence (Unruh & Elvin, 2004), improved fitness (Unruh & Elvin, 2004), and a sense of control over their health (Unruh & Elvin, 2004).

*Mixed-modality exercise programs.* Community programs that offer educational sessions combined with aerobic, resistance, and flexibility exercises to BC survivors undergoing treatment was valuable in managing symptoms and adverse effects associated with chemotherapy and radiation (Leach, Danyluk, Nishimura, & Culos-Reed, 2015). The “Breast cancer patients Engaging in Activity while Undergoing Treatment” (BEAUTY) program was a 12-week mixed-modality program offered to BC survivors. In this study, in-treatment BC survivors (M$_{age}$ 50±9 years; N=80) attended bi-weekly educational sessions and did aerobic exercises twice a week, resistance exercises once a week, and flexibility/stretching exercises five to seven times per week. The study revealed BC patients maintained physical and psychosocial health over the 12-week program (Leach et al., 2015). The CanWell program at the YMCA is a very similar community program available to BC survivors with a similar program design to BEAUTY. It is a supervised, community-based, exercise, and informational program focused on bringing BC survivors together. The CanWell program produced significant improvements in aerobic capacity as well as physical and emotional well-being associated with increased QoL in BC survivors (Cheifetz et al., 2014). Even though both the BEAUTY and CanWell study had very similar study designs, the CanWell study did not differentiate in-treatment and post-treatment survivors.

Sherman and colleagues (2010) evaluated the short-term impact of the YMCA Encore program. The YMCA Encore program is an eight-week program consisting of a combination of resistance, stretching, floor based exercises, and hydrotherapy designed specifically for BC survivors. This study was a mixed modality group exercise and support program for BC
survivors (M_{age}=56.10.5; N=162). The first hour of each session was dedicated to exercise and the second half of each session was dedicated to support/information sessions. Those in the Encore program showed a significant increase in energy levels (p<0.0005), physical wellbeing (p<0.0001), emotional wellbeing (p<0.0001), social support (p<0.05) and QoL compared to the waitlist control group (Sherman et al., 2010).

To further support the beneficial effects of a mixed-modality exercise program to survivors, Courneya et al. (2007) examined BC survivors (M_{age}=49.2 years; N=242) who performed aerobic and resistance while undergoing chemotherapy. Results showed a small increase in body weight but changes were associated with positive changes in body composition. Specifically, aerobic training (60% VO_{2} max) prevented gains in fat mass and maintained muscle mass and resistance training (2 sets; 8-12 reps; 60-70% 1RM) increased lean body mass (Courneya et al., 2007). Similarly, Knobf et al. (2014) found a four to six-month aerobic program on the elliptical and treadmill did not result in body weight changes in post-treatment BC survivors (M_{age}=51.3 6.2 years; N=26), however, they did indicate that BC survivors who perform resistance exercise can improve body composition (Knobf et al., 2014). Furthermore, McKenzie and Kalda (2003) found that a mixed-modality progressive eight-week aerobic and resistance exercise program did not worsen arm lymphedema and improved QoL in BC survivors (McKenzie & Kalda, 2003).

As outlined above, there are many physical and mental health benefits associated with increased PA for BC survivors. Specifically, disseminating successful interventions into community practice will create sustainable PA programs for BC survivors to prolong survivorship, mitigate treatment-related side effects and enhance social support (White et al., 2009; Wurz et al., 2015). Unfortunately, successful interventions are rarely disseminated to
the general population or evaluated in these real-world settings (Rabin et al., 2009; Kerner, Rimer, & Emmons, 2005); rather they are conducted in a controlled environment using highly standardised and expensive protocols (Glasgow, Vogt, & Boles, 1999). These controlled clinical studies do not address how a program may feasibly work in a real-world setting, particularly in specific population groups such as BC survivors. Therefore, undertaking process evaluations are necessary to understand how research translates into practice. Using evaluation frameworks, such as the RE-AIM framework, provides an opportune mechanism for evaluating research interventions and understanding how they may assist with improving population health practice (Dzewaltowski et al., 2004).

2.8 RE-AIM Framework

The RE-AIM framework, developed by Glasgow, Vogt, and Boles (1999), is a comprehensive and systematic approach to planning, implementing, evaluating, and reporting health-related programs and interventions for translation and dissemination into the real-world (Glasgow et al., 2009). It is a tool used to assess the acceptability, delivery, and sustainability of programs and is commonly used to evaluate the impact of health promotion programs in public health (Caperchione & Coulson, 2010; Caperchione et al., 2015; White et al., 2009). It is considered a framework appropriate for feasibility studies (Bowen et al., 2009; Green & Glasgow, 2006) surrounding PA and health related interventions (Caperchione et al., 2015; Folta et al., 2015; Phillips et al., 2014). The objective of RE-AIM is to redirect the focus of translational research from internal validity (i.e., research in a controlled environment where we expect a certain outcome) to external validity (i.e., generalisability) (Ory, Mier, Sharkey, & Anderson, 2007). According to Glasgow et al. (1999), the RE-AIM framework is compatible for community-based and public health
interventions, however few studies have utilised the RE-AIM framework in cancer survivorship intervention research. With the growing number of cancer survivors, and the need for safe and effective exercise programs for this population (Jankowski et al., 2014), process evaluations utilising frameworks such as RE-AIM are needed to understand the impact of these interventions and determine ways to refine and/or improve the program for the future dissemination. Interventions are commonly evaluated at the individual (i.e., participant) and the organisational (i.e., community stakeholders) level, however for this current study, data collection and analysis will only be undertaken at the individual level.

The RE-AIM framework consists of five dimensions; reach, effectiveness, adoption, implementation, and maintenance (Burke et al., 2015). Reach is described as the absolute number and representativeness of individuals who participate in an intervention (Glasgow, Vogt, and Boles 1999). Reach is measured by comparing total population to the number of subjects who participate in a program/intervention. Reach also encompasses the representativeness of the subjects to the target population. Therefore, demographic information such as age, gender, race, and income of participants is often compared to non-participants (Glasgow, Vogt, and Boles, 1999). Both reach and representativeness of participants and settings are emphasized in the framework (Glasgow, Vogt, and Boles 1999). Limiting the subject inclusion criteria to those select few that are motivated and prepared for change may not allow for generalizability to the whole target population (Glasgow, Vogt, and Boles 1999). Therefore, reaching high numbers of participants within the population is more likely to be reflective of the entire target population. Reach was a component of the RE-AIM framework Conlon and colleagues (2015) used to evaluate the Bronx Oncology Living Daily Healthy Living program, a community based diabetes prevention and
management program for cancer survivors. The 12-week lifestyle behaviour change program consisted of weekly nutrition education (60-75 min) and PA (60 min) classes. Reach was evaluated by the proportion and representation of cancer survivors that participated in the program. It was reported 104 individuals initially expressed interest in the study, however, 83 survivors (M\text{age} 60.5\pm10.2 years) participated. Some of the reasons for not participating included work conflicts, medical appointment conflicts, and lost to follow-up from initial contact as they were unreachable. The majority of participants were female (95.2%) and had BC (75.7%).

Effectiveness is described as the effect of the intervention on the anticipated outcomes (Glasgow, Vogt, and Boles 1999). Rogers et al. (2009), utilised the RE-AIM framework to examine the feasibility of their PA behaviour change intervention for BC survivors (n=41) undergoing hormonal therapy. They evaluated the effectiveness of their 12-week PA program by examining changes in PA levels, health outcomes and program adherence compared to those in the usual care group. It has been noted that both negative and positive outcomes of a program need to be highlighted and addressed to ensure the program is effective. Potential negative outcomes included unintended harm to subjects, low cost-benefit of the program, or lack of effect on target variables (Glasgow, Vogt, and Boles 1999).

Adoption is described as the proportion of individuals, settings and practices that uptake a program (Glasgow, Vogt, and Boles 1999). Adoption also considers the number of organisations that adopt the program in proportion to the number of total organisations that could adopt a program. Although many studies have evaluated adoption at the organisational level, some studies have evaluated individual level adoption. For instance, Caperchione et al. (2015) evaluated the larger dissemination of their ManUp Intervention, a program that used
interactive web-based technologies to improve PA levels and nutrition habits in middle-aged men in the workplace. Adoption was evaluated by the number of participants who registered with ManUp during phase 4 of disseminating the project and the percentage of organisations that adopted the ManUp program. Another study by Belkora et al. (2015) evaluated adoption of the communication aids and decision aids at the individual level. Researchers administered surveys to evaluate adoption as the level of patients’ acceptance, use of, satisfaction with, and willingness to recommend to others, the program intervention.

Implementation is described as the extent to which the intervention was delivered as intended (Glasgow, Vogt, and Boles 1999). In other words, the fidelity to the intervention’s protocol. Treatment fidelity refers to the methodological strategies to monitor and enhance the reliability and validity of interventions (Borrelli et al., 2005); which are important as it helps explain research findings, can be used towards revising future interventions and increases statistical power and effect size by reducing random and unintended variability (Moncher & Prinz, 1991). Considering and enhancing treatment fidelity increases internal and external validity which is important for study replication and generalisation of programs to similar settings (Borrelli et al., 2005). In regard to implementation, the Healthy Living after Cancer study was a dissemination study that consisted of evaluating the integration of an evidence-based lifestyle intervention for cancer survivors utilising the RE-AIM framework (Eakin et al., 2015). The program aimed to disseminate cancer information and support services as well provide nutritional and PA advice to cancer survivors over the phone. Specifically, the implementation of the program was evaluated by the number of referrals to the program, consent rates, fidelity of delivery, program completion rates, and cost to deliver the program. The data was collected via semi-structured telephone interviews,
reports from the Australian Cancer Council (i.e., the organisation that delivered the intervention) database and documentation (e.g., cost, consent). As the program is in phase two of dissemination, the results have yet to be published.

Lastly, maintenance is the extent to which the program and/or behaviours, as a result of the intervention, are sustained at least six months following program completion (Glasgow, Vogt, and Boles 1999; Ory et al., 2015; White, McAuley, Estabrooks, & Courneya, 2009). In addition to the study mentioned previously, Rogers and colleagues (2009), also evaluated the maintenance of their PA behaviour change program by assessing attrition rates, the likelihood of repeating the program and survivors’ barriers to PA participation (i.e., withdrawals from program and refusals to participation) via project related statistics and self-report questionnaires.

Evaluating a program across the five dimensions provides information about feasibility, why a program was successful or unsuccessful, how a program could be improved, if a program is worth sustained investment and identifies if the program could work in the real-world (Glasgow, Vogt, & Boles, 1999; Jauregui et al., 2015).

2.8.1 Using RE-AIM to Evaluate Community Programs

As mentioned previously, the RE-AIM framework has been used in a variety of health promotion interventions with different populations in the community (McGoey et al., 2016; Olstad et al., 2016). For instance, Jaipakdee and colleagues (2015), evaluated the potential application of the Diabetes Self-Management Support (DSMS) program into the real-world. The program comprised of educating diabetics on the process of the disease, skills to help manage their condition and skills to modify their lifestyle towards healthy behaviours with the help of computer-assisted instruction. Diabetics were randomised into
the DSMS (n=203) program or the usual care (n=200) program which consisted of regular physical examinations, blood-glucose monitoring, and individual health education with a nurse or healthcare provider. The RE-AIM framework was used to evaluate the feasibility of the program which included: (i) Reach, the percentage of eligible diabetics willing to participate; (ii) Effectiveness, changes in hemoglobin A1c, fasting plasma glucose, body weight, health behaviour, depression and QoL; (iii) Adoption, the number of public health centres that agreed to deliver DSMS program and participant satisfaction towards the program; (iv) Implementation, the extent to which the intervention was delivered as intended, barriers to implementation, and participant retention; (v) Maintenance, extent to which the participant maintains the health behaviour, and the public health centres intention to maintain the program in the long term.

In another instance, the RE-AIM evaluation framework was used to evaluate the national dissemination of the Strong Women Healthy Hearts program, a community based prevention program that aims to reduce the risk of cardiovascular disease among middle-aged women (Folta et al., 2015). Trained leaders (n=85) who adopted the program recruited overweight females who were 40 years or older and were considered sedentary (n=345). The 12-week program consisted of two weekly one-hour sessions. Each one-hour session consisted of PA for 30 minutes and a nutrition education session for 30 minutes. The RE-AIM framework was utilised to evaluate the feasibility of the program for potential national dissemination. Reach was determined by the proportion of eligible participants who participated compared to the total eligible women in the county as well as the representativeness of the sample. Effectiveness was evaluated by changes in body weight, fruit and vegetable intake, and PA levels. Adoption was assessed by the proportion of trained
leaders who ran the program. Implementation was evaluated by participant adherence to the program and the cost of running the program. Lastly, maintenance was assessed by the proportion of leaders who continued to run the program within one year of intervention completion.

Previous studies have used RE-AIM to evaluate health promotion interventions specific to BC survivor health. One study was conducted to determine the feasibility and preliminary effectiveness of a 12-week multidisciplinary PA intervention for sedentary BC survivors (n=41; M_age=53±9 years) on PA behaviour change and hormonal therapy (Rogers et al., 2009). In regard to RE-AIM, reach was assessed by the percent of BC survivors recruited and participant characteristics were compared to a provincial cancer registry. The study indicated that 34% of the target population was reached. The effectiveness of the program was assessed via program adherence rates, participant program evaluation, changes in PA, health outcomes, and adverse events (Rogers et al., 2009). The study was effective at increasing PA (p<0.005), back/leg muscle strength (p<0.05), and social well-being (p<0.05) in the intervention group compared to the usual BC care group (Rogers et al., 2009).

Adoption was evaluated by the number of oncology clinics that referred BC survivors to the program. Despite mentioning their classification for measuring adoption, the results were not reported. Further, implementation was assessed via process evaluation and cost. Process evaluation consisted of continuous monitoring of the intervention activities by the investigators, a study coordinator, exercise physiologist and psychologist to ensure the implementation of the intervention was as intended. Also, study participants were given a 21-item evaluation form post intervention regarding the appropriateness of the intervention for BC survivors and if the program was helpful in modifying lifestyle behaviour. Lastly,
maintenance was assessed via attrition rates, barriers to participation, and the likelihood the intervention would be repeated. In terms of maintenance, 100% of participants completed the individual exercise sessions, 95% completed the individual update sessions, and 98% of participants completed the group sessions. The positive outcomes associated with this study suggests that this intervention has potential to be disseminated into practice, however, given the 34% reach, refinements to recruitment strategies may be required for further dissemination to this particular population.

Another study by Belkora and colleagues (2015), evaluated their project using RE-AIM with the purpose of monitoring and improving the implementation of communication (i.e., question lists, consultation summaries, and audio recording to increase information recall after appointments) and decision aids (i.e., print or audio-visual materials to help increase patient knowledge and limit decisional conflict) for BC survivors when they visit their oncologist at the clinic. Specific to reachability, researchers reported the number of eligible individuals they contacted and the number of participants that received the intervention. Over the course of the study there were 1,212 communication aids and 5,153 decision aids administered to BC patients. Effectiveness results indicated that communication aids were associated with increased self-efficacy (p<0.001), increased number of questions (p<0.001) and ability to access information for recall purposes, and decision aids were associated with increased patient knowledge (p<0.001). Specific to adoption, among the patients sent communication and decision aids, 86% reviewed one or more of the communication aids after their visit and 82% reviewed some or all decision aids. Implementation results indicated there was an increase in number of available staff time for patient support from 29% at the beginning of the study to 84% at the end of the study.
Furthermore, in terms of maintenance, the program has been integrated into current clinic workflow and has minimized burden on the clinic while enhancing patient experiences (Belkora et al., 2015).

These studies exemplify the diversity of programs where the RE-AIM framework can be applied as well as the value in translating and disseminating valuable programs into the community.

2.9 Summary

Despite the evidence that PA interventions for BC survivors are beneficial in improving the physical and psychological effects of cancer and treatment-related side effects, as mentioned previously, few PA interventions are transferred from the research setting and into community practice (White et al., 2009). The purpose of this current study was to evaluate the feasibility of Project MOVE via process evaluation utilising the RE-AIM framework. Evaluating the feasibility of the program will not only add to the research literature, but also provide recommendations for future program dissemination so that the program can continue to be available to BC survivors and benefit their health.
Chapter 3 Methods

3.1 Preface

The following chapter details methods and protocols used in this research. The study design was exploratory in nature and utilised mixed methods (qualitative and quantitative) to gain feasibility information concerning the Project MOVE intervention. Each dimension of RE-AIM was informed via self-reported questionnaires, focus group discussions, and semi-structured facilitator interviews. Ethical approval was granted by the Behavioural Research Ethics Board at the University of British Columbia (#H14-02502). The following sections outline the larger Project MOVE program (of which this thesis reports on the process evaluation component) followed by study design, research questions, role of the researcher, measures and procedures, data analysis, and concludes with a description of rigor.

3.2 Project MOVE Intervention

Project MOVE is an innovative intervention aimed at increasing PA levels in BC survivors through the use of microgrants (small amount of funds awarded to applicant groups to develop and implement a PA initiative) and financial incentives (a financial reward for increasing PA). The microgrants served as a means to bring groups of female BC survivors from the Okanagan together to design and implement their own intervention based on their own needs and interests, and more importantly, to address any specific barriers that may have limited them from being active. The microgrant enabled accessibility to informational resources, gym facilities, personal trainers, or fitness equipment by reducing barriers associated with finances.

