Self-Presentation among Breast Cancer Survivors: Implication for Physical Activity Behaviour

Jennifer Brunet
Department of Kinesiology and Physical Education
McGill University, Montreal
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Abstract

Women who have been treated for breast cancer have endured many treatments and resulting side effects (e.g., weight gain, unfavourable changes in body composition, deformities or loss of the breast(s), tissue damage, alopecia, decreased range of motion and lymphedema). Research aimed at understanding the impact breast cancer has on women’s perceptions, cognitions, and feelings surrounding their changed physique following treatment for breast cancer and how this may link to physical activity behaviour is of particular importance in order to guide psychosocial care aimed at relieving distress and promoting well-being. To this end, this research program involved three interrelated studies. Study one was a qualitative study, grounded in constructivist epistemology, in which semi-structured interviews with 11 breast cancer survivors were conducted. The objective was to better understand women’s perceptual, attitudinal/cognitive, affective, and behavioural experiences with their changed physique following treatment for breast cancer. Overall, appearance was important to these women. They had negative perceptions of their changed physique and this evoked primarily negative emotions. As a result, these women engaged in appearance management strategies (i.e., changed their clothing, wore make-up, wigs and scarves) to camouflage the unwanted side effects of cancer treatments (e.g., hair loss, loss of breast) and used diet and physical activity to try to alter their physique (i.e., lose weight, gain muscle definition). Study two involved the completion of a self-administered questionnaire package. The objectives were to: (1) evaluate the psychometric properties of the Self-Presentation in Exercise Questionnaire (SPEQ), (2) examine the cross-sectional relationships between self-presentation processes (i.e., impression motivation, impression construction) and physical activity behaviour among breast cancer survivors, and (3) if social cognitive constructs moderate these relationships. The SPEQ was best represented as a
two-factor oblique model with impression motivation and impression construction factors. Based on hierarchical regression analyses, impression motivation related to breast cancer survivors’ physical activity behaviour, and self-presentation efficacy and outcome value moderated this relationship. These findings provide empirical evidence that self-presentation processes related to physical activity behaviour in a population of breast cancer survivors. It may be effective to target impression motivation, self-presentation efficacy and outcome value in interventions aimed at increasing physical activity behaviour among breast cancer survivors. Study three involved the completion of a self-administered questionnaire package three times over the span of six months. The objectives were to: (1) describe naturally occurring changes in breast cancer survivors’ self-presentation processes and physical activity over a period of six months, (2) evaluate the associations between cancer-specific factors and self-presentation processes, and physical activity behaviour, and (3) disentangle the within- and between-person effects of impression motivation and impression construction on physical activity behaviour. In general, self-presentation processes remained stable over time, whereas physical activity levels changed over time. Women who had received radiotherapy reported lower levels of impression motivation and impression construction, whereas women who had received chemotherapy reported higher levels of impression motivation. Last, self-presentation processes had both within- and between-person effects on physical activity behaviour, indicating that women who reported higher overall levels of impression motivation and impression construction reported higher levels of physical activity (i.e., between-person effect), and women were more active at times when their levels of impression construction were higher relative to their average levels. Findings raise questions as to whether self-presentation processes should be conceptualized as state or trait characteristics and illustrate the need to integrate physical activity behaviour
interventions as women approach the six month post-treatment mark. Furthermore, there was
evidence that self-presentation can be used as a guiding framework to examine factors related to
physical activity behaviour over time in this population. Collectively, this program of research
provides evidence that researchers and health care providers who work with women should be
cognizant of the impact that the physical changes following breast cancer may have on them and
help them develop positive attitudes toward their bodies. It also provides insight into the
relationships between self-presentation processes and physical activity behaviour, and identified
potential moderators that are essential to helping understand these associations. These findings
can be used to provide researchers with information that will assist in the development of
theoretically and empirically based interventions aimed at increasing physical activity levels in
this population.
Résumé

Les femmes qui ont été soignées pour le cancer du sein ont subi plusieurs traitements ainsi que certains effets secondaires qui en découlent (p. ex.: gain de poids, changements désavantageux de la composition corporelle, difformités ou perte d’un ou des deux seins, lésions tissulaires, alopécie, diminution de l’amplitude des mouvements et lymphoédème). Les chercheurs visent à mieux comprendre les conséquences des changements physiques chez les femmes après le cancer du sein, tant au point de vue percutif, cognitif qu’émotif. C’est pourquoi il est important de vérifier comment ces conséquences peuvent mener à des comportements liés à la pratique d’activités physiques afin de guider les soins psychosociaux dans les buts de diminuer la détresse et de promouvoir le bien-être. Dans cette optique, ce programme de recherche a été conçu en trois études étroitement liées. La première était une étude qualitative, fondée sur le courant constructiviste de l’épistémologie, au cours de laquelle des entretiens semi-structurés ont été réalisés auprès de 11 survivantes du cancer du sein. L’objectif était de mieux comprendre les expériences percutives, attitudinales/cognitives, affectives et comportementales en ce qui a trait aux changements physiques qui ont suivi les traitements pour le cancer du sein. En général, l’apparence était importante pour les survivantes du cancer du sein de l’étude. Elles ont manifesté des perceptions négatives à propos des changements de leur corps et ceci a suscité essentiellement des émotions négatives. Conséquemment, ces femmes ont eu recours à une gestion de stratégies pour préserver leur apparence (c’est-à-dire: changer leurs vêtements, se maquiller, porter des perruques et des foulards) afin de camoufler les effets secondaires indésirables subvenus à la suite des traitements pour le cancer (par exemple: la perte des cheveux, la perte du sein) et elles ont tenté de modifier leur physique en suivant des diètes et en pratiquant de l’activité physique (p. ex.: perdre du
poids, sculpter leurs muscles). L’étude deux consistait à remplir une série de questionnaires autoadministrés. Les objectifs étaient (1) d’évaluer des propriétés psychométriques du Self-Presentation in Exercise Questionnaire (SPEQ), (2) d’examiner les relations transversales entre les processus de présentation de soi [(c.-à-d.: l’intérêt porté à la façon dont les autres nous perçoivent (impression motivation) et les stratégies qu’on utilise pour se présenter aux autres de la façon désirée (impression construction)] et la pratique d’activités physiques chez les survivantes du cancer du sein, et de (3) vérifier si les variables sociocognitives ont un effet modérateur sur ces relations. Le SPEQ était bien représenté en tant que modèle à deux facteurs obliques qui mesurent le processus par lequel les personnes contrôlent les impressions que les autres ont à leur égard. Selon les analyses de régression hiérarchique, l’intérêt que les survivantes du cancer du sein portaient à la façon dont les autres les percevaient et les évaluaient était en lien avec leur pratique d’activités physiques. De plus, la perception d’efficacité et la valorisation de la présentation de soi ont modéré cette relation. Ces résultats sont en accord avec les prédictions théoriques de la présentation de soi et de la pratique d’activités physiques chez une population de survivantes du cancer du sein. Il pourrait être avantageux de cibler la motivation, l’efficacité et la valorisation reliée à la présentation de soi lors d’interventions qui visent l’augmentation de la pratique d’activités physiques chez les survivantes du cancer du sein. La troisième étude consistait à remplir un ensemble de questionnaires autoadministrés à trois reprises au cours d’une période de six mois. Les objectifs étaient de (1) décrire les changements naturels des processus de présentation de soi et la pratique d’activités physiques chez des survivantes du cancer du sein lors d’une période de six mois, (2) d’évaluer les associations entre les facteurs liés au cancer, les processus de présentation de soi et la pratique d’activités physiques, et (3) de discerner les relations des processus de présentation de soi, aux niveaux
personnel et interpersonnel, en lien avec l’activité physique. En général, au cours du temps, les processus de présentation de soi sont demeurés stables alors que les niveaux d’activité physique ont changé. Les femmes qui ont reçu de la radiothérapie ont déclaré des niveaux d’intérêts plus bas à la façon dont les autres les perçoivent et elles ont utilisé moins de stratégies pour se présenter aux autres de façon positive. En revanche, les femmes qui ont reçu de la chimiothérapie ont utilisé davantage de stratégies. Finalement, les processus de présentation de soi ont montré à la fois des effets, tant au niveau personnel qu’interpersonnel, sur la pratique d’activités physiques. Ceci indique que les femmes qui ont déclaré, en général, un plus haut niveau de motivation reliée à la présentation de soi et une plus grande utilisation de stratégies pour bien se présenter aux autres pratiquaient davantage d’activités physiques (c.-à-d.: effet interpersonnel) et les femmes étaient encore plus active au moment où elles utilisaient plus de stratégies qu’à l’habitude. Les résultats soulèvent des questions à savoir si les processus de présentation du soi devaient être conceptualisés tels quels ou en traits caractéristiques et illustrent le besoin d’intégrer des interventions qui viseraient à augmenter la pratique d’activités physiques lorsque les femmes approchent de la marque de six mois après les traitements. De plus, il y avait évidence que la présentation de soi peut être utilisée en tant que modèle théorique pour vérifier les facteurs qui représentent les comportements reliés à la pratique de l’activité physique au cours du temps chez cette population. En conclusion, dans l’ensemble, ce projet de recherche démontre que les chercheurs et les professionnels de la santé qui travaillent auprès des femmes devraient connaître l’impact que les changements physiques après un cancer du sein peuvent avoir sur celles-ci et ils devraient les aider à développer des attitudes positives envers leur corps. Aussi, ce projet de recherche donne un aperçu des relations entre les processus de présentation de soi et la pratique d’activités physiques et il détermine les modérateurs potentiels qui sont
essentiels pour aider à la compréhension de ces associations. Ces résultats peuvent être utilisés pour renseigner et guider les chercheurs à concevoir des interventions théoriques et empiriques dans le but d’augmenter les niveaux d’activité physique chez cette population.
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List of Abbreviations

ACSM: American College of Sports Medicine
AT: Aerobic training
BFNE: Brief Fear of Negative Evaluation scale
BMI: Body mass index
CDC: Centers for Disease Control and Prevention
CFI: Comparative fit index
CIHR: Canadian Institutes of Health Research
FNE: Fear of negative evaluation
HHR: Heart rate reserve
HRmax: maximum heart rate
IC: Impression construction
IM: Impression motivation
IPA: Interpretative phenomenological approach
LTEQ: Leisure Time Exercise Questionnaire
METS: Metabolic equivalent units
MVPA: Moderate-to-vigorous physical activity
MUHC: McGill University Health Centre
NNFI: Non-normed fit index
PA: Physical activity
PORT: Psychosocial Oncology Research Training
RMSEA: Root mean square error of approximation
RPE: Rating of perceived exertion
SSHRC: Social Sciences and Humanities Research Council

SPE: Self-presentation efficacy

SPEE: Self-presentational efficacy expectancy

SPEQ: Self-Presentation in Exercise Questionnaire

SPES: Self-Presentation Efficacy Scale

SPOE: Self-presentational outcome expectancy

SPOV: Self-presentational outcome value

SPSS: Statistical Package for the Social Sciences

VIF: Variance inflation factor
Contributions of Authors

Surviving Breast Cancer: Women’s Experiences with Their Changed Bodies

Author: Jennifer Brunet

Contributions: Designed the study, performed literature review, collected data, conducted data analyses, drafted and revised manuscript, and was primary author of the manuscript.

Co-author: Catherine M. Sabiston, Ph.D.

Contributions: Assisted with the study design, discussed the results and implications and edited the manuscript.

Co-author: Shaunna Burke, Ph.D.

Contributions: Assisted with the development of the interview guide, discussed the results and edited the manuscript.

Status of manuscript: Submitted to a peer-reviewed journal.

Self-presentation and Physical Activity in Breast Cancer Survivors: The Moderating Effect of Social Cognitive Constructs

Author: Jennifer Brunet

Contributions: Designed the study objectives as part of a larger study, performed literature review, chose the assessment tools to be included in the larger study, conducted data analyses, drafted and revised manuscript, and was primary author of the manuscript.

Co-author: Catherine M. Sabiston, Ph.D.

Contributions: Designed main study, obtained funding for larger study infrastructure, supervised
study design and data analysis, discussed the results and implications, and edited
the manuscript.

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**A Prospective Investigation of the Relationship between Self-Presentation and Physical
Activity in Breast Cancer Survivors**

Author: Jennifer Brunet

Contributions: Designed the study objectives as part of a larger study, performed literature
review, chose the assessment tools to be included in the larger study, conducted
data analyses, drafted and revised manuscript, and was primary author of the
manuscript.

Co-author: Catherine M. Sabiston, Ph.D.

Contributions: Designed main study, obtained funding for larger study infrastructure, supervised
study design and data analyses, results and implications and edited the
manuscript.

Co-author: Patrick Gaudreau, Ph.D.

Contributions: Assisted with the data analyses, discussed the results and revised the final
manuscript.

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Overview of Dissertation

The following document is a scholarly presentation of my doctoral research. There are seven chapters to this document, followed by a reference list and appendices. Chapter one provides a contextual background for the research program, the research objectives and basic elements of the methods used in each study. Chapter two provides an overview of the theoretical framework used to guide this research, definitions, and presents literature pertaining to the constructs under investigation. In addition, measurement issues surrounding self-presentation processes are reviewed. The reviewed research is divided within four main sections: (1) breast cancer, (2) breast cancer and physical activity, (3) a theoretical perspective, (4) research on self-presentation and physical activity. Throughout this chapter, the limitations of earlier studies are underscored to make a case for the significance of this research program. The chapter ends with the research rationale and purposes. Chapter three presents the methods used to collect and analyze the data for the three interrelated studies that form this dissertation. Specifically, it provides detailed information on the participants, instrumentation, data collection procedures and data analyses. Chapters four, five, and six present the three scholarly manuscripts that emanated from this research program. Specifically, chapter four presents a qualitative study that explores women’s perceptual, attitudinal/cognitive, affective, and behavioural experiences with their altered bodies following treatment for breast cancer (Brunet, Sabiston & Burke). Chapter five presents a cross-sectional study that evaluates the psychometric properties of the Self-Presentation in Exercise Questionnaire, examines the relationships between self-presentation processes and moderate-to-vigorous physical activity behaviour, and determines if social cognitive variables (i.e., self-presentation efficacy, outcome expectations and outcome value) are moderators of these relationships (Brunet & Sabiston). Chapter six presents a prospective longitudinal study that
describes naturally occurring changes in breast cancer survivors’ self-presentation processes and moderate-to-vigorous physical activity behaviour over a period of six-months, evaluates the associations between cancer-specific factors and self-presentation processes, and moderate-to-vigorous physical activity behaviour, and examines the within- and between-person effects of impression motivation and impression construction on moderate-to-vigorous physical activity behaviour (Brunet, Sabiston & Gaudreau). Chapter seven summarizes essential findings from all three studies and highlights the theoretical, conceptual, methodological and practical implications of these findings, along with a conclusion.
Chapter One

Introduction

Breast cancer is the leading form of cancer detected in women, with one in nine women likely to develop breast cancer during her lifetime (Canadian Cancer Society, 2011). Although the number of women diagnosed with breast cancer each year is increasing, early detection and improved treatments have led to an increase in survival rates (Canadian Cancer Society, 2011). As a result, there is a growing population of breast cancer survivors (i.e., women who have completed active medical treatment; Courneya, 2003; Courneya & Friedenreich, 2007), who are at increased risk for recurrence, secondary cancers, and co-morbidities (Burstein & Winer, 2000; Demark-Wahnefried, Aziz, Rowland, & Pinto, 2005). Studies have shown that physical activity at moderate- and vigorous-intensity may help prevent or minimize these risks (Demark-Wahnefried & Jones, 2008). Moderate-to-vigorous physical activity has also been linked to a variety of physiological and psychosocial benefits in this population, such as improved cardiorespiratory fitness, muscle strength, aerobic fitness, physical functioning, quality of life, as well as reduced fatigue, anxiety, and depression (Blanchard, Courneya, & Stein, 2008; Courneya & Friedenreich, 1999; Demark-Wahnefried & Jones, 2008; McNeely et al., 2006; Milne, Wallman, Gordon, & Courneya, 2008; Pinto, Frierson, Rabin, Trunzo, & Marcus, 2005; Pinto & Maruyama, 1999; Sabiston & Brunet, 2011). Unfortunately, physical activity levels decrease during cancer treatment and the majority of breast cancer survivors fail to meet physical activity guidelines (Blanchard et al., 2003; Irwin et al., 2004; Pinto, Trunzo, Reiss, & Shiu, 2002). Based on the mounting evidence that physical activity is associated with a number of health benefits for breast cancer survivors, targeted efforts are required to address the consistent state of physical
inactivity in this population. To do this, it is important to identify and understand factors that may influence breast cancer survivors’ physical activity participation.

A self-presentation framework has been used in studies predicting and explaining physical activity motivation and behaviour (Hausenblas, Brewer, & Van Raalte, 2004; Leary, 1992). Self-presentation is defined as the process individuals engage in to monitor and/or control the impressions other people form of them (Leary & Kowalski, 1990). Researchers have adopted this perspective based on the notion that some individuals engage in physical activity for self-presentation reasons (i.e., improve or maintain physical appearance, obtain or preserve a desired social identity), while others may avoid it for these same reasons if they are concerned about their ability to convey an attractive image in front of others (Hausenblas et al., 2004; Leary, 1992). Given the physical changes ensuing from breast cancer treatment modalities (e.g., hair loss, weight gain, loss of the breast(s), muscle atrophy), women may develop appearance-related concerns as they try to reconcile their post-breast cancer physique with how they looked before they were diagnosed with breast cancer. This may fuel negative perceptions, feelings, and thoughts toward their bodies, particularly among women who ascribe a great deal of significance to their physical appearance (Cash, Melnyk, & Hrabosky, 2004). However, many researchers have adopted a positivist stance and employed quantitative methodologies where the goal has been to determine general trends. Thus, women’s unique and varied experiences with the wide range of physical changes resulting from breast cancer are not well understood. Therefore, qualitative studies that adopt a constructivist perspective which enable researchers to interpret and understand women’s experiences with their bodies after breast cancer are warranted.

The physical changes may also increase breast cancer survivors’ desire to monitor and/or control how others perceive them. As such, women treated for breast cancer may participate in
physical activity as a strategy to recover or preserve their physical facade by helping them improve their body composition (i.e., increase body strength and tone, lose weight). Engaging in physical activity may also help women portray a desired social image since being physically active is seen positively in Western societies and associated with several positive attributes (Martin, Sinden, & Fleming, 2000). Alternatively, breast cancer survivors who are apprehensive about their bodies may worry that others will negatively evaluate them, and therefore avoid engaging in activities where their physique is on display, namely physical activity (Leary, 1992). While an extensive body of literature exists on the relationships between self-presentation processes and physical activity behaviour in healthy populations (Hausenblas et al., 2004; Martin Ginis, Lindwall, & Prapavessis, 2007; Strong, Martin Ginis, Mack, & Wilson, 2006), self-presentation has not been used as a theoretical framework to explore breast cancer survivors’ health-related experiences. Thus, the relationships between self-presentation processes and breast cancer survivors’ physical activity behaviour is not well-understood. Research aimed at understanding the impact breast cancer has on women’s perceptions, cognitions, and feelings surrounding their changed physique following treatment for breast cancer and how this may link to physical activity behaviour is of particular importance in order to guide the development of interventions aimed at both at relieving distress and promoting physical activity.

Furthermore, given the notion that self-presentation may either promote or hinder physical activity participation, researchers have highlighted the need to examine possible moderators (Gammage, Hall, & Martin Ginis, 2004; Gammage, Hall, Prapavessis, et al., 2004; Martin, Leary, & O'Brien, 2001; McAuley, Bane, & Mihalko, 1995; Woodgate, Martin Ginis, & Sinden, 2003). Social cognitive constructs such as self-presentation efficacy, outcome expectations and outcome value (Leary, 1983), may help explain why certain individuals who
are highly motivated to manage their impressions engage in certain activities, whereas others avoid these activities (Gammage, Hall, & Martin Ginis, 2004; Woodgate et al., 2003). Speculatively, among breast cancer survivors who display high self-presentation motives, only women with high self-presentation efficacy, outcome expectations and/or outcome value will engage in physical activity (Gammage, Hall, & Martin Ginis, 2004; Woodgate et al., 2003). However, the potential moderating roles of these social cognitive constructs in the relationships between self-presentation processes and physical activity behaviour are not well understood. Thus, research integrating social cognitive constructs into the theoretical framework of self-presentation is needed to provide insight into links between self-presentation processes and physical activity behaviour.

As survival rates continue to improve, there is increasing research interest in identifying the psychosocial issues breast cancer survivors may face and explain their physical activity behaviour. In this research program, qualitative and quantitative methods were used to better understand, describe, and examine self-presentation processes and physical activity behaviour in women who recently completed systemic treatments for breast cancer. The use of a concurrent mixed method approach enabled different types of research questions to be answered. Specifically, qualitative methods were used to extend current knowledge of the complex psychosocial issues women face in the aftermath of breast cancer, and elucidate how these experiences may be linked with perceptual, affective, cognitive and behavioural outcomes. Quantitative methods were used to advance the measurement of self-presentation processes in this population, provide insight into the relationships between self-presentation processes and physical activity behaviour at the between- and within-person level, identify potential moderators that are essential to helping understand these associations, and describe natural change over time.
in self-presentation processes and physical activity behaviour. The use of a concurrent mixed method approach also allowed for triangulation (i.e., determine whether there was correspondence of results from the different methods), the clarification of the results from one method with the results from the other method, the emergence of new perspectives, and the breadth of inquiry to be extended. Overall, the knowledge gained from this research program may inform intervention strategies aimed at both reducing adverse psychosocial outcomes and increasing physical activity levels among breast cancer survivors – a population that includes over 2.5 million North American women.

**Objectives**

In order to address the purposes of this research program, the following objectives were addressed in three interrelated studies:

**Specific Aim One**

To explore women’s perceptual, attitudinal/cognitive, affective, and behavioural experiences with their changed bodies following treatment for breast cancer. To address this aim, a qualitative study grounded in constructivist epistemology was conducted with a purposeful sample of breast cancer survivors. Data was collected through semi-structured face-to-face interviews. Data were transcribed verbatim and analyzed using interpretative phenomenological analysis.

**Specific Aim Two**

To evaluate the psychometric properties of the Self-Presentation in Exercise Questionnaire, examine the relationships between self-presentation processes and moderate-to-vigorous physical activity behaviour, and determine if social cognitive variables (i.e., self-presentation efficacy, outcome expectations and outcome value) are moderators of these
relationships. To address this aim, a cross-sectional study was conducted. Breast cancer survivors completed a questionnaire package. Data were analyzed using confirmatory factor analysis and multiple hierarchical regression analysis.

**Specific Aim Three**

To describe naturally occurring changes in breast cancer survivors’ self-presentation processes and moderate-to-vigorous physical activity behaviour over a period of six-months, evaluate the associations between cancer-specific factors and self-presentation processes, and physical activity behaviour, and examine the within- and between-person effects of impression motivation and impression construction on moderate-to-vigorous physical activity behaviour. To address this aim, a longitudinal study was conducted with breast cancer survivors. Participants completed a questionnaire package on three occasions over the span of six months. Data were analyzed using multilevel modeling.
References


Chapter Two

Review of Literature

Breast Cancer

There are over 1.38 million women diagnosed annually with breast cancer (Jemal et al., 2011). In Canada, breast cancer is the leading form of cancer diagnosis in women, with one in nine women likely to be diagnosed during her lifetime (Canadian Cancer Society, 2011). Although the number of women diagnosed with breast cancer each year is on the rise, early detection and improved treatments in developed countries have led to an increase in survival rates. The most recent five-year relative survival rate for breast cancer is 88% (Canadian Cancer Society, 2011). The high incidence and promising survival rates have resulted in breast cancer survivors comprising one of the largest groups of cancer survivors. Research efforts focused on breast cancer survivors (i.e., women who have had a diagnosis of cancer, have completed primary treatment, and are currently disease-free; Courneya & Friedenreich, 2007) is needed since women in this distinct phase of the cancer trajectory have unique needs and are faced with unique challenges (Canadian Cancer Society, 2011).

The available treatments for breast cancer include surgery (i.e., lumpectomy or mastectomy), chemotherapy, radiotherapy, and hormonal therapy. These treatments can be used independently or in combination and may offer women a positive outlook for surviving breast cancer. However, there are a number of associated short- and long-term physical and mental side effects. The physical effects include loss of function, decreased range of motion, pain, loss of the breast(s), lymphedema, nausea, fatigue, lung fibrosis, cardiomyopathy, cardiotoxicity, peripheral neuropathy, anemia, alopecia, weight gain, hot flashes, tissue damage, muscle loss, muscle weakness, and osteoporosis (Demark-Wahnefried, Aziz, Rowland, & Pinto, 2005;
Demark-Wahnefried et al., 2001; Irwin et al., 2005; Shapiro & Recht, 2001; Ward, Kuta, Sanborn, & Burt, 2003; Winningham et al., 1994). The mental effects include depression, anxiety, stress, loss of sense of control, and decreased well-being (Burgess et al., 2005; Ganz et al., 1996; Glanz & Lerman, 1992; Mahon, Cella, & Donovan, 1990; Maunsell, Brisson, & Deschenes, 1992; Ward et al., 2003). Given these side effects and comorbidities, it is necessary to identify specific factors and strategies that may reduce the negative symptoms experienced by breast cancer survivors.

**Breast Cancer and Physical Activity**

Research indicates that physical activity is a behavioural intervention that may compliment existing treatments and address a number of side effects relevant to breast cancer survivors (McNeely et al., 2006; Pinto & Maruyama, 1999; Sabiston & Brunet, 2011; Ward et al., 2003). Physical activity, as defined by Caspersen, Powell and Christenson (1985), refers to “any bodily movement produced by skeletal muscles that results in energy expenditure above basal requirements” (p. 126). As part of an effort to improve breast cancer survivors’ health and well-being, several reviews have been conducted to establish the feasibility and safety of physical activity for individuals who have been treated for cancer (Courneya & Friedenreich, 1999; McNeely et al., 2006; Sabiston & Brunet, 2011; Schmitz et al., 2010; Schmitz et al., 2005). In light of the evidence that physical activity is feasible and safe for this population, specific guidelines have been formulated for cancer patients and survivors (Schmitz et al., 2010), as well as for breast cancer survivors specifically (Brunet, Sabiston, & Meterissian, in press; see Appendix A). The guidelines for breast cancer survivors suggest they should engage aerobic training at least 3 times per week, resistance training 2 to 3 times per week, and flexibility training 3 times per week. Aerobic (or endurance) activity refers to any activity that uses large
muscle groups, can be maintained continuously for a long period of time, and is rhythmic in nature (American College of Sports Medicine, 2006). Examples include walking, jogging, running, cycling, dancing, skating, swimming, aerobics classes, and household chores (e.g. vacuuming, sweeping, mopping, and raking). Walking is a commonly reported aerobic activity that is also enjoyable to many breast cancer survivors (McNeely et al., 2006). Resistance (or strength) training refers to any activity that uses resistance methods (e.g. free weights, an individual’s own weight, machines, and elastic bands) to increase one’s ability to exert or resist force (American College of Sports Medicine, 2006). These activities involve concentric (i.e. lifting and pushing/pulling) and eccentric (i.e. controlled lowering/returning) muscle contractions and are done for each major muscle group (i.e. quadriceps, hamstrings, hip adductors/abductors, upper/lower back, abdomen, chest, shoulders, biceps/triceps, and neck). Flexibility training refers to activities that lengthen muscles to increase range of motion around the joints (American College of Sports Medicine, 2006). These activities can be static (i.e. stretch is held for a period of time), dynamic (i.e. fluid motion such as tai chi), or active (i.e. hold stretch while balancing such as yoga).

**Intensity.** The intensity of physical activity is important as this may affect the effectiveness of a program to improve overall health. It refers to the magnitude of the effort that is exerted to perform an activity. Intensity is most often characterized as light (i.e. heart rate does not increase considerably above resting heart rate), moderate (i.e. heart rate and sweating increases; person can still maintain a conversation), or vigorous/strenuous (i.e. fast and hard breathing, heart rate increases considerably, person cannot maintain a lengthy conversation), and is monitored using a variety of parameters. It is often monitored using physiological parameters, namely a percentage of maximum heart rate, heart rate reserve, or maximum oxygen
consumption (Cadmus et al., 2009; Courneya, Mackey, et al., 2003; Daley et al., 2007; Pinto, Frierson, Rabin, Trunzo, & Marcus, 2005; Pinto & Trunzo, 2004), though ratings of perceived exertion, a subjective parameter whereby a person self-evaluates their level of fatigue, have also been used (Daley et al., 2007). Although there is considerable heterogeneity in the magnitude of intensity between the studies in the literature, the examination of moderate- and vigorous-intensity physical activity is common in observational and experimental studies (e.g., Bellizzi, Rowland, Jeffery, & McNeel, 2005; Blanchard et al., 2003; Blanchard, Courneya, & Stein, 2008; Coups & Ostroff, 2005; Irwin et al., 2004; Pinto, Maruyama, Engebretson, & Thebarge, 1998). The evidence derived from experimental studies consistently demonstrates that moderate- and vigorous-intensity activities lead to improvements in physical and psychosocial health among cancer survivors (Brunet et al., in press; see Appendix A; Courneya & Friedenreich, 1999; McNeely et al., 2006; Sabiston & Brunet, 2011; Schmitz et al., 2010; Schmitz et al., 2005). These findings suggest researchers should center their attention on studying factors related to moderate- and vigorous-intensity physical activity in order to help women minimize the negative physical and psychosocial consequences that ensue after breast cancer surgery and treatment.

**Health Benefits.** As alluded to above, a compelling body of literature supports the notion that physical activity, particularly at moderate and vigorous intensity, plays a key role in the prevention and management of the side effects and comorbidities breast cancer survivors may develop as a results of the treatments endured, and leads to a variety of physical and mental health benefits (Cadmus et al., 2009; Courneya, 2003; Courneya & Friedenreich, 1999; Courneya & Friedenreich, 2007; Courneya, Friedenreich, et al., 2003; Daley et al., 2007; Holmes, Chen, Feskanich, Kroenke, & Colditz, 2005; Irwin et al., 2009; McNeely et al., 2006; Mutrie et al., 2007; Pinto, Clark, Maruyama, & Feder, 2003; Pinto & Maruyama, 1999; Pinto & Trunzo, 2004;
Based on recent meta-analyses and systematic reviews, the most common benefits of moderate- and vigorous-intensity aerobic activity, strength training or a combination of both types of activity included improved physical fitness, overall functioning, quality of life, and reduced fatigue in breast cancer survivors (Courneya, 2003; Courneya & Friedenreich, 1999; Courneya & Friedenreich, 2007; Kirshbaum, 2006; McNeely et al., 2006; Schmitz et al., 2005). Furthermore, studies have demonstrated that physical activity is linked to lower levels of depression and anxiety, improved social and emotional well-being, body self-esteem, body image, and body composition (Courneya, Friedenreich, et al., 2003; Courneya et al., 2007; Daley et al., 2007; Pinto et al., 2003; Pinto & Maruyama, 1999; Pinto & Trunzo, 2004; Pinto, Trunzo, et al., 2002). Researchers have also shown that physical activity following breast cancer diagnosis and treatment is associated with improved survival rates and reduced risk of breast cancer recurrence and death (Holick et al., 2008; Holmes et al., 2005; Sabiston & Brunet, 2011). Collectively, these findings suggest that there are positive effects of moderate- and vigorous-intensity physical activity for the management of breast cancer treatment side effects, as well as for continued health.