Each group (pre-existing or newly formed) had a designated leader apply for a microgrant online via the Project MOVE website. The application comprised questions
pertaining to the proposed PA initiative, how the activity would enhance PA levels and social connectedness amongst the group, goals and objectives, potential to engage the community, and a proposed budget. There was no pre-determined PA program developed or promoted by the researchers, however, if groups had trouble developing a PA program then they were encouraged to contact members of the research team via email and the Project MOVE website for support. Each application was reviewed by a grant review panel, which consisted of members from the research team, a representative from the Canadian Cancer Society and a female BC survivor from the community. Successful applicants had to meet the following criteria: 1) ability to engage BC survivor population; 2) facilitate social support; 3) describe project sustainability; 4) clearly state goals and objectives; 5) describe feasibility of implementation; and 7) describe the project’s potential to engage the community. Successful applicants (see Table 4.2) were each awarded a microgrant of $2000. Participant groups who were awarded a microgrant, were also informed that if their PA levels increased when assessed at the six-month assessment period, they would also receive a $500 incentive per group. Change in PA behaviour was measured objectively (accelerometry) and subjectively (Godin Leisure Time Exercise Questionnaire). Other outcome measures included changes in sedentary behaviour (Marshall Sitting Questionnaire), QoL (RAND-36 Health Survey), feelings of social support, (Relatedness to Other in PA Questionnaire), and motivations for engaging in PA (Behavioural Regulation in Exercise Questionnaire). Assessments were conducted at baseline, six months and 12 months post baseline. Participants provided written informed consent prior to baseline assessments.
The current thesis is focused on the process evaluation outcomes to inform program feasibility, thus only data relative to this objective has been analysed and reported. This includes data collected at baseline and six-month follow-up.

3.3 Study Design

The current study was exploratory in nature and used a mix-methodological, pre-post design to assess program feasibility. More specifically, a process evaluation guided by the RE-AIM framework was undertaken to assess feasibility and gain further insight into the transferability of Project MOVE into community practice.

3.4 Research Questions

The purpose of the current study was to evaluate the feasibility of Project MOVE by utilising RE-AIM, a process evaluation framework. The research questions for this study included; 1) What proportion of the target population was recruited for the intervention? 2) Was Project MOVE effective at positively changing PA behaviour in BC survivors? 3) Was Project MOVE easily adopted? What were the perceptions of process, acceptability, and satisfaction? 4) What were the barriers and facilitators to implementing the program as intended? and 5) What was the participant retention rate and were PA behaviours maintained over six months?

3.5 Role of Researcher

The role of the researcher was to gain insight on the participant’s perceptions of the feasibility of Project MOVE, the effectiveness of the program on influencing PA levels, and any potential barriers and enablers to adopting and implementing the program. In this study, the researcher (TP) collected all data (baseline and six months), performed the analysis, and interpreted the results for dissemination. A portion of the study involved building a rapport
with the participants during the focus groups and interviews so as to better understand their perceptions and experiences of Project MOVE. Building rapport with participants may have helped respondents feel more comfortable in sharing the experiences of their situation (De Tona, 2006). The researcher attended the focus groups 15 minutes early to begin set-up. This also allowed the researcher to greet and create conversations with participants about their day. During the focus groups, the researcher (TP) lead and navigated the discussion to ensure the pre-determined questions related to the objective were covered. The researcher allowed the participants to discuss experiences not related to the questions however, the group was redirected back to the topic or question if the group deviated from the purpose of the focus group (Gates & Waight, 2007). The researcher [TP] transcribed focus group and facilitator interview audio recordings and performed content analysis and interpretation. During analysis, it was important to be reflexive. Reflexivity is the process of internal dialogue and critical self-evaluation as well as acknowledgement that the researcher’s position may affect the research process of outcome and impose bias (Bradbury-Jones, 2007). As the researcher’s background knowledge is on PA, there is the potential for biases in the results. However, the researcher aimed to mitigate these biases by imposing neutrality and various rigorous techniques detailed further in this section. Data were discussed with fellow researchers to ensure minimal bias. As the researcher’s background is in Human Kinetics, it was important to mitigate this personal bias by imposing strategies as described further in this section.

3.6 Participants and Recruitment

The participants in this study consisted of adult (18+ years) female BC survivors living in the Okanagan (Kelowna, Vernon, Penticton) region in British Columbia, Canada. For the purpose of this study, a person was considered a BC survivor from the point of
diagnosis until end of life (National Coalition for Cancer Survivorship, 2014). Women who self-identified themselves as a BC survivor were eligible to participate. The eligibility criteria were modified to include women living in the Okanagan who wished to participate but were not BC survivors, provided there was space in the groups after all interested BC survivors were accommodated. This decision was made based on challenges faced with recruiting groups consisting of all survivors. Therefore, the remaining group space comprised of participants providing social support (i.e., friend or family of BC participant), other types of cancer survivors (i.e., hepatocellular carcinoma, lymphoma, renal cell cancer etc.) and a motor vehicle accident survivor.

A variety of recruitment methods were used, including face-to-face meetings between researchers and community stakeholders with existing connections to BC survivors (e.g., Canadian Cancer Society, BC Cancer Agency, BC Cancer Lodge), as well as meetings with those from local health (e.g., Inspire Health) and fitness centres (e.g., Parkinson Recreation Centre, Phoenix Fitness). Additional recruitment methods included paid advertisements through local print (e.g., newspapers) and radio (radio interviews and announcements) media and social media (e.g. Facebook, Castanet, Twitter); posts were released periodically throughout the recruitment phase. Pamphlets and posters were also distributed to local businesses and medical clinics. An information booth was set up at Run for the Cure (Oct 2015), an annual fundraising event that brings individuals together who are BC survivors or have a personal connection to BC. Two public “drop in” information sessions (one during each recruitment phase) were held at a local community centre to allow prospective participants to meet the researchers, connect with potential group members, and ask questions about the study. Advertising/recruitment tactics were designed to accentuate the
benefits of PA for cancer survivors, the importance of creating social support networks, and promoting autonomy and empowerment by allowing participants to create their own PA initiative. Recruitment occurred in two phases: Phase one recruitment period began May 2015 through to July 2015, and Phase two recruitment period began September 2015 through to November 2015.

3.7 Measures and Procedures

Mixed-methodology, in which both quantitative and qualitative data were collected simultaneously, analyzed independently, and then combined for analysis and interpretation (Morse & Miehaus, 2009) was utilised. Mixed-methodology has been used in health-related research involving program evaluation, community health, and health services (Zhang & Creswell, 2013). The essence of qualitative research is to explore and understand phenomena while quantitative research measures quantities or amounts that may produce generalizable results (Zhang & Creswell, 2013). In mixed-methodology, qualitative and quantitative data supplement each other by accounting for data one method may not have been able to fully explain and to provide a richer understanding of the data (Bryman, 2006; Koorts and Gillison, 2015; Zhang & Creswell, 2013). It provides a more comprehensive and insightful evaluation, conveying a sense of rigor (Bryman, 2006; Koorts and Gillison, 2015). Moreover, previous RE-AIM research supports the use of mixed-methodology to gain a greater understanding of each RE-AIM dimension for a particular health promotion intervention (Altpeter et al., 2015; Koorts and Gillison, 2015). The quantitative methods utilised for this study included: 1) self-report questionnaire which collected information pertaining to participant demographics and anthropometric variables, BC related information, PA behaviour and program satisfaction; and 2) accelerometry, a device that continuously records
rate and intensity of human activity (Godfrey et al., 2008). The qualitative measures for this study included: 1) focus group discussions with participant groups; and 2) interviews with group leaders. These measures are further detailed below. Table 3.1 provides a summary of each RE-AIM dimension and associated process evaluation methods.

3.7.1 Demographics, Anthropometrics, and BC Information

Demographic information was collected by a self-report questionnaire, comprising of fill-in-the-blank and multi-option lists, and included variables such as: date of birth; ethnicity; education; marital status and employment (Appendix A). Participants also provided self-reported height and weight to calculate body mass index (BMI). Questions related to BC included: date of most recent diagnosis; stage of BC at diagnosis; type of treatment; date of most recent treatment; and menopausal status (Appendix B). Questions pertaining to demographics were only included in the baseline questionnaire. Questions concerning anthropometrics and BC information were included in both the baseline and six-month questionnaires. These questionnaires were administered concurrently with the other self-reported measures outlined below.

3.7.2 Quantitative Measures

Participants were asked to complete questionnaires about their weekly PA levels (baseline and six months) as well their perceptions of feasibility concerning satisfaction, acceptability, and practicality of Project MOVE (six months). Assessing PA levels with self-report questionnaires is common in cancer research as it is an inexpensive, easily administered, and an effective way to collect information (Amireault et al., 2015). With BC survivors, surveys provide a quick and unobtrusive means of collecting information. The researcher provided information about the purpose and the contents of the questionnaire.
Clear instructions on how to fill out the questionnaire properly (e.g., how to complete each question) and completely (i.e., no blank questions) were given. As the participants were completing their questionnaires, the researcher was readily available to assist with any potential questions. These quantitative measures are detailed below.

*Physical activity.* The Godin Leisure Time Exercise Questionnaire-GLTEQ (Amireault et al., 2015) was used to collect self-reported PA levels (Appendix C). The GLTEQ is one of the most well used PA questionnaires in oncology studies (Su et al., 2014). It is a valid and reliable, four-item, self-report tool that assesses the frequency (e.g., number of PA occurrences) of strenuous, moderate, and mild PA in a typical week (Godin, Jobin, & Bouillon, 1984; Godin & Shephard, 1985; Su et al., 2014). For this study, the GLTEQ was modified to include the average number of minutes per PA session to help determine if participants were meeting PA recommendations (Pauline, 2013). To determine participant PA levels for the week, the frequency of each intensity was multiplied by the average minutes per session. The total time spent in moderate and vigorous PA for the week was summed. Participants who engaged in 150 minutes of MVPA were classified as adequately active, in accordance with the American College of Sports Medicine (ACSM) PA guidelines for cancer survivors (Rock et al., 2012; Schmitz et al., 2010). Participants who engaged in less than 150 minutes of MVPA were classified as insufficiently active (Rock et al., 2012; Schmitz et al., 2010).

Additionally, PA was objectively assessed using an Actigraph GT3X™ accelerometer (ActiGraph, Pensacola, FL). Accelerometry has been used previously in clinical population studies, involving cancer survivors, in assessing PA levels as it is considered one of the most accurate device-based instruments for recording PA (Amireault et al., 2015; Bassett & John,
All participants were assigned an ActiGraph GT3X™ accelerometer at baseline and six-month assessments. Participants were instructed to wear the accelerometer, during waking hours for seven consecutive days. They were also instructed not to wear the accelerometer in any water-based activities (e.g., shower, swimming, etc.) (Appendix D). The accelerometer was mounted on an adjustable elastic belt and asked to be worn around the waist with the unit positioned over the right hip (Keadle et al., 2014). The accelerometers were initialised, using ActiLife 6 Data Analysis™ software, to begin collecting data (i.e., steps, inclination, and acceleration counts in tri-axial mode, using a 30-second epoch) at 12:00 am the day after distributing the monitors to the participants. The accelerometers were programmed to record data for 10 consecutive days. In the case that a participant forgot to wear the device for a day, they were instructed to wear the device an extra day as to capture seven days of accelerometer wear. As the device did not have a digital display screen, no feedback was provided to the participants. Participants were also asked to complete a daily log and record the time the device was put on and taken off each day, if they performed more or less activity than a typical day, as well as any circumstances which they felt relevant to explain (e.g., illness or forgot to put it on) (Appendix E). Participants returned their accelerometers to their group leader after they completed seven days of at least 10 hours of daily wear time. A member of the research team picked up the accelerometers from group leaders. For any outstanding accelerometers, a member of the research team met the individual at a scheduled location. The accelerometer data was downloaded using the ActiLife 6 Data Analysis™ software. Moderate-to-vigorous PA and step counts were assessed. The data were extracted in 60-second intervals (Amireault et al., 2015). Established cut-off points were used to calculate daily minutes of light (100-1,951 counts/min), moderate...
(1,952-5,724 counts/min) and vigorous ($\geq 5,725$ counts/min) PA (Freedson, Melanson, & Sirard, 1998). MVPA was calculated by adding the daily minutes where counts met the criterion for MVPA intensities (Amireault et al., 2015). Participants who accumulated 150 minutes of moderate activity or 75 minutes of vigorous activity for the week were classified as sufficiently active; participants who accumulated less than 150 minutes of MVPA for the week were classified as insufficiently active (Rock et al., 2012; Schmitz et al., 2010). The seven-day period in which each participant wore the accelerometer for the most amount of time was captured. Participant’s data were included in the analyses if the wear time was at least 500 minutes on four or more days (Sabiston et. al, 2014). Participants were classified at baseline to determine if they were meeting MVPA guidelines. All downloaded accelerometer data and data from the GLTEQ were saved to a password protected network folder at the University of British Columbia – Okanagan (UBCO) campus.

**Program evaluation.** Program evaluation (Appendix F) was evaluated via a brief Likert-scale questionnaire at six-month follow-up. The questions were guided by the research question specific to feasibility in terms of experience, acceptability, satisfaction, and appropriateness of intervention. Questions pertaining to participant experience of being part of Project MOVE were rated on a 4-point scale, with 1 being “not at all” and 4 being “a great deal”. Examples of questions related to experience included: “Participating in Project MOVE helped me start to be more active” and “Participating in Project MOVE helped me increase my PA levels”. Statements pertaining to satisfaction, appropriateness, and acceptability were rated on a 5-point scale with 1 being “strongly disagree” and 5 being “strongly agree”. Examples of these statements included: “Overall, I was satisfied with the Project MOVE
program”; “The Project MOVE program was appropriate for female BC survivors”.

Frequencies of each Likert-type item was reported during analysis.

3.7.3 Qualitative Data Collection

Qualitative research involves seeking to understand participants’ perspectives and convey meanings of phenomena in primarily naturalistic settings (Hanson et al., 2011; Sofaer, 2002). In this study, focus groups with Project MOVE groups as well as semi-structured phone interviews with group leaders were conducted at six-month follow-up. Previous BC related research has utilised focus groups (Nilsson et al., 2013) and semi-structured interviews (Dong et al., 2016) to better understand survivor experiences and perceptions, reaffirming the appropriateness of this method for this population. Focus groups and semi-structured interviews are useful for exploratory research as they are an effective method for eliciting relevant program feedback, which can be used to inform design and implementation of future studies (Vaughn et al., 1996).

Focus groups provide data in much more detail that is often not obtained by conventional methods (e.g., one-on-one interviews, surveys) (Liampittong, 2011). It provides an opportunity for participants to interact and build on the opinions and experiences of other members in the group, creating a synergistic effect (Liampittong, 2011). This reveals points of agreement, conflict, and uncertainty (Liampittong, 2011). Focus groups are commonly homogenous, meaning like-minded people with something in common (e.g., breast cancer) participate in discussion. However, the focus groups conducted for this current study were heterogenous and consisted of BC survivors, other cancer survivors, as well as women who provided social support to BC survivors throughout the intervention. Heterogenous focus groups can maximize the opportunity to explore different perspectives.
from different subjects (Hennink, 2007; Litosseliti, 2003; Smithson, 2008) and is considered suitable for community-based research when the researcher is looking for a range of responses (Hesse-Biber & Leavy, 2010; Kitzinger, 1995).

Semi-structured interviews provide more knowledge-producing potentials compared to structured and unstructured interviews (Leavy, 2014). Semi-structured interviews consist of the researcher asking a series of pre-determined questions, however, there may be some flexibility in the focus of the conversation if the researchers deems the conversation appropriate or important to the research project (Opdenakker, 2006; Given, 2008). The semi-structured interviews, conducted in this study, were valuable in obtaining feedback from the leader in terms of adopting and implementing Project MOVE.

The purpose of utilising focus groups and semi-structured interviews for the current study was to assess the satisfaction and practicality of Project MOVE, and to understand the challenges/enablers associated with design, implementation, and adoption of the program, including feasibility parameters such as recruitment, accrual, adherence, and acceptability of the program. In this study, questions for the focus groups and semi-structured interviews were standardised and determined in advance. The questions were based on the study objectives, were guided by research literature and were reviewed by other research team members. Qualitative data collection methods are detailed below.

**Focus groups.** Questions were piloted with a small sample (n=5) of BC survivors to ensure clarity and validity. Based on the feedback from pilot participants, the questions were straightforward and covered all the questions needed to answer the research questions. Therefore, none of the focus group questions were modified for the study.
Focus groups (n=10) were conducted, by the primary researcher (TP), at various locations in the community that were free of distractions and scheduled at a time suitable for the majority of participants. A fellow research assistant (KF) helped facilitate the focus groups, took notes, listened for dropped points to be re-visited, as well as clarified or expanded any questions or information provided. Prior to starting the focus groups, the researcher outlined the purpose of the session and reminded participants that the focus groups were completely voluntary. Verbal consent was obtained prior to the focus group discussion, in addition to the written informed consent they provided previously at baseline data collection. Each focus group was conducted with two to seven participants and ranged from 35-60 minutes in duration. Attendance was required from at least 50% of BC survivors from each group. The focus groups provided an informal and conversational approach to understanding participant experiences, attitudes, and perspectives, in much more detail than a survey. The questions were pre-determined and open-ended (i.e., require more than a yes/no answer) and pertained to participants’ experiences of Project MOVE, recommendations for future Project MOVE groups in implementing a PA program, challenges individuals with BC may experience in being physically active, recommendations for overcoming challenges, and overall thoughts on the program model (Appendix G). Prompts were utilised to generate discussion and ensure adequate information was collected for each question (Harrell & Bradley, 2009). The first couple of questions involved utilising stimulus materials, such as sticky notes as well as flip charts and pens to generate involvement from all participants (Kitzinger, 2005). The focus groups were audio recorded with a digital Sony™ recorder (ICD-PX333) and transcribed verbatim. The notes that were taken from the second facilitator during the focus groups were also transcribed and included in the analysis.
Facilitator interviews. Semi-structured phone interviews were conducted with all group leaders (n=10). The purpose of the interview was explained to each interviewee and verbal consent was obtained in addition to the signed consent collected at the beginning of the study. All phone interviews were operated from the PHAB laboratory, conducted by the primary researcher (TP) and trained research assistants (KF and RT), and ranged from 15-30 minutes in duration. The interviews are a strategy to further probe into participant responses and provide an opportunity to gain further insight into the participants’ experiences, perceptions, or opinions (Peters & Halcomb, 2015). As the leaders played an important role in the application process and implementing the program it was important to gain further information from them. The semi-structured interviews consisted of asking leaders open ended questions pertaining to the microgrant application process, challenges and enablers to leading the group, their role in leading the group, and their perception of group member’s experiences with Project MOVE (Appendix H). Semi-structured interviews were chosen as a method to gather further data that could not be extracted through the focus group session. Phone interviews were recorded using the digital Sony™ recorder (ICD-PX333) and transcribed verbatim.
Figure 3.1. Flow Chart of Protocol for this Current Study.
3.7.4 RE-AIM Dimensions

RE-AIM consists of five dimensions: *reach, effectiveness, adoption, implementation,* and *maintenance*. The methods for each RE-AIM dimension are detailed below.