**Prevalence.** Despite the reported benefits of physical activity, studies comparing physical activity levels before and after breast cancer diagnosis and treatment have shown that women reduce their physical activity levels during the treatment phase and fail to regain prediagnosis levels (Andrykowski, Beacham, & Jacobsen, 2007; Demark-Wahnefried et al., 1997; Devoogdt et al., 2010; Irwin et al., 2004; Littman, Tang, & Rossing, 2010). In addition, a growing body of research has provided compelling evidence that the majority (i.e., 58 – 80%) of breast cancer survivors are not sufficiently active at levels known to yield health benefit (Bellizzi et al., 2005; Coups & Ostroff, 2005; Harrison, Hayes, & Newman, 2009; Irwin et al., 2003; Irwin
et al., 2004; Matthews et al., 2007; Pinto et al., 2005; Pinto, Trunzo, et al., 2002). For instance, in a large prospective cohort study of breast cancer survivors, 32% of the women reported meeting physical activity guidelines of 150 minutes per week of moderate to vigorous intensity physical activity (Irwin et al., 2004). Using similar cut-off points, Blanchard, Courneya, and Stein (2008) found comparable rates indicating that 37% of the breast cancer survivors in their study met physical activity recommendations. In addition, using the physical activity guidelines established by the Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM; ≥ 30 minutes of moderate activity on at least five days per week or ≥ 20 minutes of vigorous activity on at least three days per week; Haskell et al., 2007), Coups and Ostroff (2005) and Bellizzi et al. (2005) found that 20% and 29% of breast cancer survivors met these guidelines, respectively. Finally, Pinto, Maruyama, Engebretson, and Thebarge (1998) and Blanchard et al. (2003) used these same CDC/ACSM guidelines and reported that 20% to 23% of breast cancer survivors were meeting the recommended levels, correspondingly. Although the majority of the women in the general population fall short of the recommended guidelines (e.g., 47.9%; Haskell et al., 2007), these findings accentuate that women diagnosed and treated for breast cancer are less likely to meet the current physical activity recommendations proposed by the CDC and ACSM. In light of the high prevalence of inactivity in this population, research related to the factors that influence physical activity behaviour is an important line of investigation.

**Survivorship Timeframe.** Although the studies discussed above provide information regarding the current status of physical activity among breast cancer survivors, the majority were conducted with women who spanned the survivor continuum (e.g., Bellizzi et al., 2005; Blanchard et al., 2003; Blanchard et al., 2008; Coups & Ostroff, 2005; Pinto, Maruyama, et al.,
2002). For example, in Coups and Ostroff’s study (Coups & Ostroff, 2005), the mean time since diagnosis in their sample of breast cancer survivors was 9.5 years (standard deviation not reported) and it ranged from less than 2 years to more than 21 years. Evidence from a cross-sectional study comparing physical activity levels across groups based on time since diagnosis suggests that women who have recently completed treatment for breast cancer are less active compared to longer term survivors (Bellizzi et al., 2005; Devoogdt et al., 2010). Specifically, Bellizzi et al. (2005) demonstrated that survivors that were less than one year from diagnosis were less likely to meet physical activity recommendations (26.9%) compared with survivors two to four years after diagnosis (32.6%) and five to nine years after diagnosis (33.3%). In addition, a longitudinal study by Pinto, Trunzo, Reiss, and Shiu (2002) revealed that the percentage of breast cancer survivors who met recommendations for moderate and vigorous-intensity physical activity increased over time, albeit not significantly. Taken together, these findings suggest that physical activity levels may be lower among women who have recently completed breast cancer treatment. In light of these findings and the evidence that physical activity is safe and feasible for cancer survivors following treatment (Jones & Demark-Wahnefried, 2006), research documenting natural changes in physical activity immediately following breast cancer treatment is warranted.

In summary, research on physical activity in the field of oncology has emerged and evolved in the past decade. A lot has been learned about the physical and mental health benefits of physical activity for women who have been treated for breast cancer. The recognition of these benefits has in turn fuelled the development of physical activity guidelines for cancer survivors (Schmitz et al., 2010) and breast cancer survivors specifically (Brunet et al., in press; see Appendix A), yet, the majority of breast cancer survivors remain inactive. The need to promote
physical activity in this population has triggered the development of studies focused on identifying factors that may promote the adoption and maintenance of physical activity during the early survivorship period. This will help guide the development of appropriate and effective physical activity intervention. Indeed, researchers have sought to identify factors that influence physical activity levels by examining demographic factors, psychological factors, social factors, or a combination of these factors. However, there have been relatively few studies that have utilized theoretical or conceptual frameworks to examine correlates and predictors of physical activity behaviour among breast cancer survivors.

It is widely accepted that theoretical and conceptual frameworks are an integral part of research. They direct researchers’ attention to concepts or variables and their interrelationships. Further, they guide researchers in the development of their research questions and hypotheses, study design, and interpretation of their results. There are many possible theories that may be used to help identify correlates and predictors of physical activity behaviour among breast cancer survivors and advance knowledge in this area. One theoretical perspective that has been used in studies aimed at predicting and explaining physical activity motivation and behaviour is self-presentation (Leary & Kowalski, 1990).

A Theoretical Perspective

A self-presentation approach allows researchers to focus on aspects of the individual and situation that may increase or decrease the likelihood of engaging in physical activity (Hausenblas, Brewer, & Van Raalte, 2004). As a result, the critical role of self-presentation in the development of physical activity behaviour has been examined in a variety of populations (Conroy & Motl, 2003; Conroy, Motl, & Hall, 2000; Crawford & Eklund, 1994; Eklund & Crawford, 1994; Frederick & Morrison, 1996; Gammage, Hall, & Martin Ginis, 2004;
SELF-PRESENTATION AMONG BREAST CANCER SURVIVORS


Self-presentation Origins and Framework

The study of self-presentation had its beginning in the 1950’s with the work of several sociologists and social psychologists (Baumeister, 1982; Goffman, 1959; Jones & Pittman, 1982; Schlenker & Leary, 1982). Baumeister (1982) originally defined self-presentation as “the use of behaviour to communicate some information about oneself to others” (p. 3). Building on the work of early researchers, Leary and Kowalski (1990) employed the concept of self-presentation to provide a new framework to understanding people’s behaviours. To this end, they re-operationalized self-presentation and presented a two-component model of self-presentation.

Leary and Kowalski (1990) described self-presentation (also referred to as impression management) as the “process by which individuals attempt to control the impressions others form of them” (p. 34). Self-presentation generally involves selectively presenting ones characteristics that will create the desired impression, while selectively omitting those that will create an undesired impression (Leary, 1992; Schlenker & Leary, 1982). In general, self-presentation is a deliberate, goal-directed process in which individuals engage in to convey desired images in order to influence how others perceive and treat them (Leary & Kowalski, 1990; Schlenker & Leary, 1982).

Leary and Kowalski (1990) proposed a two-component model of self-presentation to elucidate factors related to the self-presentation process. Specifically, they posited that the types of impressions individuals attempt to convey of themselves are influenced by two discrete sets of processes: impression motivation and impression construction. Impression motivation refers to
how motivated individuals are to control how they are perceived by others in a particular social encounter. *Impression construction* involves deciding which impression to convey to others and the particular strategies in which individuals engage in, either implicitly or explicitly, to create this impression. The distinction between impression motivation and impression construction is that the former deals with the motivation behind making an impression and the latter deals with the content and extent to which actions are taken to make that impression. Taken together, these two processes may help researchers understand why people wish to create certain impressions and engage in certain behaviour in order to convey their desired impressions (Leary & Kowalski, 1990).

Since the development of this two-component model, self-presentation has been used to better inform and enrich researchers’ understanding of various health behaviours, such as dieting, exercising and smoking (Conroy & Motl, 2003; Conroy et al., 2000; Gammage, Hall, & Martin Ginis, 2004; Lamarche & Gammage, 2010; Mack, Strong, Kowalski, & Crocker, 2007; Martin Ginis & Leary, 2004; Martin & Leary, 2001; Martin et al., 2001). For example, Martin and colleagues (Martin & Leary, 2001; Martin et al., 2001) investigated the relationship between self-presentation processes and various health behaviours (e.g., smoking, drinking, exercising, dieting, using drugs) among adolescents and college freshmen. Focusing on eating behaviour, Mack et al. (2007) examined self-presentation motivation among women who were clinically diagnosed with an eating disorder, women who were considered at-risk of developing an eating disorder, and women who were considered not-at-risk for an eating disorder. In terms of physical activity motivation and behaviour, Strong et al. (2006) examined the associations between self-presentation exercise motives (e.g., weight management, appearance, strength and endurance, social recognition) and social physique anxiety. In addition, Conroy et al. (2000)
developed a contextualized self-presentation measure and examined its relationship with exercise behaviour. Lastly, Lamarche and Gammage (2010), studied the influence of the exercise leader’s gender on self-presentation processes among women exercisers.

Additionally, there are several reviews of research on self-presentation (Hausenblas et al., 2004; Leary, Tchividjian, & Kraxberger, 1994; Martin, Leary, & Rejeski, 2000). Hausenblas et al. (2004) reviewed the literature on self-presentation in relation to physical activity, focusing on motivation, behaviour, environment, and the effect of exercise interventions on self-presentation. Within a different context, Leary et al. (1994) reviewed the literature on self-presentation in relation to health risks and unhealthy health behaviours, namely malnutrition and eating disorders, alcohol consumption, tobacco and drug use, skin cancer, and HIV infection. Lastly, Martin et al. (Martin et al., 2000) reviewed the literature on self-presentation within older adult populations and outlined the implications of self-presentation on psychological and physical well-being for this population. Taken altogether, these studies and reviews demonstrate that the influence of self-presentation may extend across different health behaviours and different populations. However, self-presentation has never been used as a theoretical framework to explore breast cancer survivors’ physical activity behaviour. Within the general population, the justification for adopting a self-presentation perspective in the physical activity domain has been rooted in the premise that people’s motives to engage in physical activity often mirror self-presentation motives, namely the desire to improve or maintain physical appearance and to obtain or preserve a desired social identity (Leary, 1992). Such motives may also be a source of influence on physical activity behaviour among breast cancer survivors.
Breast Cancer: The Impact on Women’s Self-Image

Researchers have documented that breast cancer surgical treatments and adjuvant therapies may result in major alterations of body image through alopecia, loss of the breast(s), disfigurement, weight gain, muscle loss, scars or skin changes (Demark-Wahnefried, Winer, & Rimer, 1993; Hopwood, Fletcher, Lee, & Al Ghazal, 2001; Irwin et al., 2005; Shapiro & Recht, 2001; Winningham et al., 1994). For instance, researchers have shown that weight gain occurs in 50% to 95% of women treated for breast cancer (Freedman et al., 2004; Goodwin et al., 1999; Irwin et al., 2005; Lankester, Phillips, & Lawton, 2002), and unfavourable changes in body composition (e.g., decreased fat free mass, increased body fat) also transpire (Freedman et al., 2004; Irwin et al., 2005). Given that Western societies promote an ideal female body characterized by flawless skin, thinness, long legs, and well-developed breast (Cash & Pruzinsky, 2002), women who have been treated for breast cancer may perceive that their current physique is far from the norm of ideal beauty (Fobair et al., 2006; Frith, Harcourt, & Fussell, 2007). In other words, the physical changes in the body ensuing from breast cancer treatment modalities may exacerbate appearance-related concerns as women try to reconcile their post-breast cancer physique with how they looked before they were diagnosed with cancer and/or the ideal promoted by society. Some women may have trouble adjusting to their altered physique and may develop negative physical self-perceptions, feelings and attitudes toward their bodies.

A growing body of literature exists to support the view that breast cancer may be disruptive to one’s body image (see Helms, O’Hea, & Corso, 2008 for review). Researchers have shown that women treated for breast cancer frequently experience negative physical self-perceptions (DeFrank, Mehta, Stein, & Baker, 2007; Fobair et al., 2006), and these are generally higher among women who have received a mastectomy (rather than breast-conserving surgery).
and are younger at diagnosis (Al-Ghazal, Fallowfield, & Blamey, 2000; Fobair et al., 2006; Yurek, Farrar, & Andersen, 2000). There are also studies suggesting women’s experiences with chemotherapy and the loss of the breast(s) impact women’s physical self-perceptions (Boehmke & Dickerson, 2005; Frith et al., 2007; Helms et al., 2008). Adverse physical changes have also been linked to affective outcomes, namely negative affect, emotional distress, and reduced self-esteem among breast cancer survivors (Carver et al., 1998; Collins et al., 2011; Falk Dahl, Reinertsen, Nesvold, Fosså, & Dahl, 2010). For these reasons, body image has been recognized by many researchers as a key aspect of breast cancer survivors’ quality of life (Bloom, Stewart, Chang, & Banks, 2004; Collins et al., 2011; DeFrank, Mehta, Stein, & Baker, 2007; McDonough, Sabiston, & Crocker, 2008).

However, despite advancements made in the field of oncology in this area, few studies examining body image in breast cancer survivors have considered the multiple dimensions of body image. Body image is a multidimensional construct that includes several dimensions: perceptual (i.e., accuracy of body size estimation relative to actual size), attitudinal (i.e., subjective satisfaction/dissatisfaction of body), affective (i.e., feelings association with the body), cognitive (i.e., investment in appearance beliefs about the body), and behavioural (i.e., compensatory behaviours such as avoidance of situations where one’s body is exposed, dieting, physical activity; Cash & Pruzinsky, 2002; White, 2000). These facets are often overlooked in quantitative because researchers have used unidimensional questionnaires, relied on aggregated data, and often failed to incorporate recent body image theories (Cash & Pruzinsky, 2002; White, 2000). Thus, it is important to better understand the impact breast cancer has on the various dimensions of body image in this population in order to guide psychosocial interventions aimed at relieving distress and promoting well-being.
Another notable limitation from the extant literature is that the focus has primarily been on intrapersonal evaluation, and therefore, less is known regarding the effects of interpersonal appearance evaluation (Cash, 2002). The physical changes resulting from breast cancer treatment modalities may interfere with women’s perceived ability to convey a desired impression and could elicit concerns that she may be perceived as unattractive. This is because individuals who are physically attractive are often “perceived as more sociable, dominant, intelligent, socially skilled, and adjusted” (Leary, 1996, p. 25). Subsequently, breast cancer survivors may try to manage their physical self-presentation by engaging in physical activity. Thus, as within the general population, appearance and self-presentation concerns may be prevalent among breast cancer survivors, and may have an effect on physical activity behaviour as a means to regulate their weight, improve toning, and/or to develop a fit and athletic social image.

Sabiston, McDonough, and Crocker (McDonough, Sabiston, & Crocker, 2008; Sabiston, McDonough, & Crocker, 2007) have provided indirect support for this contention through two qualitative studies with breast cancer survivors engaging in a dragon boating program. In Sabiston and colleagues’ (2007) study, appearing athletic and increasing muscle mass were important motives for engaging in dragon boating and related exercise for several of the women. In addition, the authors showed that many of the breast cancer survivors experienced important changes in their physical self-perception, whereby they saw themselves as stronger, fitter, and more physically competent. Similarly, McDonough et al. (2008) found that some women felt they looked younger and healthier as a result of dragon boating. Several of the women in their study also noticed improvements in their body composition, weight and shape. Taken together,
these findings suggest that some breast cancer survivors’ motivation for participating in physical activity may reflect their desire to improve their appearance and social image.

Although many breast cancer survivors may engage in physical activity for self-presentation reasons, some may avoid physical activity for the same reasons (Leary, 1992). Specifically, self-presentation can discourage individuals from participating in physical activity if they are concerned about their ability to convey an attractive image in front of others (Hausenblas et al., 2004; Leary, 1992). Researchers have shown that some breast cancer survivors experience body-related anxiety as a result of the changes associated with breast cancer treatment and perceive that others negatively evaluate them as ‘lopsided’, ‘mis-shaped’ or ‘disfigured’ (McDonough et al., 2008). As such, breast cancer survivors who are apprehensive about their physique (e.g., weight, muscle mass, body fat) may worry that others will negatively evaluate them, and therefore, avoid engaging in activities where their physique is on display. In fact, Leary (1992) has suggested that individuals who are concerned about being perceived as incompetent, unfit and/or unskilled may not engage in physical activity as this may highlight these undesirable characteristics. Similarly, McAuley et al. (1995) contended that the main reason why overweight female exercisers avoided exercising in public was their apprehension associated with being observed and evaluated by others. This seems to suggest that there may be potentially positive or negative effects of self-presentation on breast cancer survivors’ physical activity; however, research is needed to better understand the processes involved in these associations.

**Social Cognitive Constructs**

The possible dual influence of self-presentation processes on physical activity behaviour is indicative of the need to look more closely at the complex interplay between these variables.
Researchers have considered social cognitive variables that may moderate these relationships (Gammage, Hall, & Martin Ginis, 2004; Gammage, Hall, Prapavessis, et al., 2004; Martin et al., 2001; McAuley et al., 1995; Woodgate et al., 2003). Based on social cognitive models (e.g., Bandura, 1986, 1997), self-efficacy and outcome expectations may moderate the associations between self-presentation processes and behavioural outcomes such as physical activity. Self-efficacy refers to the belief one has regarding his/her ability to perform a task to produce the desired outcome, whereas outcome expectation is the belief one has regarding the outcomes that will result from performing a specific task. Based on outcome-expectancy theories (e.g., Bandura, 1997) and social learning theory (Rotter, 1954), outcome value may also be a potential social cognitive moderator. Outcome value refers to the importance individuals place on an expected outcome.

Researchers have operationalized these social cognitive constructs from a self-presentation perspective (Maddux, Norton, & Leary, 1988). From this perspective, self-efficacy (or self-presentational efficacy expectancy), refers to the perceived probability of successfully conveying one’s desired impressions to others, outcome expectation (or self-presentational outcome expectancy) refers to the degree to which one perceives certain behaviours will lead to a desired impression, and outcome value (or self-presentational outcome value) reflects the importance placed on making a desired impression (Maddux et al., 1988). Presumably, physical activity behaviour will only be used as a self-presentation strategy by breast cancer survivors who have high self-presentation motives and high self-presentation efficacy, outcome expectancy and/or value (Gammage, Hall, & Martin Ginis, 2004; Woodgate et al., 2003). In these regards, researchers adopting a self-presentation perspective to identify factors related to
physical activity participation among breast cancer survivors should consider the role of these social cognitive constructs.

**Research on Self-Presentation and Physical Activity**

Looking at specific health behaviours, researchers have focused on understanding the relationship between self-presentation processes and physical activity behaviour (Gammage, Hall, & Martin Ginis, 2004; Lamarche & Gammage, 2010; Leary, 1992; McAuley et al., 1995; Strong et al., 2006; Thogersen-Ntoumani & Ntoumanis, 2007). This is because the desire to be perceived as attractive by others and to improve or maintain physical appearance are two key self-presentation reasons that may either lead people to engage in or avoid physical activity (Leary, 1992).

**Social Physique Anxiety and Physical Activity**

To date, the majority of research relating to physical activity has focused on the construct of social physique anxiety, a construct that is rooted in the process of self-presentation (Hart, Leary, & Rejeski, 1989). Social physique anxiety is defined as the anxiety individuals experience when they perceive that others are negatively evaluating their physique and/or appearance (Hart et al., 1989). Researchers investigating the links between social physique anxiety and physical activity motivation have generally found that individuals who report higher levels of social physique anxiety participate in physical activity for self-presentation motives (e.g., appearance, weight control, body tone; Crawford & Eklund, 1994; Eklund & Crawford, 1994; Markland & Ingledew, 1997; Sabiston, Crocker, & Munroe-Chandler, 2005; Strong et al., 2006), whereas individuals who report lower levels of social physique anxiety participate in physical activity for non-self-presentation reasons (e.g., health, pleasure; Eklund & Crawford, 1994). For example, Martin and colleagues (2001) found that adolescents who were
apprehensive about others’ evaluation of their physiques were less likely to be active. The authors suggested that the need to make a good impression is more important for adolescents than the health benefits gained by physical activity. Similar findings were documented by and Frederick and Morrison (1996) and Gillison, Standage, and Skevington (2006), whereby social physique anxiety was a significant positive correlate of weight- and appearance-related goals for physical activity.

The direct relationship between social physique anxiety and physical activity behaviour has also been examined and has yielded equivocal results, suggesting that it can be both a motivator and deterrent to engagement to physical activity behaviour. For example, Frederick and Morrison (1996) found that university fitness-center participants who experienced higher levels of social physique anxiety engaged in physical activity more often than those who had lower levels of social physique anxiety. Eklund and Crawford (1994) found no significant relationship between social physique anxiety and physical activity behaviour (e.g., number of days per week, minutes per day exercised, minutes per week exercised) among college aged women. In contrast, Lantz et al. (1997) showed that adults who reported higher levels of social physique anxiety were less likely to engage in physical activity. Similarly, Ransdell et al. (1998) found that older, postmenopausal women who reported higher social physique anxiety engaged in less leisure time physical activity. Also among older women, Woodgate et al. (2003) found that social physique anxiety was a significant negative correlate of physical activity. Finally, Brunet and Sabiston (2009) reported a significant inverse relationship between social physique anxiety and physical activity in a sample of young adults.

Although these studies collectively provide evidence that social physique anxiety is associated with physical activity motivation and behaviour, they highlight the complexity of this
relationship and stress the need to consider moderating and/or mediating variables in order to understand the inconsistent relationships observed. In addition, it is important to note that the majority of studies relating to social physique anxiety and physical activity have been conducted with adolescent and young adult samples who do not appear to have a history of cancer (e.g., Crawford & Eklund, 1994; Eklund & Crawford, 1994; Frederick & Morrison, 1996; Martin et al., 2001). The rationale given for focusing on this segment of the population has been that there is a paradox between the socially prescribed ideal physique and the maturing female body that heightens self-presentation concerns. Besides puberty, there are other life events that can result in physical changes and might also widen the gap between women’s bodies and the idealized body and exacerbate self-presentation concerns. For instance, the changes that occur as a result of the treatment for breast cancer (e.g., increased body fat and weight) are inconsistent with the social standard of physical attractiveness (e.g., being toned, thin, shapely). Accordingly, self-presentation concerns might not be restricted only to young adults, but might also be pertinent to women who experience disease-related physical changes, such as breast cancer survivors. Given that these women represent an increasingly large segment of the population who may experience self-presentation concerns because of the physical changes following surgery and treatment (Demark-Wahnefried et al., 1993; Hopwood et al., 2001; Shapiro & Recht, 2001) and are insufficiently active (Coups & Ostroff, 2005; Harrison et al., 2009; Irwin et al., 2004), it is necessary to examine the associations between self-presentation process and physical activity participation in this population.

Furthermore, despite the fact that research focusing on social physique anxiety has made significant contributions to the physical activity literature, it may be informative to investigate self-presentation processes specifically, rather than use social physique anxiety as a proxy
measure for these two distinct constructs (i.e., impression motivation, impression construction). One possible reason why researchers have neglected to focus on self-presentation is due to the relative absence of a psychometrically sound measure.

**Measurement of Self-Presentation in the Physical Activity Domain**

In an attempt to overcome this shortcoming in the literature, Conroy et al. (Conroy, Motl, & Hall, 1998) developed a measure to assess self-presentation tendencies in relation to the impression that an individual is an exerciser (i.e., fit, healthy, active), known as the Self-Presentation in Exercise Questionnaire (SPEQ). The SPEQ is the only measure available in the physical activity domain that assesses both facets of self-presentation and that is based on Leary and Kowalski’s (1990) two-component model of self-presentation. The original scale includes two subscales: an impression motivation subscale (10-items) that assesses an individual’s motivation to be perceived as an exerciser, and an impression construction subscale (10-items) that assesses the use of strategies (i.e., exercise) to convey such impressions.

Since its initial development, the SPEQ has been subjected to psychometric testing and findings have raised concerns regarding its validity, factor structure and composition (Conroy & Motl, 2003; Conroy et al., 2000; Gammage, Hall, Prapavessis, et al., 2004; Lindwall, 2005). Although the underlying two-factor structure of this measure has been confirmed across studies, different truncated versions of the scale have been developed which have included between 8 to 14 items. For example, Conroy and colleagues (2000) tested a truncated 11-item model of the SPEQ and this resulted in a better fitting model than a 14-item model. Owing to the data-driven approach adopted in Conroy et al.’s (2000) study, Conroy and Motl (2003) conducted a follow-up study to cross-validate the 14-item and 11-item SPEQ with college students and middle aged adults. Results indicated that neither model demonstrated acceptable fit, and thus, model
modifications were performed to the 14-item model and resulted in an acceptable 9-item model which demonstrated tight-cross validation. To further test the psychometric properties of the SPEQ, Gammage, Hall, Prapavessis et al. (2004) re-examined the factor structure and composition of the 11-item version and this model failed to demonstrate acceptable fit. Subsequently, the authors conducted modifications that reduced the number of items of the SPEQ to 8-items and this enhanced the fit of the model. Based on these findings, it is not clear which version of the SPEQ should be used. Therefore, an important step in testing the associations between self-presentation processes and physical activity behaviour among breast cancer survivors is to test and confirm the psychometric properties of the original SPEQ in this population. This may provide insight into the measurement of self-presentation processes and help in the understanding how these processes relate to physical activity behaviour.

Impression Motivation, Impression Construction and Physical Activity Research

Irrespective of the measurement limitations, the introduction of the SPEQ has allowed research on self-presentation and physical activity to progress. Using the 11-item version of the SPEQ, Conroy et al. (2000) found that impression motivation was positively associated with self-reported number of days per week of exercise, and impression construction was positively associated with the percentage of time spent exercising among college students. Similarly, Lindwall et al. (2005) used an 8-item Swedish version of the SPEQ and indicated that both impression motivation and impression construction were positively related to exercise frequency and duration for university students. In another study, Gammage, Hall, and Martin Ginis (2004) found that low-frequency exercisers (i.e., exercised once or twice per week) and high-frequency exercisers (i.e., exercised three or more times per week) did not differ significantly on their reported levels of impression motivation. However, the authors only used the impression
motivation subscale of the 8-item version of the SPEQ, and therefore conclusions regarding the
association between impression construction and physical activity are not possible. Since the
empirical and theoretical perspectives on self-presentation suggest that both impression
motivation and impression construction are associated with physical activity behaviour (Conroy
et al., 2000; Leary, 1996; Leary & Kowalski, 1990), researchers should include both dimensions
in research aimed at understanding the influence of self-presentation processes on physical
activity behaviour as this may provide stronger support for the proposed conceptual and
theoretical links.

Similar to research focusing on social physique anxiety, another limitation with studies
examining the relationship between self-presentation and physical activity is the repeated use of
college and/or university student samples (e.g., Conroy et al., 2000; Gammage, Hall, & Martin
Ginis, 2004; Lindwall, 2005). There is an obvious lack of literature focusing on the relationships
between self-presentation processes and physical activity behaviour among other samples who
may also wish to make desirable impression and take steps to create these impressions, such as
women who have been treated for breast cancer. As such, research should be undertaken to
examine how self-presentation processes relate to physical activity behaviour among these
unique populations.

**Social Cognitive Constructs and Physical Activity Research**

Social cognitive constructs, namely self-efficacy, outcome expectancy and outcome
value, have recently been identified as variables that are associated with self-presentation
processes and physical activity behaviour. Empirical studies have provided evidence that self-
presentation processes and these three social cognitive moderators may interact to determine
people’s tendency to engage in or avoid physical activity (Gammage, Hall, & Martin Ginis,
2004; Woodgate et al., 2003). For example, Conroy et al. (2000) found that impression motivation and impression construction were negatively linked to physical self-presentation confidence. Moreover, Gammage, Hall, and Martin Ginis (2004) demonstrated that while low-frequency and high-frequency exercisers did not differ significantly on their reported levels of impression motivation, high-frequency exercisers reported stronger perceptions in their ability to convey the desired impression and placed more importance on portraying the desired impression than females who exercise less frequently. The findings from Gammage, Hall, and Martin Ginis’ (2004) study suggest that although individuals may have similar levels of impression motivation, it may be their levels of self-presentation efficacy that will determine whether they engage or avoid physical activity. Woodgate et al. (2003) provided indirect support for this contention among older women. Specifically, the authors examined whether self-presentation efficacy moderated the relationship between social physique anxiety and physical activity behaviour. As hypothesized by the authors, self-presentation efficacy was a moderator such that women with high self-presentation efficacy and low social physique anxiety were more likely to exercise than women with low social physique anxiety and low self-presentation efficacy. Based on these findings, it is possible that self-presentation efficacy also moderates the relationship between self-presentation processes and physical activity behaviour. Future research is warranted to determine if the self-presentation-physical activity behaviour relationship varies as a function of self-presentation efficacy. This is particularly important among breast cancer survivors as they may be motivated to engage in physical activity to improve or maintain their physical appearance and to obtain or preserve a desired social identity, but if they lack confidence in their ability to successfully convey their desired impressions to others, they may avoid participating in physical activity. To the extent that the physical changes ensuing breast cancer surgery and treatment
may increase women’s motivation to be physical active, it may also jeopardize their confidence in their ability to present themselves as competent exercisers, decrease their perceptions that physical activity will help them make their desired impression, and diminish the value they place on making a desired impression. Thus, researchers should consider social cognitive constructs when examining the relationships between self-presentation processes and physical activity behaviour among breast cancer survivors.

**Research Rationale and Purposes**

Considering the potential impact breast cancer treatment may have on women’s physical appearance, studies examining women’s perceptions, feelings, and thoughts surrounding their experiences with their bodies are needed. To date, methodologies grounded in the positivist paradigm have dominated the literature in this area. Consequently, women’s unique perceptions and experiences with the wide range of physical changes resulting from breast cancer may not be well reflected in the literature. Thus, researchers would benefit from adopting a mixed methodology that combines the strength of constructivist qualitative research and quantitative research. This would allow for the exploration of body image from breast cancer survivors’ perspectives and would provide a better understanding of the impact of breast cancer on the different dimensions of body image in this population. In addition to understanding the impact of intrapersonal self-evaluations, it is important to determine whether breast cancer survivors are motivated to monitor and/or control the impressions other people form of them and whether this links to physical activity behaviour. Identifying whether these self-presentation processes relate to physical activity is important given the evidence that physical activity confers numerous physical and psychological benefits after breast cancer surgery and/or adjuvant therapy.
(McNeely et al., 2006; Pinto & Maruyama, 1999; Sabiston & Brunet, 2011) and the fact that 68% of breast cancer survivors report not meeting physical activity guidelines (Irwin et al., 2004).

Therefore, the main purpose of this research program is to better understand breast cancer survivors’ experiences surrounding their changed physique and the subsequent associations with physical activity behaviour. This purpose was addressed through a mixed-methodology approach and involved three interrelated studies conducted concurrently. Specifically, the first study was conducted to explore women’s perceptual, attitudinal/cognitive, affective, and behavioural experiences with their bodies following treatment for breast cancer. The second study was conducted to (1) evaluate the psychometric properties of the SPEQ, (2) examine the relationships between self-presentation processes and moderate-to-vigorous physical activity behaviour, and (3) determine if social cognitive variables (i.e., self-presentation efficacy, outcome expectations and outcome value) are moderators of these relationships. The third study was conducted to (1) describe naturally occurring changes in breast cancer survivors’ self-presentation processes and moderate-to-vigorous physical activity behaviour over a period of six-months, (2) evaluate cancer-specific factors differences in women’s levels and patterns of self-presentation processes and moderate-to-vigorous physical activity behaviour, and (3) examine the within- and between-person effects of impression motivation and impression construction on moderate-to-vigorous physical activity behaviour.
Self-Presentation Among Breast Cancer Survivors

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Chapter Three

Methods

Qualitative Study

Methodology

A constructivist qualitative research was chosen as the approach for this study since the underlying objective was to understand the impact of breast cancer within the context of women’s perspectives and experiences (Creswell, 2003). Specifically, the aim was to explore women’s perceptual, attitudinal/cognitive, affective, and behavioural experiences with their bodies following treatment for breast cancer. As opposed to positivist perspectives where objectivity is central to the judgment of truth and asserts that scientific knowledge is testable, a constructivist philosophy holds that the multiple perspectives that women have are informative and can be interpreted by the researcher to build a complex, holistic picture, and detailed report of participants views of a social phenomenon (Creswell, 2003). Researchers adopting a constructivist perspective view knowledge as socially constructed as a result of a people’s experiences with the phenomenon (e.g., breast cancer), and they value the multiple realities that people have in their minds. Accordingly, the researcher aims to interpret and understand people’s meaning of a phenomenon and the knowledge generated reflects the mutual interpretation of the interviewer and the interviewee (Smith, Flowers, & Larkin, 2009).