*Reach*. Reach is defined as the number and proportion of participants that were aware of and recruited for the intervention (van Acker et al., 2011). In the current study, the number of participants was recorded via attendance at each data collection time point (baseline and six months) and saved in a participant master spreadsheet Microsoft Excel™ document. The document included a list of the ten groups, participant identification numbers, participants’ names, contact information, as well as accelerometer data collection and download dates for each participant. The British Columbia Cancer Agency Centre for the Southern Interior was contacted to obtain the total number of BC survivors living in the Central Okanagan. The source of recruitment was self-reported on a questionnaire; participants indicated the means by which they heard about Project MOVE from a multi-item list. The number of groups that applied for the microgrant and the number of groups successfully recruited for the study, was documented by the number of microgrant application submissions.

*Effectiveness*. Effectiveness is the impact of Project MOVE on the anticipated outcomes. This was assessed by the GLTEQ and accelerometry in terms of changes in PA over time (baseline to six months). Additionally, the effectiveness of the program on perceived changes in PA behaviours was evaluated through the program evaluation questionnaire (Appendix F).
Adoption. Participant level adoption was defined as participant’s acceptance, satisfaction, willingness to recommend others (Belkora et al., 2015) to Project MOVE. Adoption was evaluated by participants’ perception of process and acceptability as well as barriers and facilitators to taking up Project MOVE. Focus groups were conducted to determine the barriers and facilitators to adopting the programs developed by the participant groups. Facilitator interviews were also conducted to gain further information concerning the program model (microgrants + financial incentives), in particular the microgrant application process.

Implementation. Implementation was measured by participants’ perceptions of the barriers and facilitators to implementing the program as intended and suggestions for future implementation. This data were collected using both the focus groups and facilitator interviews.

Maintenance. Maintenance is the extent to which the program was sustained over time. This was measured by the number of participants who remained in the study at six months (i.e., program retention) and remained physically active with their Project MOVE group and/or independently. This was determined via focus groups. Additionally, reasons for drop out were also recorded in the participant master spreadsheet Microsoft Excel™ document. Maintenance of Project MOVE groups was evaluated during the focus group discussions. Continued group engagement in PA at six months, as well as confidence in being regularly active over the next six months was evaluated by self-report questionnaire at six months.
Table 3.1. Methods and Outcome Measures for Each RE-AIM Dimension

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Outcome measures</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{each}$</td>
<td>Number and proportion of participants who are BC survivors</td>
<td>Participant master sheet; BC information questionnaire</td>
</tr>
<tr>
<td></td>
<td>Demographics of participants</td>
<td>Baseline questionnaire</td>
</tr>
<tr>
<td></td>
<td>Sources of recruitment</td>
<td>6-month survey</td>
</tr>
<tr>
<td>$E_{effectiveness}$</td>
<td>Change in PA levels</td>
<td>GLTEQ; Accelerometry</td>
</tr>
<tr>
<td>$A_{adoption}$</td>
<td>Barriers and facilitators to BC survivors adopting the Action Grant program</td>
<td>Focus groups; 6-month program evaluation survey</td>
</tr>
<tr>
<td></td>
<td>Proportion of participants who utilised the Project MOVE website</td>
<td>6-month program evaluation survey</td>
</tr>
<tr>
<td>$I_{implementation}$</td>
<td>Barriers and facilitators to implementing PA strategies</td>
<td>Focus groups; Facilitator interview</td>
</tr>
<tr>
<td></td>
<td>Perception of microgrant application process</td>
<td>Facilitator interview; 6-month program evaluation survey</td>
</tr>
<tr>
<td></td>
<td>Considerations for future implementation</td>
<td>Focus groups; Facilitator interview</td>
</tr>
<tr>
<td>$M_{maintenance}$</td>
<td>Number of participants who continued to be active individually and as a group at 6 months</td>
<td>Accelerometry; GLTEQ, Focus Groups</td>
</tr>
<tr>
<td></td>
<td>Retention of participants at 6-month</td>
<td>Participant master sheet tracking</td>
</tr>
<tr>
<td></td>
<td>Participants confidence to continue regular activity 6 months post program.</td>
<td>6-month program evaluation survey</td>
</tr>
</tbody>
</table>

3.8 Data Analysis

3.8.1 Quantitative Analysis

Descriptive data analyses were completed and reported as means (M) and standard deviations (SD) for all participant characteristics. All statistical analyses were conducted using IBM’s Statistical Package for the Social Sciences (SPSS Version 21.0). For estimates of change in PA (GLTEQ and accelerometry), five mixed analysis of variances (ANOVA) were conducted with meeting MVPA guidelines (meeting vs. not meeting) as the between-subjects variable, time as the within-subjects variables (baseline vs. 6-month follow-up) and
weekly minutes of MVPA, average daily step-counts, general health, physical functioning and role limitations due to health as the dependent variables.

All seven assumptions for the mixed ANOVAs were tested (Tabachnick & Fidell, 2013) including: 1) dependent variables were measured at the continuous level, 2) within-subjects variables consisted of at least two categorical, matched pairs, and 3) between-subjects variable consisted of at least two categorical, independent groups (Tabachnick & Fidell, 2013). Assumptions four to seven were met using SPSS Statistics, indicating that: 4) there were no significant outliers, 5) the dependent variable was normally distributed for each combination of the groups of the two factors, 6) there was homogeneity of variances for each combination of the groups of the two factors, and 7) sphericity (Tabachnick & Fidell, 2013). The Shapiro-Wilk test of normality was used to test the normal distribution, satisfying assumption five. Levene’s test was used in the analysis for homogeneity of variances, satisfying assumption six (Tabachnick & Fidell, 2013).

The analysis included all available data using the intention-to-treat principle. The intention-to-treat principle takes into consideration that participant status did not change so their data is carried forward from their last observation or measurement if they were lost to follow-up (Elkins & Moseley, 2015; El-Masri, 2015). Baseline measures for participants who accumulated insufficient wear time at 6-month follow-up were also carried forward. This type of analysis provided an unbiased assessment of the efficacy of the intervention; in other words, effectiveness of an intervention may be overestimated if an intention-to-treat analysis is not performed (Hollis & Campbell, 1999). It also preserves the sample size (White et al., 2011). Intention to treat is commonly used during analysis in studies involving cancer populations (Ambrogi et al., 2011; Piessen et al., 2013; White et al., 2011). In this current
study, participants who completed questionnaires and wore an accelerometer at baseline, but dropped out at follow-up, had their scores carried over from baseline to 6-months to replace missing values and assumed no changes occurred. The level of significance (α) was set at 0.05. As the primary outcome of this current study was feasibility, a sample size calculation was not performed (Billingham et al., 2013).

3.8.2 Qualitative Analysis

All audio recordings were transcribed verbatim by the primary researcher (TP). Content analysis, supported by NVivo10™, was conducted once all interviews and focus groups were transcribed verbatim. Content analysis is a method used, in qualitative research, for identifying and describing phenomena from the data to provide knowledge and new insights (Krippendorff, 1980). Content analysis was conducted deductively; meaning the analysis was operationalised from previous theory or principles (Burns & Grove, 2005). Data for the current study were categorised into the appropriate RE-AIM dimension and coded. The purpose of using content analysis was to identify barriers, challenges or facilitators experienced during program implementation and program maintenance, as well as reveal factors or recommendations for program refinement to assist with future program dissemination. The process began by reading and re-reading the interviews and focus groups to ensure there was familiarisation with the data. Two members of the research team, trained in qualitative research (TP and PS), independently identified and coded participant responses into relevant sub-themes for adoption, implementation, and maintenance, to enhance rigor. This involved labelling important features of the data that were relevant to the research question (Clarke & Braun, 2013). The next step involved searching for themes, meaning codes were examined to find common themes. Themes are constructed based on identifying
codes that are similar. Once common themes were identified, the themes were reviewed and refined to ensure the data were categorised under the appropriate RE-AIM dimension. The next step involved defining and naming themes for adoption, implementation, and maintenance. This consisted of conducting and writing a detailed analysis of each theme and explaining the essence of each theme. Once all the themes were identified, reviewed, and analysed, a final report was conducted. To ensure bias was minimized, themes were discussed among three researchers (secondary investigator [CC], lab coordinator [PS] and research assistant [KF]) once all the coding was complete. In the event of disagreement between research members during analysis, a further discussion with the other research team members was conducted until a consensus was reached. All identifiable information was removed from the transcriptions to anonymise the data.

3.9 Rigour

Rigour refers to the thorough, ethical conduct of a study that establishes trust or confidence in the research findings (Thomas & Magilvy, 2011). A common criticism in qualitative research is that data tends to be more subjective compared to quantitative research and therefore lacks scientific rigour (Samkin & Schneider, 2008). To achieve rigour in this study, three criteria (validity, reliability, and generalisability) were taken into consideration. In qualitative research, the validity is operationalised by how well the data represents the phenomenon. The reliability is the dependability, consistency or repeatability of the data collection methods, interpretation, or analysis. Finally, the generalisability/transferability is the ability of extending the results or conclusions to the greater population or to other settings (Maxwell & Chmiel, 2014; Polit & Beck, 2012). The following paragraphs detail the techniques used to ensure rigor in this study.
To enhance the validity and generalisability of the study, *purposeful sampling* was conducted to ensure representation of participants. It was important to select a sample with access to relevant sources of knowledge surrounding BC and PA. The researcher recruited participants from cancer related organisations, community advertisements, as well from community health and fitness centres. Selecting a sample of participants who could speak to the phenomenon being studied was important for generalisability/transferability (Mays & Pope, 1995).

Another method utilised to enhance rigour was through the process of *peer review* and *auditing* (Lincoln & Guba, 1985). To improve validity and reliability, data were peer reviewed by supervisors and external qualitative researchers. Peer reviewers provided insight and questions surrounding the data analysis (Tuckett, 2005). Discussions surrounding data analysis and potential themes were conducted with the supervisor, research coordinator, and research assistants until an agreement was reached. Further, an audit trail was documented to show how, why, and when decisions were made throughout the research process. For example, using NVivo10™ to document decisions and insights during focus group and facilitator interview data analysis ensured validity and reliability. Additionally, during data collection, an audio recorder was utilised to record and store information to contribute to reliability and validity (Mayan, 2009; Guba & Lincoln, 1985). All transcriptions were completed with due diligence and verbatim to ensure accuracy. Audio taping and transcriptions provides the opportunity for subsequent researchers to analyse the data (Mays & Pope, 1995).

*Methodological congruence* between research questions, methods and analytic procedure added validity (Mayan, 2009). The researcher conducted a literature review
surrounding RE-AIM and BC survivor health to help frame the clarification and justification of the study. The aims of the research study and research questions were clear and thorough. Additionally, the design and methods of the current study were justified as a result of the literature review. It was important to keep track of data collection and analysis so another researcher can conduct and analyse the data the same way as to come to essentially the same conclusion (Kitto, Chesters, & Grbich, 2008). For this current study, methods for data collection and analysis were outlined in detail to ensure reliability.

Additionally, researcher responsiveness pertained to having a neutral stance towards opinions, emotions, and thoughts while maintaining empathy is important in enforcing rigor (Patton, 2002). The researcher must be compassionate and open-minded which can help build rapport between the researcher and participants and may help garner greater insight and detailed perceptions (Patton, 2002). During the focus groups and facilitator interviews, empathetic neutrality was implemented by the researcher. The researcher would ask questions, allow for the participants to respond, then would ask for elaboration to their responses if needed. It was important that the researcher refrained from being judgemental or opinionated about participant responses, and remained neutral and unbiased, as there were no right or wrong answers (Chadwick et al., 2008).

A further aspect to ensure validity was to think theoretically (Morse et al., 2002). Data analysis was conducted thoroughly over two months to ensure data were analysed in detail and to avoid jumping to conclusions (Mayan, 2009). Relative components of participant quotes from the focus groups and facilitator interviews were evaluated to reinforce interpretation of the data. Quotes that highlighted the participant’s thoughts or experience in full detail were coded and analysed.
These strategies, were employed to ensure rigour and increase validity, reliability, and generalisability of the current research study.

3.10 Data Storage

All participant data remained confidential and was securely stored in the PHAB Laboratory at UBCO, which is directed by Dr. Cristina Caperchione (researcher’s supervisor). All electronic data (i.e., focus group and interview recordings) as well as corresponding transcriptions were securely stored in the UBCO secure network on a password protected computer in the PHAB Lab. All paper-based data, including demographics and questionnaires, were stored in a locked filing cabinet also in the PHAB Lab. Participants were recognised only by their group and participant number. Only the primary researcher (TP), research assistant (KF) and the supervisor (Dr. Caperchione) had access to this data. All data will be stored for a minimum of five years following publication of the results. Data will be destroyed and/or deleted at the end of the five-year period to ensure no breach of confidentiality.
Chapter 4 Results

4.1 Preface

The current study revealed that Project MOVE was an appropriate and acceptable program for BC survivors. Utilising the RE-AIM process evaluation framework, our findings indicated that Project MOVE had good Reach in terms of targeting BC survivors (82%); was found to be Effective, as evidenced by the positive changes in both subjectively and objectively measured PA levels; was perceived to be appropriate for this particular population and thus was highly Adopted by participants. In terms of Implementation, participants perceived the process of implementing their Project MOVE program/initiative to be mostly easy and straightforward, highlighting specific facilitators and barriers to implementation. In addition, participants suggested that when implementing future Project MOVE initiatives, additional education resources concerning PA and other health behaviours (e.g., nutrition information) are warranted. Results concerning Maintenance revealed that 83% of participants completed the program at six months, and 47% of participants reported they still engaged in PA with their Project MOVE group. This chapter outlines the results specific for each RE-AIM dimension.

4.2 Reach

Reach was evaluated by: 1) the number of BC survivors recruited for the study and proportion of BC survivors living in the Central Okanagan, 2) the demographics of participants, 3) the sources of recruitment, and 4) the number of action grant applications submitted and accepted. These findings were extracted from program reports and the self-report program evaluation questionnaire.
Number and Proportion of BC Survivors

A total of 87 participants took part in baseline assessments. The sample included 71 BC survivors (81.6%), 3 other cancer survivors (3.5%), and 13 healthy individuals (14.9%) providing social support (i.e., friend or family member of a BC survivor). Of the 4300 BC survivors living in the Central Okanagan (i.e., Kelowna, Vernon, Summerland, Peachland and Penticton) 2% participated in Project MOVE (BC Cancer Agency).

Demographics of Participants

Participants had a mean age of 59 years (SD = 8.8) and a mean BMI of 25.7 kg/m² (SD = 5.0). They were primarily white (94.3%), married (69%), college educated (39.1%), and retired (34.5%). On average, BC survivors that participated were 9-years post-diagnosis (SD = 8.15; range .13-29.11 years). The average stage of diagnosis was 2.03 (SD = 1.2) and the most common treatments these survivors received included lymph or axillary node dissection (58%), radiotherapy (47%), chemotherapy (45%), and/or a lumpectomy (41%). Table 4.1 provides further demographic characteristic details.

<table>
<thead>
<tr>
<th>Table 4.1. Demographics of Participants (n=87)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Age (years)¹²</td>
</tr>
<tr>
<td>35-44</td>
</tr>
<tr>
<td>45-54</td>
</tr>
<tr>
<td>55-64</td>
</tr>
<tr>
<td>65-74</td>
</tr>
<tr>
<td>75-84</td>
</tr>
<tr>
<td>Ethnicity²</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td><strong>Education</strong>&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>High school or less</td>
</tr>
<tr>
<td>High school diploma</td>
</tr>
<tr>
<td>Some post-secondary without diploma or degree</td>
</tr>
<tr>
<td>College or technical diploma or certificate</td>
</tr>
<tr>
<td>University Degree</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td><strong>Martial Status</strong>&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Married or living with a life partner</td>
</tr>
<tr>
<td>Living alone</td>
</tr>
<tr>
<td>Widowed</td>
</tr>
<tr>
<td><strong>Employment</strong>&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Full time work</td>
</tr>
<tr>
<td>Part time work</td>
</tr>
<tr>
<td>Caring for family/managing household</td>
</tr>
<tr>
<td>Unemployed</td>
</tr>
<tr>
<td>Recovering from illness/disability</td>
</tr>
<tr>
<td>Retired</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td><strong>BC staging</strong></td>
</tr>
<tr>
<td>Stage 0</td>
</tr>
<tr>
<td>Stage I</td>
</tr>
<tr>
<td>Stage II</td>
</tr>
<tr>
<td>Stage III</td>
</tr>
<tr>
<td>Stage IV</td>
</tr>
<tr>
<td>Unknown</td>
</tr>
<tr>
<td><strong>BC treatment</strong>&lt;sup&gt;f&lt;/sup&gt;</td>
</tr>
<tr>
<td>Lymph or axillary node dissection</td>
</tr>
<tr>
<td>Radiotherapy</td>
</tr>
<tr>
<td>Chemotherapy</td>
</tr>
<tr>
<td>Lumpectomy</td>
</tr>
<tr>
<td>Reconstructive surgery</td>
</tr>
<tr>
<td>Hormonal Therapy</td>
</tr>
<tr>
<td>Single Mastectomy</td>
</tr>
<tr>
<td>Double Mastectomy</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td><strong>Menopause status</strong>&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
<tr>
<td>Pre-menopausal</td>
</tr>
<tr>
<td>Going through menopause</td>
</tr>
<tr>
<td>Post-menopausal</td>
</tr>
</tbody>
</table>

*Note. BC = Breast Cancer, <sup>a</sup> 5 participants unresponsive, <sup>b,c,d,e,h</sup> 1 participant unresponsive, <sup>f</sup> participants indicated 1 or more options, <sup>g</sup> 4 participants unresponsive, <sup>h</sup> 13 unresponsive due to no cancer.*
Sources of Recruitment

The primary sources of recruitment included word of mouth from a family member or friend (28%), referrals from a cancer related organisation (26%) or a Project MOVE researcher (22%) and print media (18%). See figure 4.1 for full details of recruitment sources. Of the approaches used to recruit participants four people contacted the research coordinator over email following news releases in print, radio and social media, but did not end up joining a group. Other recruitment methods included two public “drop in” information sessions at a local community centre. The first information session was held during phase one of recruitment, of which 14 BC survivors attended. Subsequently, four survivors joined Project MOVE. The second information session was held during phase two of recruitment of which zero people attended. Further, Project MOVE researchers attended the Run for the Cure 2015 event in Kelowna. A total of 970 people registered for the event and 30 people approached the Project MOVE booth for information regarding the study. Of those who approached the project team, four people registered for Project MOVE.
Figure 4.1. Sources of Recruitment

Microgrant Application Submissions

Regarding application submissions, 11 action grant applications were received during phase one of recruitment of which seven applications were accepted and five groups were funded. Seven applications were received during phase two of recruitment of which five were funded. Two of the seven applications in phase one were not funded because one group did not meet the eligibility criteria of at least 50% of the group’s membership being BC survivors, and the other application was withdrawn from the program due to a deterioration in health of the group leader, affecting the ability to implement the initiative and lead the group. Other reasons why applicant groups were not successful in receiving a microgrant was because their intended program did not meet one of the following criteria: ability to engage target population (three applications), the potential of project sustainability (two
applications), the presence of clearly stated goals and objectives (one application). Each funded group received C$2,000 (Canadian Dollars) to implement their PA initiative. See Table 4.2 for microgrant application status per group.

Table 4.2. Microgrant Application Status per Group for Each Round of Recruitment

<table>
<thead>
<tr>
<th>Group</th>
<th>Round 1 Application Status</th>
<th>Round 2 Application Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women on Weights</td>
<td>Funded</td>
<td>Spin Together</td>
</tr>
<tr>
<td>Group Training</td>
<td>Funded</td>
<td>Fit Together</td>
</tr>
<tr>
<td>Explore Movement</td>
<td>Funded</td>
<td>New Wave Warriors</td>
</tr>
<tr>
<td>Move Anytime Anywhere</td>
<td>Funded</td>
<td>Inspire Health</td>
</tr>
<tr>
<td>Strive to Thrive</td>
<td>Funded</td>
<td>SpinCo</td>
</tr>
<tr>
<td>Moving and Healing Garden</td>
<td>Approved</td>
<td>New Wave Warriors</td>
</tr>
<tr>
<td>Lunchtime Yoga</td>
<td>Approved</td>
<td>Phoenix Fitness</td>
</tr>
<tr>
<td>Inspire Health</td>
<td>Not Approved</td>
<td></td>
</tr>
<tr>
<td>Fit Together</td>
<td>Not Approved</td>
<td></td>
</tr>
<tr>
<td>Cycle the City</td>
<td>Not Approved</td>
<td></td>
</tr>
<tr>
<td>Horseback Riding</td>
<td>Not Approved</td>
<td></td>
</tr>
</tbody>
</table>

4.3 Effectiveness

The effectiveness of the program was determined by changes in PA behaviour from baseline to 6-month follow-up, assessed by accelerometry and self-report. Additionally, two PA perception questions were included in the program evaluation survey in which
participants reported, on a scale from one to four, the extent to which Project MOVE “helped me start to be more active” and the extent to which Project MOVE “helped me increase my PA levels” (Appendix F).

**Accelerometer Results**

At baseline one participant had insufficient wear-time and at 6-month follow-up four participants had insufficient wear-time, therefore utilising the intention-to-treat principle, these observations were carried forward. After the removal of two outliers, mixed ANOVA indicated no significant main effect between time points on weekly MVPA ($F(1, 84) = 3.36$, $p = .07$, partial $\eta^2 = .038$). However, a significant interaction was found between those meeting MVPA guidelines at baseline and those not meeting weekly MVPA between time points ($F(1,84) = 10.28$, $p = .002$, partial $\eta^2 = .109$). See figure 4.2.

![Figure 4.2. Weekly Average of MVPA from the Accelerometer by Those Meeting and Not Meeting PA Guidelines by Time Point](image)

---

83
Follow-up t-tests showed that those not meeting MVPA at baseline had significantly higher weekly MVPA at follow-up compared to baseline ($t(38) = 3.92, p < .001$) however, those meeting MVPA at baseline showed no significant differences between baseline and 6-month follow-up ($t(46)= .929, p = .36$) on weekly MVPA. See Table 4.3 for means and standard deviations.

**Table 4.3. Weekly Average Minutes of MVPA Measured with the Accelerometer**

<table>
<thead>
<tr>
<th>Time Point</th>
<th>Not Meeting Weekly MVPA$^a$</th>
<th>Meeting Weekly MVPA$^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Baseline</td>
<td>74.92 (38.98)</td>
<td>264.46 (83.08)</td>
</tr>
<tr>
<td>6-month follow-up</td>
<td>117.97 (85.15)</td>
<td>252.73 (95.72)</td>
</tr>
</tbody>
</table>

$^a$n=39, $^b$n=47

**Godin Leisure Time Exercise Questionnaire Results**

After the removal of two outliers mixed ANOVA indicated a significant main effect between time points on self-reported weekly MVPA ($F(1,84) = 9.46, p = .003$, partial $\eta^2 = .101$). No significant interactions were found between those meeting MVPA guidelines at baseline and those not meeting weekly MPVA between time points ($F(1,84) = .118, p = .732$, partial $\eta^2 = .001$) (Figure 4.3). See Table 4.4 for means and standard deviations.
Table 4.4. Weekly Average Minutes of MVPA Measured with the GLTEQ

<table>
<thead>
<tr>
<th>Time Point</th>
<th>Not Meeting Weekly MVPA&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Meeting Weekly MVPA&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>96.87 (159.29)</td>
<td>265.93 (154.33)</td>
</tr>
<tr>
<td>6-month follow-up</td>
<td>161.58 (149.90)</td>
<td>317.66 (182.36)</td>
</tr>
</tbody>
</table>

<sup>a</sup>n=38, <sup>b</sup>n=48
Self-Reported Perception of PA Behaviour

Findings from the self-report program evaluation data revealed that the majority of participants thought Project MOVE was effective at helping them initiate PA (75.6%) and helped increase their current PA levels (72.3%).

4.4 Adoption

Adoption was assessed by: 1) participant perception of acceptability and satisfaction of the program contributing to adoption, 2) facilitators and barriers participants experienced to adopting the program, and 4) participant utilisation of the Project MOVE website. These findings were extracted from the project reports, self-report program evaluation questionnaire and focus groups.

Participant Perception on Acceptability and Satisfaction Project MOVE

Participants self-reported their experience with Project MOVE in terms of acceptability and satisfaction which contributed to adoption. Findings from the self-reported program evaluation questionnaire indicated that overall, participants were satisfied with Project MOVE (88.1%), learnt new things about PA through Project MOVE (70.8%), felt that Project MOVE was appropriate for female BC survivors (92.2%), and would recommend Project MOVE to other female BC survivors (95.6%). Additionally, 94.2% of participants enjoyed being part of a Project MOVE group and 79.4% felt socially connected to the women in their group. The focus groups elaborated on what made Project MOVE acceptable and appropriate for BC survivors, therefore facilitating adoption.

Facilitators and Barriers Participants Experienced to Adopting the Program

The majority of participants reported that Project MOVE was easy to adopt, in part due to the nature of the groups. For instance, survivors indicated that contemporary support
groups for BC survivors tended to be melancholic and focused on the hardships associated with BC. However, participants were satisfied with the support structure they received through Project MOVE, how it was positively framed and how it brought a sense of normality or control over their life. One participant explained how her Project MOVE group was full of laughter and positive support.

*I went through the cancer clinic for their [support] group. After the second [session] I knew, no way. I can’t [continue to attend] and cry or whatever because it wasn’t going to help me…I needed more positive [support] and in our [Project MOVE] group we have to calm down and not laugh as much* (group 5, participant 2).

Participants indicated that their Project MOVE group provided the opportunity to deflect from the problems of cancer and helped them focus on the positive aspects of their health. One woman explained how she enjoyed coming to the PA sessions to exercise, socialise, and to not talk about cancer. “Life is about living, getting better, and increasing your activity level…you don’t need to talk about cancer” (group 2, participant 3). In fact, the majority of participants indicated that their group did not primarily identify as a BC survivor group but instead as a PA group. The majority of participants focused on moving beyond their cancer towards a healthy future.

*I didn’t want to join a support cancer group and just talk about our cancer. But I thought we have a connection [in our Project MOVE group]. It doesn’t mean that we have to talk about it [cancer] all the time. But exercise is a good vehicle for making some extra connections* (group 3, participant 3).

Participants spoke to the importance of having a shared experience and suggested that even though they were part of a PA group, they still provided BC related support to one
another if a person needed it. One participant mentioned that is was nice being able to ask
other people if they experienced symptoms and being able to provide support to one another;
“Just even them asking someone else...hey do you remember experiencing this, is there
something I should or shouldn’t be doing?” (group 3, participant 2). One survivor explained
how she enjoyed the program because her group created a supportive environment and she
felt comfortable being active with similar others (i.e., other BC survivors); “It was nice
exercising with people who have gone through what you have gone through. The friendships
we’ve built and just the support here. That was nice” (group 5, participant 3). Many
participants reported they lacked knowledge in how to use gym equipment and how to do
certain exercises properly, prior to the program. This often resulted in many survivors feeling
uncomfortable attending a gym as described by one survivor; “If it was a class full of really
confident women, who were really fit and used to exercising all the time, I would feel very
uncomfortable, which is a lot of why I don’t go to gyms” (group 1, participant 3).

Many participants indicated that a smaller sized group also influenced program
adoption because the women were provided with more intimate opportunities to build
camaraderie with one another. One survivor mentioned that “because it’s a smaller group I
feel more comfortable and you connect quicker” (group 9, participant 1). In addition to the
small group size, all groups mentioned that a smaller size group made it easier to find a
common time that was suitable for all group members to get active. In contrast, the larger
Project MOVE groups discussed how difficult it was to organise a common time that was
suitable to everyone’s schedule, making program adoption difficult at times.

It was also difficult to adopt the program if the activities or fitness sessions were too
difficult or unenjoyable. One participant explained how “it felt like the instructors didn’t
necessarily know the capabilities of the group or the individuals within the group” (group 3, participant 3). Fear of injury was also a concern, as noted by one survivor; “for me some things are easy and some things are hard, but sometimes they [exercises] could even be slightly dangerous” (group 3, participant 1).

Many survivors also indicated that prior to the Project MOVE microgrants, financial barriers to adopting a PA program often existed. Many participants detailed how they required time off work post-treatment which created financial hardship. They explained how they couldn’t afford to purchase a gym pass or hire a personal trainer on top of their everyday necessities and the extra BC treatment related supplies they needed (e.g., medication).

And there’s just always something that you have to buy. No matter how well covered you are, there’s always bandages that you end up buying. Or you end up having to buy vitamins... Cost is a huge factor. And they preach that you need to change your way of eating, you need to do well with this, and that’s all financial. It all costs money (group 8, participant 3).

Participants also reported that prior to the program they were hesitant to spend their money on a new activity or fitness class. They were concerned that they might not enjoy the program or would find it to be too physically challenging after paying or committing to a contract:

I couldn’t quite frankly go to a jazzercise...Because, if I had joined and paid them money and realised I couldn’t do it...I couldn’t do it. So, what would I have done? I would just all gone away defeated and lost my money (group 1, participant 2).

Participants explained how the Project MOVE model (specifically the microgrant and financial incentive) enabled them to explore and take up activities without the financial
burden generally tied to PA programs. One participant explained; “For me it [Project MOVE] was an introduction to things I never experienced before like yoga, circuit training and spin. So, it was really good” (group 8, participant 5). Once participants found an activity they enjoyed through Project MOVE, they were more willing to invest their own money on a gym pass or an activity following program completion. One participant explained the importance of the free program in exploring and adopting new activities:

Free I think is a big bonus because a lot of women maybe won’t put their money out because they don’t know [what the program’s about]. I don’t know if I want to do this [program]. But if it’s free for this long, then it’s like I do like these things and I do want to pay to do these things (group 5, participant 1).

Many survivors reported that the microgrant was very helpful in learning new exercises and utilising the gym equipment; “Project MOVE gave us that little bit of funding to be able to put a group together, learn some skills and meet some people which was very helpful” (group 1, participant 3). The microgrant was also used to purchase equipment which helped participants adopt the PA program. For example, one group purchased Fitbits™ and another group purchased yoga mats. The participants valued utilising the funds towards encouraging PA as indicated by one survivor: “Here’s some money, do something that is going to get you out there and active, and that was really motivating for me” (group 4, participant 7).

Overall, participants found it easy to adopt Project MOVE because it provided an opportunity to engage in PA in a supportive environment with like women, as well as explore and adopt new activities, and provided the opportunity for participants to adopt/uptake PA by eliminating the financial burden that was often attached to PA programs.
Participant Utilisation of the Project MOVE Website

Google™ website analytics revealed that 2,959 people visited the Project MOVE website between the launch date (May 2015) and the end of the program (May 2017). Thirty-three percent of participants reported that they visited the Project MOVE website to obtain the following: 1) general information (25.7%); 2) the Project MOVE application (11.4%); 3) cancer and PA information (10%); and 4) staff contact information (5.7%). Of those who visited the Project MOVE website, 61.5% thought the purpose of Project MOVE was explained very clearly.

Table 4.5. Number of Website Views per Month and Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>92</td>
<td>696</td>
<td>242</td>
<td>83</td>
<td>185</td>
<td>370</td>
<td>103</td>
<td>35</td>
<td>1,806</td>
</tr>
<tr>
<td>2016</td>
<td>99</td>
<td>135</td>
<td>190</td>
<td>1115</td>
<td>51</td>
<td>34</td>
<td>40</td>
<td>50</td>
<td>58</td>
<td>55</td>
<td>56</td>
<td>50</td>
<td>933</td>
</tr>
<tr>
<td>2017</td>
<td>58</td>
<td>33</td>
<td>54</td>
<td>51</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>220</td>
</tr>
</tbody>
</table>

4.5 Implementation

Implementation was evaluated by: 1) leader’s perceptions of the microgrant application process; 2) participant’s perceptions of the barriers and facilitators to implementing Project MOVE initiatives; and 3) participant’s considerations for future implementation. Results were extracted from focus groups with Project MOVE participants and semi-structured interviews with each group leader.

Perceptions of the Microgrant Application Process

Seventy-five percent of the group leaders responsible for submitting the microgrant application found the process of completing and submitting the application easy and straightforward, as supported by one leader, “it [the application process] was pretty concise.”
“It was not difficult to answer the questions” (group facilitator). No leaders provided recommendations on how the application process could be improved. Some leaders indicated they filled out an application prior to forming a group which made it difficult to answer the application questions.

I felt like for me it was kind of difficult because the questions were formatted in terms of having a group already formed. So, the questions were like how do you guys know each other? And what are your goals? And I didn’t have a group at that point. So, I kind of had to answer just like what I expected the group to be (group facilitator).

One leader indicated she wrote up the microgrant application then recruited participants who were interested in cycling to satisfy the requirement of the application. Another leader indicated that once she had a group, she consulted with them to see what activities they wanted to do. “I applied and then basically had a discussion with the participants” (group facilitator). However, most of the groups did get together to plan their PA program during the application process. One leader described that when the group did get together to discuss this they relied heavily on the recommendations from the leader.

In the beginning we had a meeting, I tried to explain it in a way that I need/want you to reach out to me like what are the things you want to try and I think that they didn’t have a lot of experience with [physical] activity so they were kind of like, I don’t know you tell us. So, I gave lots of suggestions (group facilitator).