In the current investigation, interpretative phenomenological approach (IPA) (Smith et al., 2009) was used. IPA has three fundamental core features: phenomenology, hermeneutics and idiography. IPA is an idiographic mode of inquiry that is aimed at understanding individuals’ personal experiences and perceptions of a life event (Smith et al., 2009). It seeks to detail each participant’s experiences. Its interpretivist philosophical assumptions mean that
knowledge and meaning are generated through interpretation, and thus, there is no objective knowledge. In this way, IPA is informed by hermeneutics – the theory of interpretation. Thus, within IPA, people’s lived experiences are explored and how they make sense of and interpret this lived experience is considered. Researchers are engaged in a double hermeneutic as they try “to make sense of the participant trying to make sense of what is happening to them” (Smith et al., 2009; p. 3). IPA recognizes that knowledge regarding people’s experiences is limited to what they reveal about their experiences. It is helpful when topics under investigation are dynamic, contextual and subjective, and where issues relating to the self are important (Smith et al., 2009). To this end, IPA enabled the exploration of breast cancer survivors’ experiences with their bodies, and thus, provided a better understanding of how women construct meaning about their physique post treatment for breast cancer.

Participants

Following University and Medical Ethics approval, participants were recruited through the Ville Marie Women’s Health Center, the Segal Cancer Center (Jewish General Hospital), and the Cedars Breast Clinic (Royal Victoria Hospital). Physician referral, in addition to in-clinic recruitment information letters and posters, were used to initially inform the women, who were asked to contact the main researcher for further details, protocol of the study, and determine final eligibility. Additional participants were recruited through snowball sampling (i.e., current participants referred potential participants from their friends, family and/or acquaintances).

Since the goal of the qualitative inquiry is to gain a deeper understanding of a particular phenomenon experienced by a specific group of people, the sampling methods was not randomized. Rather, selection of participants proceeded via a purposeful sampling procedure advocated by qualitative inquiry (Creswell, 2003; Morse, 1991; Patton, 2002). Participants were
selected because they had received a diagnosis and treatments for breast cancer and were willing to share their experiences surrounding their bodies. To this end, adult women who had completed treatment for breast cancer (as a result of the prolonged time in which hormonal therapy is administered, post-treatment was defined as the successful completion of breast cancer treatments with the exception of continued hormonal therapy), were able to provide written informed consent and communicate in English, and willing to discuss their experiences with their bodies were invited to participate in this study. This purposeful sampling ensured that participants would have experienced that same life event (i.e., receiving a diagnosis and treatment for breast cancer) and that a detailed description of women’s lived experiences following breast cancer could be obtained.

Data Collection Process

Interviews are an effective way to gain insight into the experiences of women (Smith, Jarman, & Osborn, 1999). Each participant was interviewed face-to-face on one occasion. Prior to commencing each interview, the interviewer ensured that participants felt welcome and at ease since establishing honest and constructive relationships with participants is vital to a successful interview (Lincoln & Guba, 1985). This was accomplished by having an informal discussion with participants to put them at ease, such as talking about their hobbies. Next, the interviewer moved into a more formal introduction and informed participants that the interview would be audio-recorded. She re-explained the purpose of the study and ensured participants understood that they were free to withdraw at any time, refuse to answer any questions and/or request that any information be excluded from the research report. She also reassured participants that any information provided would be kept confidential and that their anonymity would be protected through the use of a coding system that would replace their name with a pseudonym.
Participants were then asked to read and sign a consent form (Appendix B) and complete a short demographic questionnaire. Once completed, audio-recording began and the interview took place.

During the interview, three types of questions were asked (Kvale, 1996; Patton, 2002). First, the main questions outlined in the interview guide were used to direct the discussion on the principal topics of the current study. Second, probe questions were used when responses lacked sufficient detail, depth, or clarity. They helped give the specific level of depth the researcher wanted and demonstrated that the interviewer was listening to participants’ responses (Patton, 2002). Third, follow-up questions were used to pursue the central themes discovered, elaborate the context of answers, and explore the implications of what has been said (Patton, 2002). The interviews were conducted by Jennifer Brunet from June 2010 through August 2010 and took place in a private room at the university or at the participants’ residence. The interviews lasted between 41 and 108 minutes ($M = 77.36$, $SD = 24.03$), which resulted in 228 pages of text following word-by-word transcription.

Throughout the data collection process, the interviewer attempted to establish and maintain a good relationship with participants and put them at ease by showing emotional understanding, such as sympathetic tone of voice and head nodding. In addition, given that personal characteristics of the interviewer have the potential to enhance the process of the interaction between interviewer and the interviewee, the interviewer tried to emanate some essential characteristics and behaviours outlined by Maykut and Morehouse (1994). These included: asking unambiguous questions, treating participants with positive regard, being authentic and open to learning from participants, willing to accept feedback, and fostering egalitarian and reciprocal relationships while being aware of the potential for power differentials.
Instruments

Data were collected through open-ended semi-structured individual interviews since they are useful when the aim is to collect in-depth information in a systematic manner from a number of participants (Smith et al., 1999). While this type of interview was partly structured, there was openness to changes in sequence and form of questions in order to follow-up the answers given by participants (Kvale, 1996; Patton, 2002). Based on Fontana and Frey’s (2005) recommendations, the interview guide included structured questions based on theories of body image (Cash & Pruzinsky, 2002; White, 2000). Of note, IPA researchers do not dismiss the use of a theoretical or conceptual framework, rather, they may be used to focus the inquiry where research is needed, inform the questions to be addressed, and aid in the interpretation of the data.

As mentioned above, the interview guide moved from broad exploratory opening questions that guided the discussion to questions that were more thematic, with supplemental probes as necessary to co-construct meaning (Reissman, 1993). Warren (2002) suggested that this approach provides rigor and allows for sound practice in conducting the interviews, while still promoting researcher flexibility. In other words, the interview guide served as a ‘checklist’ to ensure that all relevant topics were covered and common information was gathered from each participant.

Once the initial interview guide was developed, it was sent to a researcher who has extensive knowledge in body image (Diane Mack, Ph.D.) and another researcher who has extensive expertise in qualitative research (Shaunna Burke, Ph.D.), who were asked to provide comments to Jennifer Brunet regarding the content, ordering, and clarity. Minor revisions in the interview guide were subsequently made, which consisted of changing the wording of the questions to be open-ended rather than closed-ended and re-ordering the interview questions.
The final interview guide appears in Appendix C. This interview guide was pilot tested for content, length and clarity with one breast cancer survivor by Jennifer Brunet. Minor revisions in the interview guide made, which consisted in revising the questions to reflect spoken language (rather than theoretical terms) and adding additional probes.

In addition to interviews, the demographic questionnaire was completed at the beginning of the interview by participants and served to describe participants involved in this study. It collected data on the participants’ demographic and cancer-related characteristics, such as age, height, weight, self-identified ethnicity, marital status, menopausal status, treatment history, and stage of the disease. The demographic questionnaire appears in Appendix D.

**Data Analysis Strategies**

Transcribed interviews were managed with the assistance of NVivo 9, a computer software program for assisting the analysis of qualitative data. Data analysis began as soon as the first interview was completed (Smith et al., 2009; Smith et al., 1999). Guiding principles for data analysis were based on IPA methods as described by Smith and colleagues (2009). This procedure entailed several steps that were followed once each interview was completed. First, participants’ transcribed verbatim interviews were read in order to acquire a sense of the whole, and memos were created in free textual analysis to record initial ideas, insights, thoughts, and feelings about the concepts discussed during this interview. Second, line by line coding of the transcripts was conducted to create themes (or nodes) that represented a single idea or concept and reflected women’s words. Third, similar themes were merged into super-ordinate themes (or categories) based on existing theories of body image (Cash & Pruzinsky, 2002; White, 2000), and additional categories were developed when data did not fit into previously conceptualized categories. Fourth, these super-ordinate themes were labelled and included in a master table of
themes for the first participant’s transcript. This master table was used to guide the analysis of subsequent transcripts, which is recommended when there are several participants (Smith et al., 2009). Accordingly, steps one through three were repeated for each subsequent transcript and results were integrated into the master table created from the first transcript. This yielded a table of super-ordinate themes and subthemes. After all transcripts were analyzed, each interview was re-read to ensure that all relevant data was coded and categorized into the super-ordinate themes. Then, an external researcher (i.e., a graduate student trained in qualitative research) re-read two transcripts to ensure all themes were grounded in the data and coded consistently. In cases of disagreement, the first author and the external researcher returned to the original transcripts and discussed the coding until a consensus was reached. In keeping with the interpretative nature of IPA, results were a narrative account developed based on the researcher’s analytical interpretation and were supported with verbatim extracts from participants.

**Criteria for Evaluation**

Although validity and reliability are inappropriate measures of quality for qualitative research, researchers have underscored the importance of seeking scientific rigor and established comparable criteria of credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). These criteria were used throughout the research process to ensure scientific rigor and the quality of this study by using various strategies. Credibility was established through member checking (i.e., participants reviewed the thematic analysis and commented on the analysis) and peer reviewing (i.e., an external researcher ensured all themes were grounded in the data and coded consistently) to ensure that the results reflected women’s experiences (Lincoln & Guba, 1985). Transferability was established by providing a description of the themes in the results sections substantiated by raw data in the form of quotations to allow other researchers to
consider transferring the findings to a larger population. Dependability was established by creating and maintaining an audit trail that documented decisions and insights, allowing others to review the reasoning process (Lincoln & Guba, 1985). Last, confirmability was enhanced by recording the researcher’s personal experiences and expertise in the area of the physical self, as well as subjective impressions and observations, throughout the research process in a journal.

Cross-sectional and Longitudinal Studies

Study Design

Studies two and three will be discussed concurrently as there is significant overlap in regards to the selection of participants, procedures, and instruments. Study two used a cross-sectional research design to: (1) examine the relationships between self-presentation processes (i.e., impression motivation, impression construction) and physical activity behaviour among breast cancer survivors, and (2) determine whether social cognitive constructs moderate these associations. Study three used a prospective longitudinal design to: (1) describe naturally occurring changes in breast cancer survivors’ self-presentation processes and moderate-to-vigorous physical activity over a period of six-months, (2) evaluate the associations between cancer-specific factors and self-presentation processes and moderate-to-vigorous physical activity, and (3) examine the within- and between-person effects of impression motivation and impression construction on moderate-to-vigorous physical activity behaviour.

Participants

Participants for studies two and three were eligible to participate if they met the following inclusion criteria: (a) women of 18 years of age or older, (b) 0-20 weeks post primary treatment (i.e., surgery, chemotherapy, radiation therapy), (c) diagnosed with stage I-III breast cancer, (d)
ability to provide written informed consent, read and speak in English or French, and (e) report no health concerns that prevent them from engaging in physical activity.

**Procedures**

Data were collected as part of an on-going prospective longitudinal study examining the impact of physical activity on breast cancer survivors’ physical and mental health (see Appendix E for description). Following University and Medical Ethics approval, participants were recruited through the Ville Marie Women’s Health Center, the Segal Cancer Center (Jewish General Hospital), and the Cedars Breast Clinic (Royal Victoria Hospital). Physician referrals, in addition to in-clinic recruitment information letters and posters, were used to initially inform the women, who were asked to contact the main researcher for further details, protocol of the study, and determine final eligibility. Once recruited and consent was obtained, participants were asked to complete (1) a demographic questionnaires (see Appendix D), and (2) a self-administered survey (see Appendix F). The data collected at baseline (Time 1) served as the initial cross-sectional data set for study two. Three (Time 2) and six months (Time 3) later, participants were asked to repeat step two. This resulted in a study duration of six months with three data points. The baseline data combined with the subsequent data collection served as the longitudinal data set for study three.

**Instruments**

**Demographics.** Personal and diseased-related characteristics were assessed at baseline. Personal characteristics included age (in years), level of education (0 = no certificate, diploma or degree, 1 = high school certificate or equivalent, 2 = some post-secondary education, 3 = college or technical diploma or certificate, 4 = university undergraduate degree, 5 = university degree above the bachelor’s level), household income (in dollars), menopausal status (0 = peri-
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menopausal, 1 = menopausal, 2 = post-menopausal), and self-identified ethnicity using the categories provided by Census Canada. Ethnicity was dichotomized as women who reported being white versus being non-white because of the small proportion of several of the groups of non-white participants. Cancer-related characteristics included stage of breast cancer at diagnosis (I, II, III), treatments received [lumpectomy (0 = no, 1 = yes), single/double mastectomy (0 = no, 1 = yes), radiotherapy (0 = no, 1 = yes), chemotherapy (0 = no, 1 = yes), hormonal therapy (0 = no, 1 = yes)], and dates of treatment completion (in days and months). These variables were used to describe the sample and/or used in the analyses as covariates.

Self-presentation processes. The 20-item Self-Presentation in Exercise Questionnaire (SPEQ; Conroy, Motl, & Hall, 1998) was used at all three time points to assess self-presentation processes. The SPEQ includes two subscales: an impression motivation subscale (10-items, e.g., “I want to be thought of as a person who exercises”) which assesses an individual’s motivation to be perceived as an exerciser, and an impression construction subscale (10-items; e.g., “I emphasize my athletic ability around those who do not yet know that I am an exercise nut”) which assesses the use of strategies (i.e., exercise) to convey such impressions. Each item was scored on a 6-point Likert scale anchored at the extremes by strongly disagree and strongly agree. After reverse-coding item 6 (i.e., “appearing fit or healthy to others is not important to me”), mean impression motivation and impression construction scores were calculated by summing the respective items and dividing by the total number of responses for each subscale, where higher scores represent higher impression motivation and impression construction.

Although researchers have raised concerns regarding the validity, factor structure and composition of the SPEQ (Conroy & Motl, 2003; Conroy, Motl, & Hall, 2000; Gammage, Hall, Prapavessis, et al., 2004; Lindwall, 2005), this questionnaire remains the only measure currently...
available in the physical activity domain that is based on Leary and Kowalski’s (1990) two-component model of self-presentation and has allowed research on self-presentation and physical activity to progress. Nevertheless, it was deemed important to include all 20 items from the original SPEQ and test the psychometric properties of the questionnaire. Thus, the validity and reliability of the SPEQ was evaluated to determine if it could be used to address the objectives of the research program.

Social cognitive constructs. The Self-Presentation Efficacy Scale (SPES; Gammage, Hall, & Martin Ginis, 2004) was used at baseline to assess the perceived probability of successfully conveying one’s desired impressions to others. The SPES is a 15-item questionnaire that assesses the three facets of self-presentation efficacy for exercise outlined by Maddux et al. (1988). The self-presentation efficacy expectancy (SPEE) subscale contains five items and asks participants to indicate the degree to which they are confident in performing behaviours and presenting images that would lead to specific self-presentation outcomes using 100-point scale ranging from not at all confident to completely confident. An example item is “How confident are you that other people will think that you are in good shape.” The self-presentation outcome expectancy (SPOE) and self-presentation outcome value (SPOV) subscales also contain five items each and ask participants to rate the extent to which they believe that specific self-presentation outcomes will result from exercising and the value they place on achieve these outcomes, respectively. An example item for SPOE is “By exercising regularly, other people will think that my body looks fit and toned” and for SPOV is “I place a lot of value of being known as someone who is in good shape.” These items are rated on a 6-point Likert scale ranging from strongly disagree to strongly agree. Higher scores on all three subscales indicate higher SPEE, SPOE, and SPOV. The internal consistency coefficients for the SPEE, SPOE, and
SPOV scores exceeded .70 in previous research in the physical activity domain with young and older adult samples (Fleming & Martin Ginis, 2004; Gammage, Hall, & Martin Ginis, 2004; Lamarche & Gammage, 2010; Woodgate, Martin Ginis, & Sinden, 2003).