Overall, it was intended that the leader worked together with their group to plan a PA program, but due to different group circumstances, some leaders completed the application first, then recruited participants. This allowed participants to join a group that already had a PA program planned.
Facilitators and Barriers to Implementing Project MOVE Initiatives

Participants detailed their experience with Project MOVE, specific to the barriers and facilitators to implementing the program. Participants strongly attested that having an organised leader with good communication was important for program implementation. One participant suggested “without her [the leader] it [the program] wouldn’t have happened” (group 9, participant 4). Delegating one person to organise the PA sessions and act as a “liaison back and forth between the trainer and the group” (group 4, participant 7) facilitated implementation. Most participants reported that they were more likely to attend PA sessions if the group had an organised leader who communicated regularly with the group compared to groups with disorganised leaders who communicated sporadically. Sporadic communication from the leader often lead to confusion as participants would receive little information and were unsure if the session was going ahead as described by the following participants; “It really felt at the start we had a leader. Like [the leader] was running our program. But then it just sort of felt like communication was sporadic. We would throw out ideas [about activities] but not necessarily get a response” (group 10, participant 1), and, “If we didn’t follow through. It never happened” (group 10, participant 2).

Some participants preferred having a leader who would plan the PA sessions and contact the facilities based on the group’s availability and suggested activities. One participant noted “For me it was just easy if all the activities already came planned. Because I’m not the type of person to phone up and say hey what is your gym all about?” (group 5, participant 2). However, a number of participants believed that having input into how the microgrant and financial incentive would be used, specifically concerning the types of activities that the group would participate in, was an important element for program
implementation as participants felt more engaged in the program when they were part of the planning and decision making process.

While each Project MOVE group used their microgrant funding and financial incentive uniquely, most groups reported that utilising the microgrant towards a fitness trainer at a gym facility was valuable in achieving knowledge surrounding exercise. Many participants reported that prior to Project MOVE, they did not know how to use the gym equipment or how to do certain exercises properly, however having fitness trainers involved provided them with this knowledge. For instance, one participant indicated;

[the instructor] taught us real basic exercises, sometimes I thought they were pretty easy but two days later I felt them…She spent a lot of time on technique and doing exercises properly which was really good...

(group 4, participant 4)

All groups reported that they enjoyed the group PA sessions but having a trainer to provide one-on-one attention was important as survivors at various levels of survivorship had various mobility limitations. One participant explained, “the thing I found the most helpful here was the one-on-one attention we got because we are a smaller group. [The instructors] could fine tune what we were doing to our strengths and weaknesses” (group 1, participant 2).

Additionally, it was important that fitness trainers had knowledge and expertise concerning BC and PA. Trainers with knowledge about BC were more likely to understand the mobility limitations BC survivors experience following treatment, and were able to modify exercises to the fitness level and physical ability of the participants. One participant noted, “they didn’t approach us expecting us to be able to bench press” (group 1, participant
4), but rather they started with simple exercises and progressed these in terms of type and intensity of exercise over time.

Considerations for Future Implementation

During the focus group sessions, participants also provided considerations for future implementation, including, allowing time for greater social interaction, incorporating health education resources concerning PA (inclusive of activities to perform at home) and other lifestyle behaviours (e.g., nutrition), implementing different modes of PA, and engaging in goal setting with the group. Most participants indicated that some social support was encouraged and promoted throughout the groups, however many wanted more opportunities to develop further social connections. Many groups recommended that the leader or trainer incorporate a time, before or after the PA session, for participants to socialise. Participants would have liked to utilise the opportunity to review group member’s names and get to know each other better.

I also wanted more of a social connection...I feel like that is very valuable, and I think it somehow could have been built into the program more. Whether it’s an hour’s class and we commit to an hour and fifteen, or commit to an hour and a half and half an hour of that is social. Where people do some sharing (group 3, participant 3).

Another common recommendation that came from the focus groups was the inclusion of health education resources. In particular, participants wanted to gain further knowledge concerning other health topics such as nutrition as many felt that healthy eating was also very important for BC survivors. They suggested paper based educational resources as well as more information about nutrition (e.g., macronutrients that survivors need, healthy recipes) on the Project MOVE website. In addition to these tangible resources, participants also
suggested that a health specialist (e.g., physiotherapist, dietitian) come in and present information to the group.

*Maybe one of the weeks have some physiotherapy people in...You do your five-minute social but maybe one week you have, you know, we’re going to do twenty minutes of exercise and the rest of the time we’ve got a guest speaker from whatever physiotherapy clinic...Who’s going to talk about how to...*(group 8, participant 3).

Additionally, most groups reported that they would have valued a personalised take home exercise package so they could continue to be active outside of the scheduled sessions. A survivor in one group explained how she “*had kind of hoped to get more of a recipe to take away that would be just personally for me...*” (group 1, participant 4). Another survivor in the group added the importance of “*[going] home with a take away*” (group 1, participant 2) in case they could not attend a session. Some groups were unaware of the activities that were available in the community and appropriate for BC survivors with various abilities. Therefore, participants recommended the leader provide a list of activities available throughout the community that may be of interest to them. “*And I think that a list of resources would just be really helpful. And if you want to, here’s a whole bunch of different studios...*” (group 10, participant 2).

Lastly, participants firmly believed that goal setting is an important strategy for PA motivation and engagement. Some reported that this was lacking in their group and suggested setting some time aside to set individual and group goals prior to the start of the program would be helpful in getting, and keeping, participants engaged in PA in the long term.

*Have some sort of goal to work towards. So, if your goal is to increase your steps.*

*That’s totally great. Or if the project is 10 weeks long, everybody’s goal is to make 8*
of those sessions. Or everybody’s goal at the start is to try 3 new things that nobody’s
done before. But having some goals at the start I think would really help motivate us
to continue on and be able to say part way through, hey guys we are on track or
we’re not (group 10, participant 2).

Overall, participants strongly attested that leadership was key to implementing the PA
program. Without a proactive group leader, it was difficult for some groups to maintain
group PA. It was also important for the leader to have experience or knowledge related to BC
in order to tailor activity sessions and exercises to the individuals with mobility limitations.

4.6 Maintenance

Maintenance was evaluated by the following: 1) participant retention in the program,
2) participant perceptions of maintaining regular PA during and following Project MOVE,
and 3) barriers and facilitators to maintaining PA during Project MOVE. Results were
extracted from project reports, the self-report program evaluation questionnaire, and focus
group data.

Participant Retention

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

Participant Perceptions of Maintaining Regular PA During and Following Project MOVE

Findings from the self-reported program evaluation questionnaire indicated that
overall, Project MOVE helped participants continue to be regularly active over the past six
months (75.7%) and instilled confidence to continue regular activity over the next six months
(87.5%). Following the program, 47% of participants reported that they continued PA with
their group even though the program was over. The potential of receiving an additional $500 (financial incentive) motivated 76.8% of participants to maintain regular activity from baseline to 6-month follow-up.

Facilitators and Barriers to Maintaining PA During Project MOVE

In addition to the self-reported data, findings from focus groups provided further insight concerning the barriers and facilitators to maintaining PA levels in BC survivors. Some survivors explained that they had difficulty maintaining PA during Project MOVE as a result of treatment related side effect such as lymphedema and pain. At times, some participants couldn’t take part in the PA sessions due to the pain they were in. Also, one group indicated that their PA sessions were too high of intensity which caused one participant to injure herself and not return to the group; “And I fell and hurt myself. And I don’t know these people so I thought, I’m not coming back” (group 8, participant 6).

Many participants mentioned they felt committed or accountable to their group which helped them maintain PA throughout the program. They referred to the PA program like an appointment. One participant said: “if I’m expected somewhere, I’ll be there. If nobody really cares, I don’t either” (group 3, participant 4). Many participants also reported that the $500 group incentive provided motivation to maintain activity as they did not want to let their team down and risk not receiving the incentive. As highlighted by one participant; “I think it did. It felt more like a team thing to me. Like I needed to show up [to the PA sessions]. Like it [the $500 incentive] was something we were working together towards” (group 1, participant 4).

The social support within the group environment was also motivating for participants to maintain PA. One participant explained how group comradery was important as it made
participants feel valued by group members and enhanced commitment to attending the PA sessions. She continued to stress the importance of comradery, saying: “Because if you don’t have that comradery already in place, you may be more inclined to say ‘oh shoot I just don’t feel like going today’” (group 5, participant 4). Additionally, almost every group reported that having a buddy to exercise with outside of the program was key to maintaining PA as they were more accountable to one another. “It’s good to partner up. Like another woman in the group and I are in touch with each other often. Also, a different woman in the group and I have become close walking buddies. You just have that accountability with a buddy system” (group 9, participant 2).

Furthermore, many participants reported that they were keen to maintain PA post-Project MOVE as a result of seeing positive health benefits, such as increased endurance and strength. For instance, one survivor noticed her strength improved from one class to the next and commented “I can’t believe how much better I’ve gotten. Because I couldn’t stand up on the spin bike the first time. The next [class] suddenly I was getting stronger” (group 7, participant 3). Others reported; “My breathing and my endurance is better” (group 7, participant 2) and “we can recover so much faster” (group 7, participant 1). Another participant explained that she was motivated to maintain PA because she understood the benefits of PA, “if I don’t do it [exercise], I weaken. That’s why I do it” (group 10, participant 1).

Lastly, many participants expressed high motivation to continue being physically active following Project MOVE to further build strength and endurance, as supported by this statement.
We want to progress through a program and improve our fitness. We don’t want to just get a little more active. We actually are looking to improve on our fitness because especially as new survivors, we have gone through all of this and have lost some of our fitness and strength. So, it is important to get that back and put some normality into your life again (group 4, participant 7).

With the experience and confidence gained from Project MOVE, several women indicated that they continued to seek opportunities for PA in the community. Participants from one group discussed continuing PA at a gym facility without needing a trainer post-intervention; “Now we know how to do the exercises, or what even exercises to do” (group 4, participant 4) and “We could create our own circuit” (group 4, participant 2).

4.7 Summary of Key Findings

Concerning reach, recruitment proved to be difficult as only 71 BC survivors participated in the study. However, various strategies such as modifying the eligibility criteria to include friends or family helped provide social support to BC survivors and extended reach. In terms of effectiveness, Project MOVE showed a positive influence on subjective and objective measures of PA in participants who were not meeting PA guidelines at baseline. According to many of the participants, Project MOVE was appropriate for BC survivors and included a number of key components that facilitated easy adoption. The program was mostly implemented as intended and it was highlighted during the focus groups that leadership played a critical role in the implementation process. Without a leader, group adherence to the PA sessions and building group comradery was sometimes difficult. Lastly, participant retention was high and participants were confident they would maintain regular PA over the next six months. Interestingly, the financial incentive was reported to be a
motivating factor to maintaining PA levels, however, the focus groups indicated it was more the team aspect and not letting the team down that contributed to maintaining PA.
Chapter 5 Discussion

To the best of our knowledge, this is the first intervention designed for BC survivors to plan and implement their own PA program with support from microgrants and financial incentives. Often, PA interventions involving BC survivors are conducted in tightly controlled research conditions under the close supervision of the research investigators, making it difficult to generalise results (Caperchione et al., 2016). With the lack of translation from the research setting to the community, more practical, real-world trials are warranted to enhance dissemination and generalisability (Caperchione et al., 2016; Wilcox et al., 2006). Therefore, the purpose of this study was to explore the feasibility of Project MOVE, utilising the RE-AIM framework, and provide recommendations for program refinement and future program dissemination. This chapter discusses the major findings drawn from each dimension of RE-AIM. The discussion includes probable explanations and implications of the previously outlined results.

5.1 Reach

As convenience sampling approaches (i.e., self-referred) are generally associated with selection bias, population-based recruitment strategies are often the preferred recruitment method (Irwin et al., 2008). However, findings from the current study indicate very similar demographics between BC survivors recruited for Project MOVE and Canadian BC survivors who have self-referred to other studies (Brunet & St-Aubin, 2016; Rogers et al., 2009; Sabiston, McDonough, & Crocker, 2007). Like other Canadian studies involving BC survivors, Project MOVE participants were mostly white (Brunet & St-Aubin, 2016; Rogers et al., 2009; Sabiston, McDonough, & Crocker, 2007), between the ages of 45 and 74 (Brunet & St-Aubin, 2016; Rogers et al., 2009; Sabiston, McDonough, & Crocker, 2007; Wrosch &
Sabiston, 2013), married (Sabiston, McDonough, & Crocker, 2007; Wrosch & Sabiston, 2013), post-secondary educated (Brunet & St-Aubin, 2016; Rogers et al., 2009; Wrosch & Sabiston, 2013), employed or retired (Brunet & St-Aubin, 2016; Rogers et al., 2009), and have lived with stage II cancer (Rogers et al., 2009; Wrosch & Sabiston, 2013). Although BC survivors recruited for Project MOVE were comparable to other Canadian BC survivors, as indicated by the demographics in other studies, we were not able to reach a large number of survivors.

Despite efforts and various recruitment strategies to reach a large number of BC survivors to participate in Project MOVE, recruitment proved to be difficult. Various recruitment techniques were employed (e.g., online, print, and radio advertisements, posters, information sessions etc.) targeting BC survivors living in the Central Okanagan, however, few applications were submitted. Some BC survivors inquired about Project MOVE and asked if they could sign up with a family member or friend who had not lived with BC. Many indicated they would feel more comfortable joining the program if they brought someone they knew along. Therefore, based on challenges faced with recruiting groups consisting of all survivors, the eligibility criteria were modified to include individuals providing social support. As a result of modifying the eligibility criteria, more interest was garnered from individuals and more microgrant applications were submitted.

The challenge of recruiting BC survivors for interventions has been well documented in previous research (Irwin et al., 2008; Moller et al., 2013; Zhou, Dunsiger, & Pinto, 2013). For instance, Irwin et al. (2008) evaluated the effectiveness of recruiting BC survivors to a six-month PA intervention using two different recruitment strategies. Irwin and colleagues (2008) identified BC survivors (n=1072) through the American cancer registry. Information
regarding the study was sent to patients’ physicians for consent to contact. Those who provided consent forwarded the information on to their BC survivor patients (n=763). Additionally, BC survivors (n=126) interested in the study self-referred via advertisements in the media. By the end of recruitment, 75 BC survivors participated in the study by Irwin et al. (2008). Reasons for lack of recruitment included physicians did not give consent to include their patient(s) (n=309), declined to participate (n=397), ineligibility (314), or unable to contact (n=90). Common reasons for refusal included vague refusal (n=74), unwilling to travel (n=75), too busy (n=71), refused after baseline visit (n=13) and other (n=63).

Although there is no ‘gold-standard’ recruitment strategy for this population, numerous studies report on the recruitment techniques they found to be effective at recruiting BC survivors. Common strategies employed to recruit participants have included paid advertisements in local print, online, and radio, posters, pamphlets, face-to-face meetings with community organisations, and information booths at community events (Brunet & St-Aubin, 2016; Rogers et al., 2009). Many researchers advocate using multiple recruitment methods to increase reach (Brown et al., 2000; Patrick, Pruncho, & Rose, 1998; Phillips et al., 2014). These recruitment methods mostly fall in line with the recruiting strategies used for Project MOVE. One strategy that was not used to recruit participants was identifying potential participants using the cancer registry. Researchers report this method is commonly expensive and time consuming as consent is needed from the patient’s physician prior to contacting the patient (Irwin et al., 2008). Although this strategy identifies many potential participants, it is common that physicians do not respond to the request of the researcher for consent to contact the survivor or do not pass along the information regarding the study to their patients (Irwin et al., 2008). Therefore, this strategy was not used to recruit participants.
Many common reasons for lack of participation at initial contact include lack of interest (Emslie et al., 2007), medical reasons (Crombie et al., 2004; Olson et al., 2014), pain and fatigue (Bitsika, Sharpley, & Christie, 2010), depression and anxiety (Haas et al., 2012; Justine et al., 2013; Olson et al., 2014), lack of time (Emslie et al., 2007), unwillingness to travel (Phillips et al., 2014). As participants self-referred to Project MOVE, we do not know exact reasons as to why more BC survivors did not inquire and/or sign up for the program. However, we can insinuate that many BC survivors experience common barriers that limit their involvement in community-based PA including lack of self-confidence as well as lack of social support. Often, BC survivors are self-conscious of their scars from treatment, are unable to perform certain movements due to limitations from surgery, or experience difficulty adjusting to alterations in body shape and image (e.g., weight gain, hair loss, removal or disfigurement of breast(s), muscle loss, and lymphedema) which often leads to negative body image perceptions (Bitsika, Sharpley, & Christie, 2010; Singh et al., 2012; Quintard & Lakdja, 2008). These concerns often prevent survivors from engaging in community-based PA programs (Miedema & Easley, 2012; Wurz et al., 2015). However, modifying the eligibility criteria to include individuals (with or without cancer) to provide social support, and to extend reach appeared to attract more participants for the current study. A potential reason could be because BC survivors felt more comfortable in their decision to join Project MOVE and exercise with a group if they were able to bring a friend or family member to participate in the program as well. It has been well documented that social support is a positive determinant of lifestyle changes such as increasing PA (McDonough, Sabiston, & Wrosch, 2014). Although there is extensive research on social support and PA, little is known regarding the role of social support as a facilitator of PA engagement (Barber, 2012).
Although, this is an indication that social support from a friend or family member who is also part of the program can help BC survivors engage in PA.

Additionally, by extending reach to include individuals (with or without cancer) providing social support, Project MOVE could act as a BC prevention measure for those who have not been diagnosed with cancer. Encouraging a healthy lifestyle through effective and acceptable prevention strategies, individuals can decrease their risk for developing chronic disease such as BC by 30-40% (Bode & Dong, 2009; Khazaee-Pool et al., 2017; Petersen, 2009). Epidemiologic studies report that those who incorporate PA into their lifestyle can mitigate the risk for developing BC (Korde et al., 2009). For example, the Women’s Health Initiative cohort study reported that women who engaged in brisk walking for 1.25-2.5 hours per week had an 18% reduced risk for developing BC compared to inactive women (McTiernan et al., 2003). Additionally, those who performed more than 10 hours per week of brisk walking had a slightly greater reduction in risk. This demonstrates the importance of including women providing social support to the program as they not only benefit from the health benefits but they also reduce their risk for developing BC.

5.2 Effectiveness

For community interventions to have a public health impact, they must be effective (Glasgow et al., 2009). Project MOVE was an effective approach to increasing PA levels in BC survivors who were not meeting the recommended 150 minutes of weekly MVPA at baseline. Additionally, for those who were already meeting PA guidelines, Project MOVE was effective at helping maintain PA levels. The positive effect on PA is an important finding as Project MOVE was effective at increasing PA levels in BC survivors who needed a “kick start” for initiating a PA routine. Similar to other health promotion studies utilising
the microgrant model, these findings support that providing participants with the opportunity to develop and implement a PA program with the help of microgrants can help facilitate behaviour change and promote PA (Bobbitt-Cook, 2005; Caperchione, Mummery, & Joyner, 2010; Hartwig et al., 2009; Honeycutt et al., 2012; Johnson et al., 2006; Schmidt et al., 2009). For example, Caperchione et al. (2010) distributed 48 microgrants, each worth up to $1,500 (Australian Dollars), to priority groups of women (i.e., indigenous, older women, women with young children, women from lower socioeconomic class) living in Australia to develop and implement unique projects that increased women’s participation in PA through established walking programs. One of the women’s group involved in the study utilised the microgrant to create a footpath with lights and benches to enhance the safety and encourage walking. Another group from the same study developed a Walk With Grandma program where Indigenous women used the microgrant towards a cultural walking program. Although no objective measures of PA were collected, the program was innovative and promoted PA for older indigenous women while supporting indigenous cultures and traditions (Caperchione, Mummery, & Joyner, 2010).

Given the need for greater research examining the use of microgrants in the promotion of PA (Caperchione, Mummery, Joyner, 2010), the current study contributes to the research literature by using the microgrant model with BC survivors and objective measures of PA. Unique to other health promotion studies utilising the microgrant model, Project MOVE is the first program, to our knowledge, to evaluate the effects of a microgrant program towards behaviour change in BC survivors and is the first microgrant related program to objectively measure PA. The current study suggests that microgrants can act as a stimulus for positive behaviour change in BC survivors.
Also noteworthy is the difference in results between the GLTEQ and the accelerometer, in which participants self-reported higher minutes of PA than what was captured by the accelerometer. However, this discrepancy is not surprising and has been commonly reported by a number of other studies. A study conducted by Mazzoni et al., (2017) found that BC survivors (n=65) self-reported more minutes in moderate and vigorous PA in their logbook compared to what was captured by the SenseWear Armband mini, a device similar to the accelerometer. Another study by Johnson-Kozlow et al. (2006) compared minutes of self-reported PA via the 7-Day Physical Activity Recall (PAR) (Sallis, 1997) and International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003) to accelerometer recordings in 159 post-treatment BC survivors. When they compared average PA minutes between the PAR and the accelerometer, BC survivors self-reported they were more moderately and vigorously active by 17 minutes and 5 minutes per week, respectively, compared to the accelerometer. When they compared the average PA minutes IPAQ to the accelerometer, BC survivors self-reported they were more moderately and vigorously active by 225 minutes and 31 minutes per week, respectively, compared to the accelerometer.

The over-reporting of PA in the current study may be explained by some limitations of the GLTEQ. Self-report is often subject to over-reporting due to response bias (i.e., influencing response of participants through wording), social desirability (i.e., over or under reporting to present one’s self in a favourable way), and failure to accurately recall frequency and duration of purposeful and incidental PA (Bassett, Troiano, McClain, & Wolff, 2015; Warren et al., 2010). Furthermore, it is also possible that the accelerometer underestimated PA during upper body activities or activities with limited movement such as dragon boating, stationary cycling or yoga, all of which are recognised as popular activities for BC survivors.
(Bower et al., 2012; Cramer et al., 2012; Sabiston et al., 2007) Also, the accelerometer fails to capture water based PA, thus if participants engaged in active swimming for example, this would not have been recorded by the accelerometer. Although participants were asked to record water based activity in their PA log, it is possible participants over- or under-reported the amount and intensity of activity or forgot to indicate their activity in the PA log.

5.3 Adoption

Project MOVE was structured to empower BC survivors to design and implement their own PA program. The ‘bottom-up’ approach and microgrant strategy was devised to help participants adopt the program. Participants reported that they were satisfied with the program (88.1%) and felt it was appropriate for BC survivors (92.2%), which helped facilitate adoption for several reasons. First, participants appreciated the positive group support they received. Compared to traditional support groups where BC survivors meet to mostly discuss their experiences with BC, expressive depressing emotions, and learn more about the disease (Lese, M., Lese, I., & Mili, 2014), Project MOVE focused more on PA with social support/connections embedded during the PA sessions. Participants enjoyed going to the PA sessions to connect with fellow team members and chat about their family, their weekend adventures and anything else that was not focused specifically on cancer. Similar to the results from Project MOVE, Wurz and colleagues (2015) reported that the BC survivors in their study enjoyed being around ‘similar others’. Participants in their study also thought it was important to engage in PA with other people who have experienced different stages of BC at different ages. The cancer free survivors gave in-treatment or recently post-treatment cancer survivors hope for the future. Like Project MOVE, the group environment in Wurz’s study created an environment where participants could talk openly about the disease which
made the women feel comfortable and facilitated participation. Compared to just support groups, Project MOVE offered women the opportunity to decide whether or not they wanted to share their experiences with BC, while providing an upbeat, enjoyable and fun environment where participants could also forget about their disease if they chose to. Further, smaller group sizes facilitated program adoption as participants tended to develop greater comradery. In line with previous research (Emslie et al., 2007; Sabiston et al., 2007; Wurz et al., 2015) the camaraderie and friendships gained from small groups were important motives for attending or adopting the PA sessions. Emslie et al. (2007) found that BC survivors preferred the social interaction and atmosphere offered with group PA compared to individual PA sessions with a trainer or exercising at home. Group PA provided an environment where survivors could empathise with one another and help transition from feelings of isolation post-treatment to feeling accepted and supported (Emslie et al., 2007).

The microgrant was also an integral part to helping BC survivors adopt Project MOVE. Financial barriers are a common reason many BC survivors do not make PA a priority post-treatment. Post-treatment necessities, such as medication and bandages often involve substantial costs, especially at a time when many survivors are off work (Emslie et al., 2007). Similar to other studies (Miedema & Easley, 2012), Project MOVE survivors said they did not consider PA post-treatment because they had to invest their money towards physiotherapy, medications, sleeve compressions, and specialised bras. In another study, one survivor described how she spent approximately $20,000 on massage therapy, a compression sleeve, counselling, physiotherapy, and medication and therefore could not afford anything else beyond necessities (Miedema and Easley, 2012). Prior to the program some survivors indicated that post-treatment they were concerned, like many, that they would not be able to
perform the exercises or keep up with the intensity of the group PA class. A common concern reported by Project MOVE participants was if they joined a class they did not enjoy or find beneficial they would drop out and lose their money. The microgrant funding from Project MOVE enabled BC survivors to explore and take up PA throughout the community. Most BC survivors tried new activities they had not considered or thought aligned with their capabilities. Once participants found an activity they enjoyed, they reported being more likely to attend the PA sessions. Similar to another microgrant program that promoted behaviour change (Tamminen et al., 2014), Project MOVE provided survivors the knowledge, confidence, and exposure to a wide variety of activities that facilitated adoption. Thus, distributing microgrants was important towards helping participants adopt the program as without it they would have been less likely to invest their own money in community-based PA.

5.4 Implementation

Leadership was an important aspect to the successful implementation of Project MOVE. Many groups had a designated leader responsible for organising the PA sessions, all of which facilitated optimal delivery of the program. While many interventions use trained research assistants to deliver program content, Project MOVE called upon BC survivors to take the lead in their group as this was a more sustainable delivery option (Harden et al., 2015). This also empowered groups to design and implement their own PA sessions without researcher influence. Little research has been conducted on participant-led PA programs for BC survivors (Estabrooks et al., 2004; Harden et al., 2015). This may be because many BC survivors generally exercise under the supervision of an exercise professional for safety purposes (Estabrooks et al., 2004). Leadership is an important role as it not only involves the
planning but also positive attitude towards encouraging participants to attend regular PA sessions. It has been reported that leadership behaviour is an important determinant for team cohesion and participation in group-based PA (Caperchione, Mummery, & Duncan, 2011; Estabrooks et al., 2004). For example, Light Shields and colleagues (1997) reported that a strong leadership style that fosters social support, democratic behaviour, provides positive feedback, and avoids autocratic decision making contributes greatly to group cohesion.

Further, a leader who is encouraging and motivates members of the group to attend the PA sessions is often key to participants’ attitudes towards, and adherence to a PA program (Estabrooks et al., 2004). Similar to other studies (Balneaves et al., 2014; Brunet & St-Aubin, 2014), the focus groups for the current study also discussed the importance of a group leader with knowledge about PA and BC. Leaders who created a safe and supportive environment helped women build confidence and motivation to attain fitness goals (Balneaves et al., 2014; Brunet & St-Aubin, 2014). Additionally, leaders who had lived with BC understood the side effects associated with cancer treatment and created a safe place which helped the survivors in the group feel comfortable (Balneaves et al., 2014). As with the Project MOVE groups that had a leader with knowledge related to PA and BC, the combination of not having to explain cancer treatments to the leaders, the sense of safety associated with the leader’s knowledge about PA and tailoring the exercises to each individual with limitations were key facilitators towards participant satisfaction (Balneaves et al., 2014).

Leaders and participants were satisfied with the implementation of Project MOVE. However, many groups mentioned that additional health resources would have further contributed to program implementation. Similar to other reports (Jefford et al., 2013; Paisley, Brown, & Greenberg, 2008), many survivors in Project MOVE described how they received
very little information upon completing treatment, concerning nutrition, the types of exercises that would benefit BC survivors specifically, and the resources available to them in the community. Including information pertaining to healthy eating tips, local physiotherapy or massage therapy clinics, fitness facilities that specialize in rehabilitation or cancer support, and exercise tips for around the home would have been well received by the participants. Several studies have demonstrated the positive effects on the addition of health-related education sessions. For example, Vallance and colleagues (2007) randomised BC survivors into one of the following groups: a standard public health recommendation for PA group, previously developed BC specific PA print materials group, a step pedometer group, or a combination of BC specific print materials and pedometers group. Of the participants who received the print materials 76.5% found the guidebook helpful, 88.3% found information about PA informative, 68.9% reported that setting PA goals helped them increase PA, and 45.7% reported that the book helped them overcome barriers to PA. Adding health resources at the start of Project MOVE would have further provided BC survivors with the knowledge about the importance of an active and healthy lifestyle. Providing a little information on healthy lifestyle choices can be enough to help BC survivors adopt a healthy lifestyle (Paisley, Brown, & Greenberg, 2008; Vallance et al., 2007). Additionally, including a list of community recreation facilities, fitness studios, and rehabilitation centres to groups at the beginning of Project MOVE, would have helped groups with planning their PA program so they could be aware of the activities available in the community and the facilities available to utilise for their PA program. Lastly, it was also suggested that the group leader should set time aside for the group to plan individual and group goals. Goal setting could have helped motivate BC survivors to maintain PA beyond the scheduled group PA sessions (Phillips &
McAuley, 2013). As described by Phillips and McAuley (2013), incorporating goal setting into the intervention design and encouraging participants to write down their goals has been associated with increased PA participation in BC survivors (Phillips & McAuley, 2013).

5.5 Maintenance

Maintenance of PA is an important component towards the success and effectiveness of a community-based PA intervention (Gaglio, Shoup, & Glasgow, 2013). Several studies have suggested that group-based PA programs are an effective way to encourage BC survivors to maintain activity as group settings can create a fun, motivational, and supportive environment (Emslie et al., 2007; Rajotte et al., 2012). The current study demonstrated that PA can be maintained in BC survivors over six months, with good intentions to maintain PA beyond the program. Participant retention rate was high during the program (83%) and many participants indicated that they were confident they would continue to be regularly active over the next six months (87.5%). These findings are important as current evidence suggests that PA is beneficial for mitigating the adverse side effects associated with cancer and related treatments (Kim et al., 2013; Schmitz, 2011), and PA maintenance is important for sustaining the benefits of PA on physical and psychological health (Lee et al., 2016). As many BC survivors in the study started to see positive health changes (e.g., body changes, less fatigue, stronger, better endurance), it may be that many were motivated to maintain PA during and post-program with the intention of receiving more health benefits in the long term. Research supports that getting BC survivors more active and maintaining PA not only improves the adverse physical and psychological effects post-treatment, but also reduces the risk of BC recurrence, early mortality, as well as secondary comorbidities (Ibrahim & Al-Homaidh, 2011; Wiggins & Simonavice, 2010).
It has been reported that participants often have trouble maintaining PA after completion of a 12-week PA program (Terranova et al., 2017). Although many of the groups used the majority of their microgrant funds towards a variety of PA sessions over a 12-week time period, many participants maintained PA at six months without the financial support. There are several potential reasons that may have contributed to this six-month maintenance. Many indicated that the $500 financial incentive helped motivate them to increase and maintain PA. So even though many PA programs finished at 12-weeks, many wanted to maintain their PA levels to help their team achieve an increase in PA and receive the financial incentive. Although it has been reported that financial incentives are effective at promoting healthy behaviour change (Giles et al., 2014) there are also reports that financial incentives are more useful for one-off behaviours (e.g., attendance) compared to sustained behaviour change (e.g., smoking cessation) (Jochelson, 2007; Sutherland, Christianson, & Leatherman, 2008). It has also been reported that once the incentives are withdrawn, there is not much drive or motivation to maintain behaviour change (Oliver, Marteau, & Ashcroft, 2009; Petry, 2010). Additionally, an external incentive can reduce an individual’s internal motivation and diminish the personal desire for behaviour change as they become dependant on the reward. However, more research on the effect of financial incentives on behaviour change maintenance in the community is warranted as majority of research surrounding health promotion using financial incentive is conducted in the lab (Deci, Koestner, & Ryan, 1999). Additionally, as a result of Project MOVE, many started to notice they developed a PA routine and started to recognise the positive health outcomes. While initiating PA is important, interventions that help participants maintain PA over the long-term are necessary to enhance physical and psychological well-being (Nigg, Borrelli, Maddock, & Dishman,
2008; White et al., 2009). In agreement with the Transtheoretical Model (TTM), participants who maintain PA for six months are less tempted to relapse and are more confident that they can maintain activity (Prochaska & Velicer, 1997). The TTM is a behaviour change model that consists of six stages of change: pre-contemplation (i.e., not intending to take action in foreseeable future), contemplation (i.e., intend to change in the next six months), preparation (i.e., intend to take action in the immediate future), action (i.e., have made overt lifestyle modifications within the past six months), and maintenance (i.e., working to prevent relapse and maintain activity for six months) (Prochaska & Velicer, 1997). It has been reported that without successful behavioural intervention, as many as 50% of individuals will drop out within six months (Dishman & Buckworth, 1996; Marcus et al., 1992). Therefore, interventions should strive to help participants maintain PA beyond six months to help foster behaviour change. Further, participants indicated that they enjoyed the group aspect of Project MOVE and were motivated to maintain PA as they felt a level of accountability to their group members. Other studies have also reported that mutual support within a group and feelings of connectedness to other members within a group lead to positive experiences and program maintenance (Brunet & St-Aubin, 2016). Another contributing factor to program maintenance was the group leader. Similar research has also suggested that the leader’s attributes (e.g., enthusiasm, knowledge, and approachability) and their focus on promoting self-improvement are contributing factors to participant’s motivation to maintain the PA (Brunet & St-Aubin, 2016; Estabrooks et al., 2004).

Another facilitator to maintenance was the self-efficacy and self-confidence participants gained from the knowledge received during Project MOVE. Exercise trainers helped BC survivors understand how to use gym equipment, helped BC survivors overcome
mobility limitations by tailoring PA programs, and suggested various ways to exercise safely and effectively. Many BC survivors now know how to exercise properly which helped build confidence being active in the community. Previous reports have also reported that self-confidence and self-efficacy have been associated with PA maintenance in cancer populations (Brunet et al., 2013). For example, Balneaves and colleagues (2014) reported that, BC survivors who took part in a 24-week lifestyle intervention gained better fitness and a sense of reclaiming their bodies, which improved self-esteem and renewed their confidence. However, despite the increase in self-confidence and self-efficacy, some BC survivors in the study by Balneaves et al. (2014) still desired support to maintain PA post-program. Researchers suggested that transitioning programs towards self-management, could help maintain PA post-program (Balneaves et al., 2014). As participants of Project MOVE designed and implemented their own PA program (i.e., self-managed), this potentially helped facilitate maintenance during and after the program.

Unique to Project MOVE, was the potential for groups to earn an additional $500 financial incentive if they increased group PA at six-month follow-up. The use of financial incentives among adults has been found to have a significant positive effect on PA session attendance and adherence over a six-month period (Finkelstein et al., 2008; Mitchell et al., 2013). The financial incentives in Project MOVE acted to motivate participants to increase and maintain their PA as there was a sense of accountability to the group to attend each session. Interestingly, although participants indicated in the questionnaire that the financial incentive was the motivation to increasing and maintaining PA levels, focus groups revealed that helping the team towards achieving the incentive and not letting the members of the team down facilitated PA maintenance and participant retention during the program. Similar
to other research, it has been reported that an important incentive to maintaining PA in BC survivors is the expectation of benefit and sense of responsibility (Leddy, 1997) and being part of a team environment with comradery keeps survivors encouraged to maintain PA (Robinson et al., 2016).