**Physical activity behaviour.** Physical activity was assessed at each data collection point using the first item from the 2-item 7-day recall Leisure Time Exercise Questionnaire (LTEQ; Godin & Shephard, 1985). The item, which was modified from the original scale, asked participants to report the frequency per week and average duration of strenuous, moderate, and mild physical activity sessions. The modification, to ask women to report on the average length of time for each session rather than limiting it at 15 minutes or more, was identical to previous studies assessing physical activity among breast cancer survivors (e.g., Andrykowski, Beacham, & Jacobsen, 2007; Courneya et al., 2009; Vallance, Plotnikoff, Karvinen, Mackey, & Courneya, 2010). This modification was made both to capture more information on physical activity in this population as well as to enable meaningful comparisons across studies. Scores were transformed into weekly metabolic equivalents (METS) by multiplying weekly minutes of strenuous and moderate by nine and five, respectively (Andrykowski et al., 2007). A moderate-to-vigorous physical activity score was calculated by summing strenuous and moderate METS.

The use of the LTEQ has been prominent in exercise psychology as a psychometrically sound research tool since it is simple, self-administered and allows for the assessment of physical activity at different intensities. Several studies have tested the reliability and validity of the LTEQ scores (Jacobs, Ainsworth, Hartman, & Leon, 1993; Kowalski, Crocker, & Kowalski, 1997; Scerpella, Tuladhar, & Kanaley, 2002). These researchers have reported acceptable reliability coefficients (i.e., two-week test-retest reliability $r = .74$), as well as evidence for the construct validity of the LTEQ scores by showing moderate positive correlations with subjective
and objective measures of physical activity (e.g., accelerometer $r \geq .32$) and fitness in various populations. In addition, the LTEQ has been used in a number of cross-sectional and longitudinal studies with breast cancer patients and survivors (Andrykowski et al., 2007; Courneya et al., 2009; Courneya et al., 2003; Culos-Reed, Carlson, Daroux, & Hately-Aldous, 2006; Vallance, Courneya, Plotnikoff, Dinu, & Mackey, 2008; Vallance, Courneya, Plotnikoff, & Mackey, 2008). This data provides sufficient evidence for the use of the LTEQ as a reliable and valid instrument of self-report physical activity behaviour cross-sectionally and over time.

Translation Procedures

All measures for the current study were translated into French. In translating the measures from English to French, the methodology outlined by Banville, Desrosiers, and Genet-Volet (2000) was used. First, a professional translator who was fluent in both English and French translated all measures into French. Although the translator had limited knowledge of the substantive area, she had extensive translating experience in health-related research and familiarity with survey data collection methods. Also, she was provided with resources to give her knowledge and background on the subject-matter and had regular conversations with Jennifer Brunet to discuss language specific issues, wording, and translation options. Second, three bilingual individuals without access to the original version, helped back-translate the measures into English. Third, the main researcher and these individuals compared the original version to the back translated version and brought modification to it to reconcile any differences among them. Fourth, the content validity was reviewed and grammatical edits were made. Finally, a pilot study was conducted with breast cancer survivors to verify the appropriateness of the translation and to estimate the reliability of the French scale. The author continued to collaborate on refining the measures on the basis of any difficulties expressed by the participants in the pilot
study. Cronbach alpha’s were used to assess the psychometric properties of the French version of the measures, and are presented alongside the English version in Table 1.

Pilot Study

After receiving approval from the Institutional Review Board at McGill University, a pilot study was conducted with a small sample of breast cancer survivors ($N = 36$). The purpose was to inform the proposed research program by testing the adequacy of the measures and procedures that were then to be used in studies two and three, as well as in the larger longitudinal study. The research procedures and data collection instruments used in this research were improved as a result of the pilot study. Specifically, the measure originally included as a proxy for self-presentation (i.e., the Brief Fear of Negative Evaluation scale; BFNE; Leary, 1983) did not appear to adequately answer the proposed research questions relating to the construct of self-presentation. Subsequently, a thorough literature review revealed that including a measure that directly assesses the two facets of self-presentation would result in an improvement in the overall study and provide the ability to answer the research questions. Thus, the SPEQ was added.

Second, the pilot study provided valuable information regarding the recruitment strategies. Although various methods were used to inform potential participants (i.e., flyers, posters, physician referrals), the majority of participants who took part in the pilot study (86%) were recruited through physician referral, suggesting the importance of including this as a recruitment strategy for the main study.

Data Analysis Strategies

**Data screening.** Initial data analyses were carried out by means of the Statistical Package for the Social Sciences (SPSS). Specifically, data were explored for missing values and outliers, and screened to tests for violations of the following assumptions: linearity, normality,
homoscedasticity, and multicollinearity (Tabachnick & Fidell, 2007). Specifically, bivariate scatterplots, distribution plots, skewness and kurtosis values, pairwise correlations, Variance Inflation Factors (VIF), tolerance and condition indices, and z-scores were examined (Tabachnick & Fidell, 2007). Multiple imputation (i.e., expectation-maximization algorithm; Dempster, Laird, & Rubin, 1977) was used to estimate and replace missing observations when missing data was minimal (≤ 5%) and appeared to be missing at random.

**Cross-sectional analyses.** First, confirmatory factor analysis for ordered-categorical data was conducted in LISREL (version 8.8) using robust maximum likelihood estimation methods to test the hypothesized two-factor model of the SPEQ. Following Hu and Bentler (1999) recommendations, model fit was assessed using the root mean square error of approximation (RMSEA), standardized root mean squared residual (SRMR), non-normed fit index (NNFI), and comparative fit index (CFI) since chi-square ($\chi^2$) values are sensitive to sample size and often inflate Type I error (Marsh, Balla, & McDonald, 1988). The RMSEA and SRMR are absolute fit measures and values below .06 and .08 demonstrate close fit to the model, respectively (Browne & Cudeck, 1993). The CFI and NNFI are incremental fit measures and values approximating .95 demonstrate good fit (Hu & Bentler, 1999). If fit indices were below recommended values, modification indices were examined to see where improvements could be made.

Then, descriptive statistics (e.g., means, standard deviations, Cronbach alpha coefficients) for measured variables were computed in SPSS (version 18.0). Main analyses involved hierarchical multivariate linear regression analysis to examine the associations between self-presentation processes (i.e., impression motivation, impression construction) and physical activity behaviour, and whether SPEE, SPOE, and SPOV moderate these relationships. Separate
models were conducted for each potential moderator to maintain parsimony of models. Each model controlled for age and body mass index (BMI = weight in kilograms/height in meters squared) since they were significantly related to self-presentation processes and/or physical activity behaviour. Of note, disease related characteristics were also initially entered as covariates. This did not change the pattern or statistical significance of any of the results. Therefore, these additional covariates were not included in any of the analyses reported. Prior to the analyses, impression motivation, impression construction and social cognitive moderator scores were centered in order to minimized the relationship between the main effect variables and the interaction variables (Aiken & West, 1991). Entry was specified a priori where age and BMI were included in the first step of the regression model as covariates. Impression motivation and impression construction were entered in the second step. SPEE was entered in the third step and the interaction terms between impression motivation and SPEE and between impression construction and SPEE were included in the final step to test moderation. These analyses were repeated to test the moderating effects of SPOE and SPOV. A moderating effect was supported when the interaction term was significant and the variance accounted for in the regression equation significantly increased when the moderator term was added to the equation. To analyze the significant interactions, significant interactions were graphed and a simple slopes analysis was conducted (Aiken & West, 1991).

**Longitudinal analyses.** Multilevel modeling analyses were used to: (1) describe naturally occurring changes in breast cancer survivors’ self-presentation processes and moderate-to-vigorous physical activity over a period of six-months, (2) evaluate the associations between cancer-specific factors and self-presentation processes and moderate-to-vigorous physical activity, and (3) examine the within- and between-person effects of impression motivation and
impression construction on moderate-to-vigorous physical activity behaviour. These analyses were performed in SPSS using Restricted Maximum Likelihood (REML) estimation. This is an appropriate and optimal method for analyzing longitudinal data because it considers the non-independence of repeated measures and accounts for the hierarchical nature of the longitudinal data (i.e., repeated observations were nested within participants). First, three unconditional models were tested to provide information on the proportion of variance explained by within- and between-subject effects in impression motivation, impression construction and physical activity behaviour. These values were used to estimate the intra-class correlations using the following formula: \( \tau / (\sigma^2 + \tau) \), where \( \tau \) and \( \sigma^2 \) represents the between- and within-person variance, respectively. Second, linear and quadratic time effects were added to these models as fixed and random effects to assess changes in impression motivation, impression construction and physical activity behaviour scores (Objective 1). A diagonal covariance type was used for the fixed effects (i.e., assumes independence of the correlated residuals between time points) and an unstructured covariance type was used for the random effects (i.e., assumes non-zero covariances among random effects). The time variable was centered at Time 1 (Time 1 = 0, Time 2 = 1, Time 3 = 2). Third, cancer-specific characteristics were added to the models as between-person factors to assess whether they were associated with these outcome variables (Objective 2). Separate models were tested for each characteristic to conserve statistical power. Finally, two models were tested to examine the associations between impression motivation and impression construction and moderate-to-vigorous physical activity (Objective 3). For both models, the between- and within-person fixed effects were included to allow for the disaggregation of the between- and within-person effects of self-presentation processes (Raudenbush & Bryk, 2002). To enable the examination of the within- and between-person
effects, person-mean (also called group-mean) and grand-mean centered variables were calculated, respectively. For person-mean centered variables, each person’s mean scores across the three time points were subtracted from that same person’s time-specific scores. For grand-mean centered variables, the average score of all individuals in the sample (pooled across the three times) was subtracted from the average score of each individual (pooled across the three times; Curran & Bauer, 2011). Separate models were tested for impression motivation and impression construction since these variables were highly correlated and the variance inflation factor provided evidence of multicollinearity in preliminary regression analyses.

Contributions of Members in Research Projects

**Doctoral candidate (Jennifer Brunet).** I played a major role in the research projects that formed my dissertation research. Specifically, I designed and conducted multiple studies that coalesced the strengths of qualitative and quantitative approaches to research. For study one, I designed the study, reviewed the literature, applied for Institutional Review Board approval at McGill University, conducted the interviews to collect the data, performed the data analyses, drafted and revised manuscript, and was primary author of the manuscript. For studies two and three, I conceptualized these two studies and selected the instruments used to collect data based on my review of the literature. I applied for Institutional Review Board approval at McGill University. I was involved in the larger longitudinal study since it began and assisted in the setting up and development of the full protocol employed for data collection. I helped recruit and corresponded with participants. I helped set up the databases, managed the database by cleaning the data, and created coding procedures. Although I did not enter collected data into the database, I provided assistance to the research assistants who
were hired to complete this task. I analyzed the data for both studies, drafted and revised the manuscripts, and was primary author of the manuscripts.

**Principal investigator (Dr. Catherine Sabiston) and co-investigators (Drs. Carsten Wrosch and Jennifer O’Loughlin).** These individuals conceptualized the larger project, secured funding from the Canadian Institutes of Health Research and arranged for the running of the project. The principal investigator also provided mentorship on the methodologies used in studies two and three, discussed the results and implications and edited the manuscript. She is a co-author on all three manuscripts that form this dissertation.

**Research coordinator (Sylvie Moisan).** She recruited participants, communicated with physicians, and managed day-to-day data collection. She also managed the financial aspects of the study at both the day-to-day level and the yearly budgetary level (i.e. yearly progress reports to granting agency and continuation grants). She assisted in hiring of various personnel (data entry personnel) for the larger longitudinal research project.

**Research assistants.** Several undergraduate and graduate students worked on the larger longitudinal research project by preparing the data collection kits and entering collected data in the database.

**Co-authors (Drs. Shaunna Burke and Patrick Gaudreau).** Dr. Burke is a co-author for the first study of this dissertation. She assisted with the development of the interview guide, discussed the results of this study and edited the manuscript. Dr. Gaudreau is a co-author for the third study of this dissertation. He assisted with the study analyses, discussed the results and implications and edited the manuscript.
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Chapter Four

Surviving Breast Cancer: Women’s Experiences with Their Changed Bodies

Jennifer Brunet¹, Catherine M. Sabiston¹, & Shaunna Burke²

¹McGill University, Montreal
²University of Leeds, Leeds

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Abstract

In this phenomenological study, we explored women’s perceptual, cognitive, affective, and behavioural experiences with their changed physiques following treatment for breast cancer. Eleven women who had been treated for the disease ($M_{\text{time since treatment}} = 4.45$ years) were interviewed and data was analyzed using interpretative phenomenological analysis. We found that physical appearance was important to these women and was described predominantly as body shape, size and weight. The women had negative perceptions of their changed physiques and this evoked primarily negative emotions. Weight gain following treatment was the main cause of distress for the women. They discussed using diet and physical activity to manage their weight and appearance management strategies (e.g., wigs, make-up, clothes) to conceal the unwanted side effects of cancer. Health care providers should be cognizant of the consequences that the physical changes following breast cancer might have on women.

Keywords: Breast cancer; survivorship; interpretative phenomenological analysis (IPA); body image; psychosocial issues
Introduction

An ideal physique that is ultra-thin, smooth-skinned, toned and youthful for women is often promoted in contemporary Western societies, yet is difficult or impossible to achieve (Cash & Pruzinsky, 2002). Consequently, women might feel dissatisfied with their overall appearance when their evaluation of their current physiques is discordant with the idealized beauty (Cash & Pruzinsky, 2002). It is estimated that more than 50% of women in Western societies have negative perceptions of their bodies (Cash, Melnyk, & Hrabosky, 2004). This is of concern because body and appearance-related self-criticisms can interfere with women’s well-being by stimulating the development of unhealthy behavioural patterns (e.g., social avoidance, maladaptive dieting, physical inactivity) and spirals of negative emotions (e.g., depression, social anxiety, poor self-esteem; Cash & Pruzinsky, 2002).

Certain life events can result in weight increases and/or changes in physical features and functioning which might impact women’s self-perceptions and heighten body image dissatisfaction, particularly among those women who ascribe a great deal of importance to their physical appearance (Cash et al., 2004). Breast cancer represents one life event that might profoundly impact women’s physical self-perceptions (DeFrank, Mehta, Stein, & Baker, 2007; Fobair et al., 2006; White, 2000) because of the adverse appearance-related treatment side effects including loss of breast(s), tissue damage, deformities in the breast(s), decreased range of motion, lymphedema (i.e., localized fluid retention and tissue swelling), alopecia, weight gain, and muscle loss/weakness (Collins et al., 2011; Frith, Harcourt, & Fussell, 2007; Irwin et al., 2005; Shapiro & Recht, 2001; Ward, Kuta, Sanborn, & Burt, 2003). As such, breast cancer can impact women’s valuation of their bodies and be disruptive to their body image (see Helms, O’Hea, & Corso, 2008 for review), and thus, impair their well-being (DeFrank et al., 2007;
For these reasons, body image has been recognized as a key aspect of breast cancer survivors’ quality of life following treatment for the disease (Bloom, Stewart, Chang, & Banks, 2004; Collins et al., 2011; DeFrank, Mehta, Stein, & Baker, 2007; McDonough, Sabiston, & Crocker, 2008).

Women’s experiences with their changed physiques after receiving a diagnosis and treatment for breast cancer have been explored using various research methodologies. There is evidence that surgery type (i.e., breast conserving surgery, mastectomy alone, mastectomy with reconstruction), age, and time elapsed since treatment impact women’s attitudes and perceptions toward their bodies (Collins et al., 2011; Helms et al., 2008; Janz et al., 2005; Kraus, 1999). Furthermore, a number of investigators have reported that hair loss, increased weight gain, fatigue, and declining physical fitness are perceived as negative physical changes to women’s bodies post-treatment (Hefferon, Grealy, & Mutrie, 2010; Lemieux, Maunsell, & Provencher, 2008). In addition to having a negative effect on body image, the physical changes to the female body that occur as a result of the treatments are often perceived as a threat to women’s sense of womanliness (McGaughey, 2006).

Despite advancements made by oncology researchers in this area, a limitation of this literature is that many researchers have adopted a narrow definition of body image and have focused on the assessment of body image evaluation [i.e., body (dis)satisfaction]. However, theoretical and conceptual researchers take a more complex approach to defining body image, which is an “internal representation of your own outer appearance” (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999; p. 4), and propose that it consists of perceptual (i.e., accuracy of body size estimation relative to actual size), attitudinal (i.e., subjective satisfaction/dissatisfaction of body), affective (i.e., feelings association with the body), cognitive (i.e., investment in
appearance beliefs about the body), and behavioural (i.e., compensatory behaviours such as avoidance of situations where one’s body is exposed, dieting, physical activity) dimensions (Cash & Pruzinsky, 2002; Muth & Cash, 1997). Theoretical frameworks have been developed to reflect the multidimensional nature of body image (Cash & Pruzinsky, 2002; White, 2000). For instance, in the psycho-oncology context, White (2000) developed a heuristic cognitive behavioural model of body image based on the general principles of cognitive behavioural and self-discrepancy theories. In his model, he contends that important events such as cancer can activate people’s appearance-related schemas (i.e., cognitive structures in people’s minds), and this will influence their investment in their appearance and self-evaluations. In turn, people may experience negative appearance-related assumptions, thoughts, images, and emotions, and engage in compensatory behaviours to improve their appearance. This model reflects the multidimensional nature of body image and has many commonalities with Cash and Pruzinsky’s (2002) cognitive behavioural model of body image. Accordingly, both could serve as frameworks to comprehensively explore the nature and consequences of the physical changes women experience as a result of breast cancer to inform more complex psychosocial care and intervention strategies aimed at relieving body-related concerns and promoting well-being.

In addition, there are few qualitative studies focused on exploring women’s unique perceptions of their physique-related experiences following treatment for breast cancer. Qualitative methodologies offer researchers the opportunity to gain in-depth insight into how women see their altered physique and feel toward it, and how this may drive their actions and behaviours (Lincoln & Guba, 1985). Therefore, we conducted a qualitative study, using Interpretative Phenomenological Analysis (IPA; Smith, Jarman, & Osborn, 1999), to explore
women’s perceptual, attitudinal/cognitive, affective, and behavioural experiences with their altered physique following treatment for breast cancer.

Methods

Participants

Based on IPA principles, women were invited to participate in the study if they had received a diagnosis, and completed treatment, for breast cancer. Eleven women with a first diagnosis of breast cancer, aged from 47 to 70 years ($M = 56.36; SD = 7.74$) and all self-identifying as White, volunteered to participate in this study. Forty-five percent of these women were overweight or obese ($BMI \geq 25 \text{ kg/m}^2$), just over 90% were married or living in common-law partnerships, and 50% were post-menopausal. Women had been treated for Stage I to III breast cancer between one year and 31 years prior to the study ($M = 6.46, SD = 8.38$), most (64%) of which had completed treatment less than five years prior to the study. These women had undergone several treatments for breast cancer, including surgery [lumpectomy (66.7%), mastectomy (33.3%)], chemotherapy (75%), radiation therapy (75%), hormonal treatment (83.3%), and reconstruction surgeries (27%). Table 1 provides a detailed summary of these women’s characteristics.

Procedures

Following University Ethics board approval, we recruited women, using snowball sampling techniques, through advertisements and oncologist referrals from various local medical clinics and hospitals. Adult women who had completed treatment for a first diagnosis of breast cancer, were able to provide written informed consent and communicate in English, and were willing to discuss their experience with their changed physique were invited to participate in this
study. Interested participants were asked to contact the first author. Eleven women provided written consent and volunteered to participate in this study.

Data Collection

Data were collected through face-to-face interviews. Prior to the study, the first author conducted a pilot interview with a woman who had been treated for breast cancer to test the content, length, and clarity of the interview schedule, and to provide her with interviewing experience (Lincoln & Guba, 1985). The data from this pilot interview were not analyzed. Interviews with the 11 women for this study were conducted by the first author from June 2010 through August 2010, took place in a private room at the author’s university or at the women’s residences, and were digitally recorded. The interviews lasted between 41 and 108 minutes (\(M = 77.36, SD = 24.03\)).

Based on principles of IPA, a semi-structured interview guide was developed that included questions based on major dimensions identified in body image theories (Cash & Pruzinsky, 2002; White, 2000). Questions were aimed at gaining an in-depth understanding of women’s perceptions, attitudes, affective states, and behaviours regarding the physical changes they experienced after being treated for breast cancer. Broad exploratory questions were initially used, followed by questions that were more thematic, with supplemental probes for when responses lacked sufficient detail, depth, or clarity. Some of the main questions included: “Can you describe the physical changes you experienced following your cancer diagnosis and treatments?” “Can you describe how you feel about your body and appearance”, “Can you describe your level of satisfaction/ dissatisfaction with your body and appearance?” “Tell me about some of the strategies you now use to change your body and appearance.” Questions were open-ended and neutral to avoid influencing participants’ responses (Smith et al., 1999).
In addition to the interview questions, the women completed a brief descriptive questionnaire before the interview began that included information on their age, height, weight, marital status, menopausal status, self-identified ethnicity, brief treatment history, and stage of the disease.

**Data Analysis**

Each interview was transcribed verbatim and reviewed for accuracy by the first author. The verbatim transcripts were used as the raw data for the study and the data were managed with the assistance of the computer program NVivo. The first author analyzed the transcripts one at a time using IPA step-by-step procedures described by Smith et al. (2009). Initially, the first woman’s transcript was read as a whole and memos were created in free textual analysis to record initial ideas, insights, thoughts, and feelings relevant to the purpose of the study. Second, line by line coding of the transcripts was conducted to create subthemes (or nodes) that represented a single idea or concept and reflected women’s words. Third, subthemes with similar meanings were merged into main themes (or categories). Fourth, main themes were labelled based on existing theoretical frameworks of body image (Cash & Pruzinsky, 2002; White, 2000) or new labels were created when the data did not fit into previously conceptualized categories. Then, a master table of themes for the first woman’s transcript was created and used to guide the analysis of the subsequent transcripts, which is recommended when there are several participants (Smith et al., 2009). Steps one through three were repeated for each subsequent transcript and the results were integrated into the master table that was created from the first transcript, yielding a table of main themes. Once all emergent main themes had been identified, a super-ordinate theme that reflected the emergent themes was created. After all transcripts were analyzed, the first author re-read each interview to ensure that all relevant data was coded and categorized into...
the main themes. Then, an external researcher trained in qualitative research re-read two transcripts to ensure all themes were grounded in the data and coded consistently. In cases of disagreement (< 5%), the first author and the external researcher returned to the original transcripts and discussed the coding until a consensus was reached.

Criteria of credibility, transferability, dependability, and confirmability as a primary framework was used to establish the trustworthiness of this study (Lincoln & Guba, 1985). We established credibility through peer reviewing (i.e., an external researcher ensured all themes were grounded in the data and coded consistently) to ensure that the results reflected women’s experiences (Lincoln & Guba, 1985). We established transferability by providing a description of the themes in the results sections substantiated by raw data in the form of quotations to allow other researchers to consider transferring the findings to a larger population. We established dependability by creating and maintaining an audit trail that documented all research choices, decisions, and insights, allowing others to review the reasoning process (Lincoln & Guba, 1985). Last, we enhanced confirmability since we recorded our personal experiences and expertise in the area of the body image, as well as our subjective impressions and observations, throughout the research process in a journal.

**Results**

Our analysis of the data showed one super-ordinate theme that described women’s experiences with their bodies: ‘A changed physique.’ We further deconstructed this super-ordinate theme into four interconnected main themes: (i) Physical changes: What happened?; (ii) Emotional feelings and attitudes toward an altered physique; (iii) Appearance is an important symbol of health and well-being; and (iv) Appearance management strategies and confidence to change. The underlying thematic structure of the data is displayed in Table 2, and described
using quotations from the interviews in the following sections. In the quotations, […] indicates omitted text. Of note, all names and other identifying information were removed to maintain confidentiality and anonymity. To avoid depersonalization, the women were allowed to either select their own pseudonym (n = 8, Kitty, Fannie, Julia, Sabrina, Vienna, Bianca, Kim, Ginger) or have one used on their behalf (n = 3, Mary, Rose, Madeleine).

A changed physique

The super-ordinate theme of ‘a changed physique’ emerged from the women’s experiences with their bodies following breast cancer. All the women experienced changes to their bodies as a result of their breast cancer diagnosis and its treatments. Their encounter with the disease caused them to reflect on their bodies and make sense of their altered physique. The women’s accounts of their experiences with their bodies clustered around four themes: physical changes, emotions and attitudes toward oneself, importance and meaning of appearance, and appearance management strategies.

Physical changes: What happened?

Various visible physical changes, such as hair loss, altered hair texture, loss of skin elasticity, being ‘lop-sided’ and ‘disfigured’ were cited as the physical changes women experienced as a result of having had cancer. In the words of Julia: “Your hair falls out, your pubic hairs fall in the shower, and you go ‘where did that come from?’ You go to put on your mascara one day and go ‘Oh I don’t have any eyelashes.’” Kim also talked about how her experience with breast cancer led to a changed body. For her, physical changes involved living with decreased breast size: “One breast was always just a little smaller than the other, but it’s become more noticeable.” The women also frequently discussed changes in their muscle mass and weight as a result of their experiences with cancer. For most women, they were now at the
heaviest weight of their lives, and thus described feeling as if they were living in a body that was unfamiliar to them. It was hard for them to accept this change and they longed for their pre-breast cancer weight. The women talked repeatedly about the changes in their body shape and size: “During some of these surgeries and stuff, I’ve lost some muscle definition so that kind of bothers me” (Kitty), “I’ve gained a lot of weight” (Sabrina), and “I was thinner so, you know, sometimes I just can’t fit in my clothes anymore and it bothers me” (Vienna). Many of these changes were hard to deal with, as described by Fannie: “I’m still battling that self-image, that whole look at you gained all this weight” (Fannie).

In addition to the visible changes experienced by women, other physical alterations that were not necessarily obvious to others, such as cessation of menstruation, hot flashes, numbness in fingers and toes, tenderness in the breast, difficulty sleeping, and being constantly tired, were also described:

Like on top of all this now I have to have the hot flashes and some of the side effect things, and again, one more thing, it’s not like it’s a big thing, it’s just after you’ve been through something that has been so life changing the little things can build up and really upset you (Kitty).

Mary described her experiences with ‘invisible’ side effects such as fatigue and a lack of energy:

I find that ever since the cancer, I don’t know if it’s the medication or what but I get tired very easily even just going up a flight of stairs, not at home but when I uh, when I go to work I try to walk up the stairs or the escalator and by the time I’m there I’m out of breath, I’m tired…. Also, I get tired very easily when I’m doing house work whatever,
before I could do so much more, I had more energy, I don’t have as much energy as I used to.

Overall, the women experienced important physical changes as a result of cancer. Changes in body shape, size and weight changes were aspects of central importance for these women. The alterations changed their inner and outer physique resulting in perceptions that their bodies no longer looked and functioned in the same way.

**Emotional feelings and attitudes toward an altered physique**

The physical changes the women experienced as a result of breast cancer had an impact on their thoughts and emotions, which were predominantly negatively valenced. They reported both dissatisfaction and satisfaction toward their physique, though feelings of satisfaction were less common.

Experiences of body dissatisfaction as a result of cancer were evident when the women discussed their overall bodies and specific body parts. For Fannie, dissatisfaction with her body was experienced as a result of the loss of a breast and weight gain in the abdomen:

I’m missing mass on one side, so I don’t like that, and I don’t like the kind of extra bit that’s around my middle and it’s like pooffed out and when I wear tight jeans I get this muffin top and I never had a muffin top before. And geez, it’s developed into more of a cake top, it’s not even like, ugh, a muffin, its way huge… So I don’t like the kind of extra bit that’s around my middle.

Vienna also experienced a sense of dissatisfaction toward her body. In her case, she expressed displeasure about her body overall:

I don’t want to be mean to myself, but now I’m a 2 on the scale of satisfied, that’s like, 10 being the best and 1 being the worst... I’m not satisfied at all. I’m not body toned, I’m
flabby… I don’t like anything about my body now. Well, my breasts are a little more perky, but that’s about it… I’m not toned so I don’t like my arms, my thighs, you know, my stomach, its flabby.


It didn’t affect me in the beginning, but ugh, I guess maybe after I lost my hair, I just felt ugly… When I used to take off my wig and remove the makeup and I would look at myself and my God, this is not me…Also, as I started gaining weight that’s when I felt ugly…I don’t know, like I said, it probably sounds superficial, but I just don’t feel good in myself…Now, I just don’t feel good in myself. Like before I started, before I was diagnosed, I felt good in myself.

For her, the effects of a breast cancer diagnosis and treatment led to feelings of discomfort toward her body. These unpleasant feelings were a direct result of her experience with breast cancer and lingered beyond the treatment phase. In a similar way, Ginger experienced negative feelings toward her body. In her case, feelings of anger and distress were shared: “I felt like…crappy, shitty, worried. It bothers me. It really makes me angry, and it still pisses me off, and it makes me upset… I’m not happy with my body.” Fannie also continued to feel a sense of anger and disappointment toward her body:

You know post-surgery and post-radiation, the initial feeling was disappointment with my body… I think the disappointment has been replaced by sort of anger. I mean it’s not a violent anger, it’s there just under the surface and it will probably remain there, um, for
the next few years… Now, I’m not happy with the way I feel, so if I look in the mirror
and I see this roll over the top of my jeans, I’m thinking ‘Oh, that doesn’t look nice…it’s
very disturbing… I’m not comfortable in my, in this body right now because I don’t feel
like I own it.

Sabrina also experienced negative feelings toward her body as a result of cancer. For her,
these negative feelings had an impact on her social interactions and made her feel depressed:

When I would look at myself, I felt very negative. You don’t feel like going out, you just
feel depressed… You are not inspired because this is the person you see everyday, it is
your body, you see it several times in the mirror a day and it wasn’t myself and I was
very hard on myself when that happened. I judge myself pretty hard.

Kim explained how the changes in her body made her feel insecure and self-conscious:

“I’m a bit insecure in a way… I’m very conscious of my body.” Madeleine further noted that the
physical changes made her feel less physically and sexually attractive:

It’s not that I dislike my body, but for sexual attraction, physical attraction, I find I can’t
get excited about myself. Whereas when I was a full breast and slimmer and not so baggy
skin, then you know… I feel inadequate… I’m not accepting very well my changes so
from that point of view, there are certain things that niggle me.

For Kim, her diagnosis and its treatments had a negative influence on how she felt about
her body in relation to her sexuality and appearance. It also made her feel poor about herself.

Thoughts and emotional experiences were often closely tied to weight. Many of the
women expressed disappointment and anger in response to not being able to control what
happened to their bodies and weight. Fannie exemplified this:
It [my body] was high-jacked by this little white pill I had to take everyday. Your body becomes high-jacked… I think the biggest thing is that all of a sudden my body wasn’t mine… Also, I was really disappointed in myself that I had, um, achieved a lot in my life, but I couldn’t control my weight.

Although the women expressed dissatisfaction and negative emotions in relation to their physiques, they discussed feeling satisfied with the way their body functioned and how strong it was. As Madeleine mentioned: “I guess what I like about my body is that it’s strong… It’s like everything is more or less growing and doing what it’s supposed to do so I guess I like that about my body.” In this way, a strong and developing physique helped Madeleine experience a sense of satisfaction toward her body. Sabrina reflected on how she believed her body helped her ‘survive’ the cancer: “My body actually was very brave, and this is what I think about it, it supported me.” For her, breast cancer allowed her to experience a sense of approval toward her body. She viewed her body as courageous and was able to rely on it throughout the illness.