To the best of our knowledge, no study has evaluated the use of financial incentives to promote PA maintenance in BC survivors. However, evidence from other population studies suggest that financial incentives have an important influence on the maintenance of PA. A systematic review evaluated randomized controlled trials that provided financial incentives for the promotion of PA in adults. The review reported a significant positive effect concerning PA session attendance, adherence, and maintenance over a six-month period (Mitchell et al., 2013). Additionally, PA participation rates progressively increased in many of the RCTs after incentives were withdrawn (Mitchell et al., 2013). Further, a workplace wellness study in the United States (Patel et al., 2016) consisted of distributing financial incentives to employees in the workplace to increase their step-count over 13 weeks. Employees were randomised into either a control group (i.e., no financial reward for increasing steps), individual incentive group (i.e., individual financial reward for increasing steps), team incentive group (i.e., group financial reward for increasing steps) or combined group (i.e., individual and group financial reward for increasing steps). Compared to the control group, those in the combined group increased and maintained their step count to the greatest extent. Those in the individual incentive and team incentive groups did not see a significant change or maintenance of PA levels. They suggested that future studies may see positive behaviour change if they balance rewarding individual accomplishments with team
accomplishments to reinforce accountability and peer support to the team to help encourage maintenance.
Chapter 6 Conclusions

6.1 Overview

The overarching aim of Project MOVE was to provide BC survivors with a unique real-world opportunity to increase their PA levels while also building confidence and self-efficacy to assist with long term PA behaviour change. However, prior to transferring an intervention from research to a community setting, it is necessary to investigate the feasibility and acceptability of an intervention under normal, everyday conditions (Antikainen & Ellis, 2011; Caperchione et al., 2014; Cohen et al., 2008; Green & Glasgow, 2006). More specifically, this process evaluation helps identify and address potential variables or circumstances that may impact future transferability (Green & Glasgow, 2006). A common approach for undertaking a process evaluation is the RE-AIM framework. RE-AIM is a process evaluation framework that consists of five dimensions including reach, effectiveness, adoption, implementation, and maintenance. It is commonly used to determine the public health impact of an intervention and the translatability of health promotion programs from the research setting to the real-world (Glasgow, Vogt, & Boles, 1999; White et al., 2009).

The purpose of the present study was to examine the feasibility of Project MOVE, in terms of acceptability, practicality, and satisfaction, utilising the RE-AIM framework. Results indicated that Project MOVE was highly accepted and practical for BC survivors. In terms of reach, 87 participants took part in baseline assessments of which 71 were BC survivors (81.6%), 3 were other cancer survivors (3.5%), and 13 were healthy individuals (14.9%) providing social support. Project MOVE was effective at increasing PA levels in BC survivors who were not meeting the recommended PA guidelines at baseline. Specific to adoption, the microgrant was valuable towards helping BC survivors explore and uptake PA
programs. Further, a supportive environment in which women alike exercised together helped build confidence and facilitated greater program uptake. With regards to program implementation having group leaders facilitate each of the Project MOVE groups was key. Lastly, the financial incentive, as well as accountability to the group, were important contributors to PA maintenance. Project MOVE shows promise as a feasible strategy for increasing and maintaining PA levels in BC survivors as well as improving physical health and psychological wellbeing of people with BC.

6.2 Strengths and Limitations

This study has a number of strengths which will be valuable towards the future dissemination of Project MOVE. An important strength of this study was evaluating Project MOVE using the RE-AIM framework. Using a systematic approach to evaluate and report on the process and outcomes of an intervention can assist with improving external validity which is crucial for translating research into community practice. External validity refers to the extent to which research findings can be generalised beyond the controlled conditions of a research intervention to the real-world (Minichiello, Sullivan, Greenwood, & Axford, 1999). External validity is important to determine if research interventions are going to be useful in improving population health (Estabrooks et al., 2003). If results are unlikely to generalise beyond the controlled conditions of a research intervention, the study will likely have little public health impact (Estabrooks & Gyurcsik, 2003; Glasgow et al., 2004; Glasgow et al., 2006). Another strength of this study was the ‘bottom-up’ approach as a strategy for increasing and maintaining PA levels in BC survivors. Project MOVE was not based on a pre-determined intervention developed by researchers (i.e., ‘top-up’ approach), but rather the Project MOVE model (microgrants + financial incentive) supported groups of
BC survivors to design, develop, and deliver their own PA initiative. This autonomy promoted a sense of empowerment and ownership for the women, providing them with the opportunity to optimize their own strengths and knowledge in a way that they felt would be most beneficial to their physical and psychological health. Moreover, this autonomy also provides great potential for program transferability as other groups and populations (e.g., different cancer sites and chronic diseases) can tailor future programs to meet their own specific needs, preferences and interests. The study also had high participant retention, which may be due to high program satisfaction reported by participants. Specifically, participants indicated that high program satisfaction was due to a number of variables, most significantly the perceived positive changes to their physical and psychological health, as well as the increased social interactions and social connections they made with their group members. Additionally, there were many strengths in terms of methodology. Most significant was the objective measure of PA via accelerometers. Accelerometers are the gold standard for recording objective measures of PA (Amireault et al., 2015; Bassett & John, 2010). Objective measures of PA avoid biases due to subjective recall of past PA levels, varied interpretations of questions, and the desire for participants to please researchers (Bassett et al., 2015). Although questionnaires are easier to administer and are less costly, they are commonly susceptible to over- and under-reporting (Amireault et al., 2015; Bassett et al., 2015). For instance, in the current study, participants over-reported their PA levels in the PA log sheet. Additionally, accelerometers capture sedentary behaviour, incidental PA, and PA performed in a variety of domains (e.g., leisure, occupational) (Bassett et al., 2015). As accelerometers are not waterproof, the device does not capture water based activities. Therefore, participants were asked to record all water based PA in their PA log.
Few studies have examined programs that use microgrants to influence some aspect of PA (Caperchione, Mummery, & Joyner, 2010; Hartwig et al., 2009; Honeycutt et al., 2012; Johnson et al., 2006; Schmidt et al., 2009) and only one has focused on specifically supporting the promotion of PA (Caperchione, Mummery, & Joyner, 2010). To our knowledge, Project MOVE is the first microgrant related study to promote health in BC survivors and first microgrant study to objectively measure PA behaviour. Other studies have evaluated the use of microgrants in stimulating health promotion initiatives or projects in other populations. However, many have only evaluated the process of using the microgrants to enhance PA opportunities (Hartwig et al., 2009; Tamminen, Faulkner, Witcher, & Spence, 2014). By collecting an objective measure of PA, researchers can better identify the effectiveness of PA programs that utilise microgrants to promote behaviour change. Also, utilising mixed measures (i.e., focus groups and self-report questionnaires) to collect data were unobtrusive, cost effective and provided rich qualitative data to support the quantitative data. Lastly, data collection and analysis was conducted diligently and included various techniques (e.g., tape recorder, peer review, audit trail) to ensure methodological rigor which improved the reliability and validity (Mayan, 2009; Minichiello et al., 1999).

Although this study had a number of strengths, it was not without limitations. Despite great potential for transferability, the views presented in the current study reflect a specific population of BC survivors, and thus cannot be generalised across the many diverse populations and settings across Canada. First, the current study mainly targeted female BC survivors and did not include male BC survivors. Although BC in males is uncommon it does affect approximately 230 Canadian men yearly (CCSACCS, 2015). Due to the rarity, there are very few social and emotional resources available for and little information specific to
male BC survivors compared to the plentiful of information that is readily available specific to female BC survivors (Donovan & Flynn, 2007; Iredale et al., 2006; Robinson, Metoyer, & Bhayani, 2008; Williams et al., 2003). Additionally, during traditional cancer support group sessions many female BC survivors are encouraged to express their experience with their disease to others and social support is commonly available. However, for men with BC, there is generally low social awareness and high social isolation associated with the disease (Pituskin, 2007; Williams et al., 2003). Men are hesitant to share their experiences with others because of concerns with stigma and embarrassment (Bunkley et al., 2000; Williams et al., 2003). Therefore, the results of this study cannot be generalised to male BC survivors.

Additionally, this study focused on group-based PA and thus did not consider the interests of those who may prefer to be physically active independently. Another limitation was that participants were mostly white, educated, married, and retired. The lack in ethnic and social diversity of participants limits representation of the entire BC survivor population. This study did not include a control group, thus the direct impact of intervention program is not clear. As this study was exploratory in nature, the study was limited in examining the cause and effect of behaviour change. Further upon secondary analysis, the assumption of independence was violated. There was a lack of independence between samples as individuals were categorised into meeting and non-meeting PA guidelines once all participants were recruited, as opposed to independent sampling for each group. Therefore, future research should consider multi-level modelling. Lastly, despite efforts to reach a large number of BC survivors, recruitment proved to be difficult. Various recruitment techniques were utilised to reach a large number of BC survivors in the Central Okanagan Region, however, many survivors did not register to the program. There are several possible reasons
recruitment was difficult. BC survivors often lack confidence to be active in a group-based community setting. Body image such as increased weight or scars from surgery could have contributed to low self-esteem thus limiting interest in PA program participation. It could have also been the cancer specific barriers, such as fatigue, pain, and depression, which limited interest from survivors who were aware of the program but did not contact the project team. It is also possible that we did not reach more BC survivors due to the techniques used. For example, although the current study used numerous strategies targeting BC survivors in the community setting (e.g., pamphlets, radio and print media) other studies have used the cancer registry to directly target and recruit BC survivors (Irwin et al., 2008). Future consideration concerning recruitment is warranted.

6.3 Future Direction and Recommendations

Based on the findings from this study there are a number of future directions that could be explored. The goal of future research should consider effective strategies to recruit a larger number of BC survivors. The current results indicate that Project MOVE is an acceptable, practical, and effective program. Therefore, it is important to determine alternative recruitment strategies as to get more of the Central Okanagan BC survivor population involved with the program so they too can benefit from the positive effects of PA. For example, few studies have engaged culturally or economically diverse BC populations. With a growing population of ethnic minorities in Canada and the United States, more culturally sensitive PA programs are needed for BC survivors (Spector, Battaglini, and Groff, 2013). Incorporating methods such as involving bilingual staff, using translated and culturally adapted intervention materials, and involving ethnic leaders in the community should be considered when recruiting hard to reach BC survivors (Phillips et al., 2014).
These strategies could help reach more BC survivors who are at a greater risk for developing the disease or need the support in managing the physical and psychological effects associated with treatment (e.g., Aboriginals, African Americans).

Future studies should also consider exploring a similar program targeting male BC survivors. As mentioned, there are very little resources and information available that is specific to males. By providing a program specific for men, it could decrease the stigma, create an opportunity for social support, as well as educate them on the benefits of PA for mitigating treatment related effects. As Project MOVE was primarily focused on increasing PA in BC survivors in an organic nature, few educational resources were provided and little time was spent discussing other health behaviours. When refining this model for wider dissemination, the development of hard copy and electronic educational resources concerning healthy eating and tips for being active at home should be provided. Further, it may be beneficial to also include information about how to assess other health professionals, such as registered dieticians and physiotherapists.

Another recommendation to consider would be to conduct a randomised controlled trial comparing the effects of different PA programs on increasing PA levels in BC survivors. This may help determine the direct impact of the intervention on behaviour.

Lastly, future research may also consider getting more community organisations involved (e.g., YMCA, rehabilitation facilities) to help facilitate program implementation. Collaborative partnerships with community organisations has the potential to increase adoption and maintenance of the program for BC survivors upon intervention completion. Different settings that adopt the PA program can potentially contribute resources, expertise, and time towards maintaining the program which can further improve population level health.
by making the program more accessible via community resources (Dzewaltowski, Estabrooks, & Glasgow, 2004).
References


Bower, J. E., Ganz, P. A., Desmond, K. A., Bernaards, C., Rowland, J. H., Meyerowitz, B.


doi:10.1177/0017896910363301


Cantarero-Villaneuva, I., Fernandez-Lao, C., Fernandez-de-las-Penas, C., Lopez-Barajas, I.


activity behavior change research: what is needed to improve translation of research into health promotion practice? *Exercise and Sport Sciences Reviews, 32*(2), 57-63. doi:10.1097/00003677-200404000-00004


in breast cancer patients. *Journal of the National Cancer Institute*, 93(2), 96-111.


study of financial incentives to increase physical activity among sedentary older adults. *Preventive Medicine, 47*(2), 182-187. doi:10.1016/j.ypmed.2008.05.002


in physical activity and exercise among middle-aged and elderly individuals.

*Singapore Medical Journal, 54*(10), 581.


doi:10.5114/pm.2015.54346


doi:10.1111/j.1365-2648.2009.05254.x


of focus groups in social and behavioural research: Some methodological issues. 


Korde, L. A., Micheli, A., Smith, A. W., Venzon, D., Prindiville, S. A., Drinkard, B., ...

150
Eng-Wong, J. (2009). Recruitment to a physical activity intervention study in women at increased risk of breast cancer. *BMC medical research methodology, 9*(1), 27.


Olson, E. A., Mullen, S. P., Rogers, L. Q., Courneya, K. S., Verhulst, S., & McAuley, E.


Phillips, S. M., & McAuley, E. (2013). Social cognitive influences on physical activity...


Tasmuth, T., von Smitten, K., & Kalso, E. (1996). Pain and other symptoms during the first


Von Ah, D., & Tallman, E. F. (2015;2014;). Perceived cognitive function in breast cancer...


Wilkinson, S., & Kitzinger, C. (2000). Thinking differently about thinking positive: A
discursive approach to cancer patients’ talk. *Social Science & Medicine, 50*(6), 797-811. doi:10.1016/S0277-9536(99)00337-8


signatures and protein markers for breast cancer grading and staging. *PLOS ONE*, 10(9), e0138213. doi:10.1371/journal.pone.0138213

Zhang, W., & Creswell, J. (2013;2012;). The use of “Mixing” procedure of mixed methods in health services research. *Medical Care, 51*(8), e51-e57.

doi:10.1097/MLR.0b013e31824642fd

Appendices

Appendix A: Demographics Form

BACKGROUND & DEMOGRAPHICS

The following information provides background information and will only be asked of you once. Please report as accurately as possible.

Date (day/month/year): ___________________

Personal Information

1. Identification number (provided by researcher): ___________________

2. What is your date of birth (day/month/year) _____________

3. People living in Canada come from many different cultural and racial backgrounds. Are you (check all that apply):
   □... White?
   □... Aboriginal (Metis, First Nation, Inuit/Inuuk)
   □... Asian (specify)?
   □... South Asian (e.g., East Indian, Pakistani, Sri Lankan)?
   □... Black?
   □... Other – Specify _________________________________

4. What is your highest level of education? (Please check one)
   □ Some high school or less
   □ High school diploma
   □ Some post-secondary without diploma or degree
   □ College or technical diploma or certificate (CEGEP, vocational, trade)
   □ University degree
   □ Other (please specify): __________________________

5. What is your marital status?
   □ Married or living with a life partner
   □ Living alone
   □ Widowed

7. What is your main activity (check one):
   □ Full time work
   □ Part time work
   □ Caring for family/managing household
☐ Unemployed
☐ Recovering from illness/on disability
☐ Retired
☐ Other______________
Appendix B: Breast Cancer Information Form

BREAST CANCER INFORMATION

1. What was the date of your most recent diagnosis for breast cancer? ____________

What stage of breast cancer were you diagnosed with?
☐ Stage 0
☐ Stage I
☐ Stage II
☐ Stage III
☐ Stage IV

2. Indicate which medical treatments you have received for breast cancer and the date of the last treatment, if applicable

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Received?</th>
<th>Date of last surgery/treatment (day/month/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymph or axillary node dissection</td>
<td>☐ Yes ☐ No</td>
<td>____________________________</td>
</tr>
<tr>
<td>Lumpectomy</td>
<td>☐ Yes ☐ No</td>
<td>____________________________</td>
</tr>
<tr>
<td>Single Mastectomy</td>
<td>☐ Yes ☐ No</td>
<td>____________________________</td>
</tr>
<tr>
<td>Double Mastectomy</td>
<td>☐ Yes ☐ No</td>
<td>____________________________</td>
</tr>
<tr>
<td>Reconstructive surgery</td>
<td>☐ Yes ☐ No</td>
<td>____________________________</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>☐ Yes ☐ No</td>
<td>____________________________</td>
</tr>
<tr>
<td>Radiotherapy</td>
<td>☐ Yes ☐ No</td>
<td>____________________________</td>
</tr>
<tr>
<td>Hormonal therapy</td>
<td>☐ Yes ☐ No</td>
<td>____________________________</td>
</tr>
<tr>
<td>Other Specify:</td>
<td></td>
<td>____________________________</td>
</tr>
</tbody>
</table>

3. What is your height, in feet and inches? _______ft, _______in.

4. Are you:
☐ Pre-menopausal

174
- Going through menopause
- Post-menopausal

**OVERALL HEALTH AND WELL-BEING**

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In general would you say your health is:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Much better now than one year ago</th>
<th>Somewhat better now than one year ago</th>
<th>About the same</th>
<th>Somewhat worse now than one year ago</th>
<th>Much worse now than one year ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Compared to one year ago, how would you rate your health in general now?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The following items are about activities you might do during a typical day (Circle One Number on Each Line)

<table>
<thead>
<tr>
<th>3. Does your health now limit you in these activities? If so, how much?</th>
<th>Yes, Limited a Lot</th>
<th>Yes, Limited a Little</th>
<th>Not limited at All</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vigorous activities</strong>, such as running, lifting heavy objects, participating in strenuous sports</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Moderate activities</strong>, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Lifting or carrying groceries</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Climbing <strong>several</strong> flights of stairs</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Climbing <strong>one</strong> flight of stairs</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Activity</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Bending, kneeling, or stooping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking <strong>more than a mile</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking <strong>several blocks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking <strong>one block</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathing or dressing yourself</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health? (Circle one number on each line)**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut down the amount of time you spent on work or other activities</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Accomplished less than you would like</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Were limited in the kind of work or other activities</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Had difficulty performing the work or other activities (for example, it took extra effort)</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

### 5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)? (Circle one number on each line)**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut down the amount of time you spent on work or other activities</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Accomplished less than you would like</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Didn't do work or other activities as carefully as usual</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
6. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

7. How much **bodily** pain have you had during the **past 4 weeks**? (including both work outside the home and housework)? *(Circle One Number)*

<table>
<thead>
<tr>
<th>None</th>
<th>Very mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Very severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

8. These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling. *(Circle One Number on Each Line)*.

<table>
<thead>
<tr>
<th>How much of the time during the past 4 weeks:</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has your <strong>physical health or emotional problems</strong> interfered with your social activities (like visiting with friends, relatives, etc.)? <em>(Circle One Number)</em></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
REASONS FOR ENGAGING IN EXERCISE

We are interested in what motivates people to be physically active. Using the scale below, please indicate to what extent each of the following items is true for you.

<table>
<thead>
<tr>
<th></th>
<th>Not true for me</th>
<th>Sometimes true for me</th>
<th>Very true for me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>It’s important to me to exercise regularly.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>I don’t see why I should have to exercise.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>I exercise because it’s fun.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>I feel guilty when I don’t exercise.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>I exercise because it is consistent with my life goals.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>I exercise because other people say I should.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>I value the benefits of exercise.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>I can’t see why I should bother exercising.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>I enjoy my exercise sessions.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>I feel ashamed when I miss an exercise session.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>I consider exercise a pat of my identity.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>I take part in exercise because my family/friends/partner say I should</td>
<td>0 1 2 4 4</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>I think it is important to make the effort to exercise regularly.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>I don’t see the point in exercising.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>I find exercise a pleasurable activity.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>I feel like a failure when I haven’t exercised in a while.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>I consider exercise a fundamental part of who I am.</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>18.</td>
<td>I exercise because others will not be pleased with if I don’t.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>19.</td>
<td>I get restless if I don’t exercise regularly.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>20.</td>
<td>I think exercising is a waste of time.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>21.</td>
<td>I get pleasure and satisfaction from participating in exercise.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>22.</td>
<td>I would feel bad about myself if I was not making time to exercise.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>23.</td>
<td>I consider exercise consistent with my values.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>24.</td>
<td>I feel under pressure from my friends/family to exercise.</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Appendix C: Modified Godin Leisure Time Exercise Questionnaire

PHYSICAL ACTIVITY

1. During a typical week (7-day period), how many times on average do you do the following kinds of exercise during your free time and for how long? Indicate in the space provided the number of times per week and the average duration:

<table>
<thead>
<tr>
<th></th>
<th>Times Per Week</th>
<th>Average Duration Per Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. STRENUOUS EXERCISE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(HEART BEATS RAPIDLY)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, vigorous swimming, vigorous bicycling)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B. MODERATE EXERCISE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(NOT EXHAUSTING)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g., fast walking, easy bicycling, easy swimming, downhill skiing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C. MILD EXERCISE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MINIMAL EFFORT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g., yoga, taking the stairs, bowling, housework, easy walking)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D. SEDENTARY ACTIVITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(NO EFFORT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g., TV/video watching, video/computer games, computer use)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. During a typical 7-day period (a week), in your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)? Check one answer.
   - [ ] Often
   - [ ] Sometimes
   - [ ] Never/Rarely

3. Compared to your physical activity levels before your breast cancer diagnosis, would you say that you are:
   - [ ] much less active?
   - [ ] a little less active?
☐ about the same?
☐ a little more active?
☐ much more active?
Appendix D: Accelerometer Instructions

ACCELEROMETER INSTRUCTIONS

Q: What is an accelerometer?
A: An accelerometer is a movement monitor that captures how much movement you do and how intense that movement is. It is like a pedometer but captures different kinds of activity.

Q: Why do I have to wear it?
A: We ask that you wear an accelerometer so that we have an idea of how much physical activity you do, and whether being part of Project Move changes this at all. We will share the results with you so you can see your activity patterns!

How do I use an accelerometer?

Make sure to put the accelerometer around your waist as soon as you wake up so that all of your movement in the day is measured. At this time, please fill out the given Accelerometer Time Log every morning.

Attach the accelerometer to your waist using the elastic belt and align it on your right hip directly above your knee. You can wear it either over or under your clothing.

Make sure your accelerometer remains upright and close to your body (The top of the accelerometer is marked by the round clasp)

Do not wear the accelerometer in the water – this includes showering, bathing, swimming etc. – since it is not waterproof. You can wear it during your usual activities and workouts as it can handle sweat and is water resistant.

After wearing the accelerometer for 7 consecutive days, please store it in a safe place and put it in the envelope given to you until a member of the research team returns to pick it up. These monitors are very expensive so please take care of them!!

Thank you so much for taking part in this study. Enjoy!
Appendix E: Accelerometer Wear Time Log

**Accelerometer Time Log**

Please record the start time (time you put accelerometer on) and the stop time (time you took accelerometer off) for each day that you wear the device. This should be done for 7 days in a row. If you have any questions, please contact the ProjectMOVE team at 250-807-9907.

Accelerometer number _____________________________

<table>
<thead>
<tr>
<th>Date (dd/mm/yy)</th>
<th>Start Time (hh:mm)</th>
<th>Stop Time (hh:mm)</th>
<th>Is this a regular routine day? If no, were you MORE or LESS active than usual?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>□ AM □ PM</td>
<td>□ AM □ PM</td>
<td>YES □ NO □ I was more active □ I was less active □</td>
</tr>
<tr>
<td>Day 2</td>
<td>□ AM □ PM</td>
<td>□ AM □ PM</td>
<td>YES □ NO □ I was more active □ I was less active □</td>
</tr>
<tr>
<td>Day 3</td>
<td>□ AM □ PM</td>
<td>□ AM □ PM</td>
<td>YES □ NO □ I was more active □ I was less active □</td>
</tr>
<tr>
<td>Day 4</td>
<td>□ AM □ PM</td>
<td>□ AM □ PM</td>
<td>YES □ NO □ I was more active □ I was less active □</td>
</tr>
<tr>
<td>Day 5</td>
<td>□ AM □ PM</td>
<td>□ AM □ PM</td>
<td>YES □ NO □</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>PM</td>
<td>I was more active □</td>
</tr>
<tr>
<td>-------</td>
<td>----</td>
<td>----</td>
<td>---------------------</td>
</tr>
<tr>
<td>Day 6</td>
<td>□</td>
<td>□</td>
<td>□ YES □</td>
</tr>
<tr>
<td>AM</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>PM</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Day 7</td>
<td>□</td>
<td>□</td>
<td>□ YES □</td>
</tr>
<tr>
<td>AM</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>PM</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
Appendix F: Program Evaluation

Date (day/month/year): __________ Identification number (provided by researcher): __________

PROGRAM EVALUATION

The following questions seek feedback about your experience participating in Project MOVE. Please report as accurately as possible.

1. How did you hear about Project MOVE? (check all that apply):
   - □ Local health and fitness centre  □ Advertising posters
   - □ Radio  □ Social media (e.g. Facebook, twitter)
   - □ Print media (e.g. newspaper)  □ Online advertisements (e.g., Castanet, Kijiji)
   - □ Friend or family member  □ Project MOVE/UBC staff or researcher
   - □ Cancer related society or organisation (e.g. Canadian Cancer Society, Cancer Agency, Cancer Lodge)
   - □ Other (please specify): ________________________________

2. Have you ever visited the Project MOVE website? □ Yes □ No

   If YES:
   2.1 What information did you access? (check all that apply):
   - □ General program information
   - □ Staff contact information
   - □ Project MOVE application
   - □ Cancer and physical activity information
   - □ Other (please explain) ___________________________

   2.2 How clear was the purpose of Project MOVE explained on the website?

   - □ Very clear  □ Somewhat clear  □ Somewhat unclear  □ Not clear at all

3. Were you responsible for submitting the online microgrant application for your group? □ Yes □ No
3.1 If YES, how did you find the process of submitting the microgrant application online?

☐ Very easy    ☐ Somewhat easy    ☐ Slightly difficult    ☐ Difficult

4. To what extent did the possibility of your group receiving an additional $500 incentive motivate you to participate in regular physical activity?

☐ Highly motivated    ☐ Somewhat motivated    ☐ Did not really motivate    ☐ Did not motivate me at all

These questions relate to your experience as a participant in Project Move. Please choose the number that best describes your experience, where 1 is not at all and 4 is a great deal.

<table>
<thead>
<tr>
<th>Participating in Project Move……</th>
<th>Not at all</th>
<th>Not a lot</th>
<th>Quite a lot</th>
<th>A great deal</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Helped me start to be more active</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. Helped me increase my physical activity levels</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. Helped me continue to be regularly active</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Using a scale from 1-5 where 1 is strongly disagree and 5 is strongly agree, to what extent do you disagree or agree with the following statements?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Overall, I was satisfied with the Project MOVE program</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. I learnt new things about physical activity through the Project MOVE program</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. The Project MOVE program was appropriate for female breast cancer survivors</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. I enjoyed being part of a Project MOVE group</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. I felt socially connected to the women in my group</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. I would recommend the Project MOVE program to other female breast cancer survivors</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
14. Approximately, how many times per week did you engage in physical activity with your Project MOVE group?
☐ 1-2 times per week  ☐ 2-3 times per week  ☐ 3-4 times per week  ☐ 4-5 times per week

15. Have you and your Project MOVE group members continued to get together and be active together even though your program is over?
☐ Yes ☐ No

If YES, can you please describe what types of activities you are doing and how often?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

16. Over the next 6 months, how confident are you that you can participate in regular physical activity (that is at least 30 minutes of moderate intensity physical activity on no less than 5 days of the week)?
☐ Very confident  ☐ Moderately confident  ☐ Not very confident  ☐ Not at all confident
Appendix G: Focus Group Guide

Project MOVE Focus Group Consultations
Session Protocol
Locations TBD
Session time: Approximately 1 hour

Objectives for Group Consultations: To gain more in-depth information from participants concerning their perceptions of physical activity for BC survivors and their overall experience with Project MOVE. Specifically, we would like to understand the challenges and barriers specific to BC survivors and how these may have been addressed through Project MOVE. Also, we would like to gather additional information about the microgrant application process (e.g., inclusive of advertising, recruitment, online application, addition of financial incentive).

Who is involved and number of consultation groups: 8-10 women from each of the 10 Project MOVE groups.

Session Preparation Tasks (30 minutes before start time)

1. Set up tables and chairs: 1 table for participants 1 table for refreshments
2. Place paper, pens, and activity materials on table
3. Set up and check the digital and back-up recorders
4. Set up snacks and beverages on snack table.

Welcome
1. Greet and connect with participants individually as they arrive; welcome them to the group session and introduce yourself.
2. Invite participants to help themselves to refreshment and choose a seat

Script:
Thanks to everyone for joining us this evening. We’re so pleased to have you participate in this session as we are very much looking forward to hearing about your experience as part of Project MOVE. This focus group is one of several we are doing with all of the groups, as we want to hear about and learn about your experiences participating in Project MOVE in order for us to understand how to make this program as accessible and beneficial as possible. Your perspectives are very important in helping us identify the best ways to support women who have been affected with breast cancer when it comes to physical activity engagement.
Group Discussion

Script: Now that we know each other a little better, let’s start:

1. What words come to mind when you think about your experience in Project MOVE? Write down as many words as you can think of – one on each little sticky note (put them up on flip charts – to quickly create a map of descriptors).
   
   Prompt: How well do these words reflect your experience? Is there anything missing – does anyone want to add anything else? Using the words on the stickies, begin a group discussion about what was special (or not) about the Project MOVE group. How is a Project Move group different than (or the same) other groups women with BC might participate in?
   
   Prompt: Some ideas for further group discussion: did they know each other before Project MOVE? If not, what was it like getting to know each other?

2. Now we would like you to think about your experience in Project MOVE. If you could provide future Project MOVE groups just starting up with some ideas and advice about planning a physical activity program for women affected by breast cancer what would you tell them? [Facilitate brainstorming; put ideas up on flip chart]
   
   Prompt: What would you say is particularly important for motivating and/or enabling women in a group like this to be active? [new ideas are added to flip chart]
   
   [This may include things like: the microgrants, the structured nature of meeting the group at a certain time and place, having a leader for the group, social interaction of the group, financial incentive, access to facilities and equipment or anything else you can think of.]
   
   Prompt: Of the ideas presented, what do you think are the most critical ingredients (“keys to success”) for a successful Project Move group? [Give each woman 3 stars and ask them to put the stars on the ideas on the flip chart that they think are most important].

3a. What would you tell a new Project MOVE group about the challenges or barriers that might be experienced by women affected by BC that could affect their participation?
   
   Prompt: This may include things like: time, expertise, leadership, money, access to facilities or anything else you can think of.
   
   Prompt: Which of these challenges or barriers are likely to be experienced most often?

3b. What advice do you have for a new Project MOVE group about how they might design their program to help women overcome these challenges or barriers?
   
   Prompt: What strategies that might be effective in encouraging BC survivors to be physically active? Strategies for strengthening social support?
4. Based on your experience as a participant in Project MOVE – do you have any overall advice for group leaders who want to plan and organise a group like this for women affected by breast cancer?

**Prompt:** Consider things like recruitment, types of activities, aspects of motivation, how to increase social support

5. We are also very interested in gaining specific information about the microgrant and financial incentive model offered as part of Project MOVE. How important do you think this model is for enabling women affected by BC to engage in PA?

**Prompt:** What did you like about it? What didn’t you like about it?

**Prompt:** Any suggestions for refining this model to make it better or more appropriate for BC survivors?

6. Do you have any final suggestions or recommendations on ways we could improve Project MOVE?

7. Lastly, if you had an opportunity to provide a brief message to another BC survivor about physical activity in general, and Project MOVE specifically, what would it be? [provide coloured pens and paper for women to write their message on]

**Prompt:** Think about the role of physical activity in the health of BC survivors

**Wrap –Up**

Thanks so much for sharing your great ideas. We really appreciate your participation in this session. Are there any questions or further comments before we say good-bye?

Thanks again and enjoy the rest of the evening. We’ll be here for the next little while if anyone has any additional thoughts to share.

- Turn off the recorders
- Facilitators will debrief
Appendix H: Facilitator Interview Guide

Project MOVE Facilitator Interview Guide

Hi (Name here)
Thanks for making time to chat with me. We really hope to learn more about the experience of all those who facilitated the groups for Project MOVE or acted as group leaders. Your input is really valuable as we move forward with the program and we’re very curious to hear things from your perspective!

Overall Experience
1. I’ll start with a really general question. Overall, what has the experience of running this group been like for you?
   Prompt: When you think back on it, what was the most memorable part of leading your group?
   Prompt: What stands out to you the most about your experience as the instructor/facilitator/leader?
   Prompt: What difference did it make that women with breast cancer were included in your group?

Application Experience
2. What motivated you to lead this group and apply for Project MOVE funds?

3. Is there anything that you think should be changed about the application process?
   Prompt: Were the instructions straightforward?
   Prompt: Was the website and supporting documents (PDF guidelines) helpful?
   Prompt: Do you have any recommendations for making this process better?

4. How were women with breast cancer involved in the planning/ application (or their needs taken into account)?

Facilitators and Challenges
4a. We know it takes extra time for people to lead a group like this, so what sorts of practical factors made it possible for you to run this group?
   Prompt: Were any of these factors more important or critical than others?
   Prompt: If you were to give advice to anyone else thinking of running a group like this, what would it be?

4b. Where there any barriers you ran into or anything that made it difficult to run the group at times?
   Prompt: How did you negotiate these?

4c. What difference did it make in running this group to have women with breast cancer involved?
   Prompt: How did activities take into account for women’s BC diagnoses? if challenges, how were these overcome? What surprised you most about having women with breast cancer in the group?
**Group leadership**

5a. We’ve noticed that having a clearly identified group leader has been really important in these programs. How would you describe your role in the group?

5b. What tasks and activities did you do each week to keep the group motivated and engaged? To create a supportive environment?

**Prompt:** Is there anything you would do differently?

6. Were there any resources or information you wish you had available to make your job easier?

7. We want to provide as much support as possible to all of the groups and especially to the facilitators. Is there anything we could have done differently to support you more effectively?

**Views of Participant Experience**

8. Finally, from your perspective, how do you think the women enjoyed the program?

**Prompt:** What role do you think it played in their lives? How do you think women with breast cancer benefited from this group?

9. Do you have any suggestions on ways for the group to keep up some of the positive changes you saw?

**Prompt:** How might we help women with breast cancer to continue being physically active

**Additional comments:**

Do you have any general comments or questions that we haven’t covered?

Thank you so much for your time, not just today but throughout the whole project.
Appendix I: Project MOVE Recruitment Poster

Are you or someone you know a female breast cancer survivor living in the Okanagan region? Does being active with a group of your friends sound like something you’d enjoy?

If so, then Project MOVE may be for you!

Project MOVE aims to increase women’s participation in physical activity.

To assist with this, you and 6-10 of your friends, neighbours, or work colleagues can apply for a microgrant and potentially receive up to $2000 for developing a program/initiative that will help to get your group more physically active.

Funded by The Canadian Cancer Society Research Institute.

Applications will be available online October 1, 2015 at www.projectmove.ca and will close November 1, 2015. Contact us to find out more details!

Marianne Clark, PhD.
Project Researcher
University of British Columbia, Kelowna
250-807-9907
marianne.clark@ubc.ca