In addition, surviving breast cancer gave rise to feelings of self-acceptance and self-realization. Rose shared: “I’m accepting… After a while, you know, you’re just happy with what you are.” Julia also had optimistic views about being alive and offered that the changes she experienced did not define her: “It’s not the end of the world, it’s just a breast, it doesn’t make you a woman, that’s only my theory… The important thing was and is, being alive.”

Positive thoughts were also discussed when successful weight loss attempts were recalled and when the women described how they looked before being diagnosed with breast cancer. In this way, there was almost a sense of nostalgia and loss. Bianca described how losing weight made her feel and how it acted as a barometer of happiness: “When I lost weight I felt great. I really, really felt great. I felt more sassy more you know.”
In general, the women shared how their experience with breast cancer led to a sense of dissatisfaction toward their bodies and negative emotions. Some women also expressed satisfaction and pleasant feelings about their altered physiques, but this was mainly regarding the strength of their bodies, how it functioned, and because they still had their life.

**Appearance is an important symbol of health and well-being**

The women valued their appearance and offered various reasons for the importance they placed on their appearance, most of which were personal (e.g., self-improvement). Health concerns were a central driving force behind their preoccupations with their physical appearances since being diagnosed and treated for breast cancer, with weight being described as central to both their health and appearance. Throughout the interviews, a vicious cycle was described such that the women gained weight, became increasingly aware of the negative consequences of being overweight, which led to them placing more importance on losing weight, which heightened negative emotions. Vienna stated that she was conscious of her weight because she believed that carrying around extra weight would put her at higher risk of life-threatening illnesses (e.g., diabetes, heart disease): “It’s because it brings up concerns. For example, some individuals pay attention to their weight because they are afraid of health concerns and that goes through my mind too.” Also, most of the women felt that it was important to manage their weight to maintain their physical health: “What I really want is to stay healthy. I just want to stay healthy, because I know being overweight is not healthy. So it’s just for health reasons” (Bianca), “I read a lot about breast cancer and they say overweight is not good and all that, so I try taking care of myself” (Rose), and “I would like to weigh less. I think that’s important, um, because you know your heart. You’ve got to think about what’s happening inside. What we don’t see and we only feel” (Madeleine).
Fannie attributed the early detection of her breast cancer diagnosis to her weight loss. Her radiologist had told her that the detection of her tumour would have been more difficult if she still had extra weight and more adipose tissue. This now gives her reason to try to maintain a healthy body weight:

She [the radiologist] was able to discover it as quickly as she did on the physical because I had lost all that weight, so my breast tissue had no fat left in it…. The lump was actually much more on the surface as opposed to being covered by layers of fat…

Because to me, that whole weight loss, and having saved my own life, that was huge. Huge factor and now all of a sudden, I’m going to regress to where I was? No, no way. This isn’t going to happen to me.

Physical appearance preoccupations were not limited to concerns about health. Physical appearance also had a bearing on the women’s emotional state and affected their overall self-worth. Looking good was frequently associated with feeling good. The positive feelings derived from embodying and displaying the desired physique acted as incentives for women to monitor their appearance: “Maybe I sound superficial, but I don’t know, it makes me feel good, looking good. You know, I’ve always been that way really, but I guess more now” (Vienna). Bianca also explained: “So it’s for me I want to feel good about me… You do it for yourself. It makes you feel better, you feel lighter.” For Kim, the external representation of her body provided her a way to transmit her feelings and wellbeing to others: “I think it’s a sign of being well too, if you are looking good and feeling good, you automatically look good… I think it’s a reflection of what’s inside if you look good and are feeling good.” And for Fannie, her body was a representation of her sense of self: “It reflects, well, if you’re nicely presented at all times, I think it kind of reflects on your sort of general state of mind…So I need to be well presented. It just makes me
feel better about who I am.” Similarly, Mary stated: “It’s important to look a certain way when I leave the house… If I’m running somewhere, I’ll always have mascara and lipstick on if I’m going out. I may not have a full face of make-up, but I always look presentable and clean.” The inextricable connection between the body and social experiences also served as a motive for women’s investment in their appearances. The body was perceived as a vehicle of social expression and control, rather than as a structure that displays health, as clearly articulated by Sabrina:

I never think of health, more appearance, in my head I know that I’m doing it [watching my weight] to be healthy but my reasons are appearance because I see that other people’s reaction are very different when you are well dressed, have make-up on, your hair done, and because you feel good they treat you different, absolutely different. You know, take the same person with grey hair and put some color on that and you take ten years off that person and people will start looking differently, and treat you differently, absolutely true what I say.

A desire to appear ‘normal’ was commonly discussed as a reason to manage their appearances. Importance was ascribed to appearance to negate public attention and potential stereotypical remarks. In other words, managing their appearances in an attempt to blend in with others (rather than stand out as a breast cancer survivor) helped the women recover their public image. For example, Fannie believed her appearance had implications for social judgements because she had cancer:

Well, to me it’s extremely important to just look normal. Just to look like anyone else on the street, it’s just to, to fit in with everybody else. Not look any different, and um, you can feel different inside but just to look like everybody else, because you are just like
everybody else, you had this even, or incident in your life and you, ugh, gained back a certain amount of control over yourself and your body, um, so it’s just to look like everybody else. You just carry this emotional scar and that’s why it’s important to look like everybody else.

Appearance was an important component of the women’s life after breast cancer. The women invested in their appearance because of health and self-presentation concerns, as well as to experience positive emotional sensations related to looking good.

**Appearance management strategies and confidence to change**

The women described expending time, energy, and resources to try to ‘camouflage’ some of the changes they experienced with their bodies (e.g., hair loss, scars) and improve aspects of their appearance (e.g., weight). Wearing make-up, prosthetics, wigs, and scarves were examples of specific strategies that helped the women conceal the physical changes that resulted from their cancer treatments. As Rose mentioned:

As soon as they told me, I went out and got a wig. I had it styled. My hairdresser did such a good job that nobody could tell it was a wig. He did it the same style as I had, really, and so I was quite comfortable wearing it… I used to wear scarves too, but when I went out, I would put on my wig.

For Rose, wearing a wig that was styled in a manner that closely resembled her real hair was important and helped her cope with the loss of her hair. Rose also avoided wearing low cut shirts to hide the scar on her breast:

I’m very conscious about wearing low cut things because I still have, you see the scar and you know the breast is never the same. So you bend over and things like that. I won’t buy
anything low cut, but um…other than that you know, I just try to buy what looks best on me… I never wore low cut clothing, but now I’m much more conscious of it.

It was also important for the women to select clothing that fit their body shape and size to cover up excess weight: “I just try to dress according to my weight. I try not to accentuate whatever I don’t like about myself” (Vienna) and “I don’t like to wear sleeveless, I always want to not show this part… and a long dress hides a lot of things” (Madeleine).

At times, social engagements were cancelled and social interactions with others were deliberately avoided when women experienced negative thoughts about their appearances. Vienna explained:

When I am not feeling good about my body, I just close myself at home and watch TV and I try to stay away from people when I feel down… I’m quite like sociable and friendly person, you know, but when I feel down I try to stay away from everybody.

In addition to camouflaging the physical changes the women experienced, they also sought to improve their physical appearance. In particular, they expressed a desire to reduce their bodies’ weight and shape. As Ginger stated: “I’d like to lose maybe 20 pounds.” Madeleine and Kitty also spoke about this aspiration to lose weight: “Well, I think that I would like to be a little less weighty… I would like to weigh less” (Madeleine) and “I find, like I said there was weight gain issue after my treatments… I would like to not have my flabby arms and my flabby belly anymore, like if I could tone those up, that would like be the ultimate for me” (Kitty). Thus, the weight gain acted as a catalyst for change by adopting a healthy lifestyle. Specifically, engaging in physical activity and modifying one’s eating behaviour (e.g., dieting, restricting food intake, eating well, and habitual food monitoring) were done mostly to lose weight and improve body composition. Kitty explained how she tried to manage her weight: “I try maintaining a healthy
lifestyle to manage my weight.” The following quote by Sabrina illustrated this as well: “Listen there is no other way on earth so far that you can take away your weight problem, there is no other way, just food and be active. I know this from experience.”

Although strategies to change appearance were described in detail, especially physical activity and adherence to proper nutrition, mixed beliefs regarding the women’s confidence to attain their ideal physique were apparent. As exemplified by Bianca, self-doubts and uncertainties were raised in regards to the women’s abilities to change their physiques:

I find it very difficult because I love to eat …I realize how difficult it is to lose [weight]… I try on a daily basis, but sometimes it’s difficult, like I said, when I go out with friends I just lose track. I don’t restrict myself. If I don’t have so many outings than I am really good and I stay on top of it. It’s the socializing that’s hard. I think that’s what throws everything off. Because when I socialize then I will eat whatever is there. I won’t think. But during the week, I am really good.

Ginger did not think she could manage on her own without any help:

I wish I could go to the gym. I wish I could do this. I wish I could do that. I can’t do everything… If I had someone to check in with me all the time and whatever and dedicated and on my case, then fine.

The ability to be active at levels required to lose weight seemed impossible at times. There was a definite feeling that the treatment side effects (e.g., increased fatigue and decreased fitness) affected their physical form. Fannie commented that day-to-day activities became effortful and less enjoyable, ultimately reinforcing the physical and psychological challenges the women experienced:
So when you’re mentally tired, and you’re not, you know, up for it, it’s harder to wrap your mind around it…I’m tired because I have insomnia now, so um, I don’t feel like doing a bunch of stuff. I don’t feel like walking the dog and I don’t feel like doing my stairs, and you know, the things I normally do to stay physically active.

Past failures to lose weight was another reason for a perceived inability to lose weight in the future. Ginger expressed it like this: “I’ve tried it [lose weight] a couple times and it didn’t work” and Fannie said: “Even when I would say ‘Oh this is crazy, I’m going to really watch myself for the next four to six weeks, and I would, but I would still get on the scale and there would still be a few more pounds.” Furthermore, losing weight was portrayed as being a constant tug-of-war and perceived as being more difficult with advancing age. Bianca illustrated this when she stated:

I know I could do it. I just have to work a little harder. I just have to really really go back… I try on a daily basis, but sometimes it’s difficult…It’s an ongoing struggle… I had tried to lose a bit of weight and stuff like that. I fluctuate. I go up and down and up. …I really think that as you get older, it’s so much harder to lose weight and to keep it off.

Overall, the women described various strategies they used to cope with the physical changes they experienced and help them reconcile with their new physique. In particular, they wore make-up, prosthetics, wigs, scarves and clothes to camouflage the physical changes that resulted from their cancer treatment. As well, they tried to restrict the amount of food they ate and/or avoided certain foods and engaged in physical activity as means to manage their weight, and help them obtain a toned and fit body.
Discussion

In this qualitative study, women’s perceptual, attitudinal/cognitive, affective, and behavioural experiences with their changed physique following treatment for breast cancer were explored. We found that appearance, especially body shape, size and weight, was important to the women in this study. As such, body-related issues should be addressed by health care providers who work with women who have survived breast cancer, as well as by researchers studying the psychosocial issues these women face in the aftermath of cancer. In addition, we found support for the multidimensional nature body image which complements and extends existing theoretical frameworks (Cash et al., 2004; Cash & Pruzinsky, 2002; White, 2000).

Accordingly, body image among breast cancer survivors is more likely to be comprehensively understood when researchers considering its different dimensions and frame their research questions to reflect this multidimensional conceptualization.

Based on the findings from this study, the women experienced various physical changes that were visible and invisible. Whereas alopecia has been rated as the most feared side effect of chemotherapy (Münstedt, Manthey, Sachsse, & Vahrson, 1997), body shape, size and weight change experiences were of central importance for the women in this study. Speculatively, the women might have focused on their body shape, size and weight since people generally view these aspects as being controllable (Tiggemann & Rothblum, 1997). Indeed, researchers have provided evidence that women treated for breast cancer often feel a loss of control over their body (Hefferon et al., 2010; Sabiston, McDonough, & Crocker, 2007). Thus, the women in this study might have felt responsible for their weight gain, whereas they might not have felt they could control the other changes [e.g., hair loss, lost of breast(s)]. Also, overweight and obese women in Western societies are often stigmatized and stereotyped as unattractive, undesirable.
and unhealthy (Degher & Hughes, 1999). Given these negative perceptions surrounding obesity, it is not surprising that weight gain was experienced as the most difficult physical change that the women had to manage.

To date, few researchers have focused on the importance of appearance to women who have been treated for breast cancer (Moreira & Canavarro, 2010). Based on the current findings, appearance is an important component of these women’s life after breast cancer. According to self-objectification theory (Fredrickson & Roberts, 1997), women’s bodies are socially constructed as objects to be looked at and judged by others. From this perspective, the women might have reflected on themselves from an outsider’s perspective, that is, as an object to be viewed. Subsequently, the women likely invested in their altered physical appearance as a strategy to control how others evaluated and treated them as a ‘breast cancer survivor.’ Consistent with this view, self-presentation was an important factor underlying the women’s investment in their appearances because they wanted to portray a desired impression of themselves and avoid making an undesired impression. Therefore, the women’s attentiveness to their appearance could be viewed as a strategy to control how others perceive and treat them, which is in line with self-presentation perspectives (Leary, 1996).

Similar to previous research (Brink & Ferguson, 1998; Hurd Clarke, 2002), the women also cited health as a reason for wanting to manage their appearance, especially their weight. This finding is not surprising given the health risks associated with breast cancer which are further compounded by being overweight or obese (Carmichael, 2006). Thus, the women might have tried to stay healthy and watch their weight to avoid complications and/or recurrence (Demark-Wahnefried, Aziz, Rowland, & Pinto, 2005). Last, appearance management was integral to the women’s psychological well-being because women’s perceptions that they
‘looked good’ were often accompanied by feelings of self-worth and emotional well-being. Thus, continued research is needed to explore how women’s positive attitudes toward their bodies can be enhanced through intervention strategies following treatment for breast cancer so they might obtain the physical and psychological health enhancing benefits of positive body image. Considering the effectiveness of cognitive behavioural therapy in the treatment of body dissatisfaction among various populations (see Cash & Lavellee, 1997), research testing this form of therapy among breast cancer survivors is warranted.

Consistent with the data from the current study, researchers have linked adverse physical changes to greater negative affect, emotional distress, and reduced self-esteem (Collins et al., 2011; Falk Dahl, Reinertsen, Nesvold, Fossà, & Dahl, 2010). The women indicated that the physical changes they experienced, particularly weight changes, elicited a wide range of predominantly negative emotions. McHugh et al. (2008) described this range of body-related emotions as a ‘web of emotion’ since young women’s body experiences could not be reduced to a single emotion. Although the sample in McHugh et al.’s (2008) study differed from the current study, both groups of women experienced physical changes that are inconsistent with the social standard of physical attractiveness (e.g., being toned, thin, shapely), and, in both cases, these changes were connected to a number of emotions. Thus, health care providers need to be aware of the emotional consequences women experience in relation to the physical changes after breast cancer. Furthermore, given the multifaceted nature of emotions, researchers need to focus on developing measures that assess these multiple emotions to ensure that women’s experiences with their bodies following a breast cancer diagnosis and treatment are captured. It would also enable researchers to explore the role of emotions in health and well-being.
The women in the current study also described positive emotions, albeit less often, suggesting that researchers should also study the positive views relating to body image. This will help broaden the understanding of women’s experiences with their bodies after breast cancer.

Specific to the current study, some of the women demonstrated acceptance toward their changed physique. This finding is in line with McHugh et al.’s (2008) findings and Neff’s (2003) notion that humans are capable of feeling compassion for themselves when there are perceived inadequacies, failures or general suffering. Thus, the women might experience self-compassion in spite of enduring the negative physical experiences of breast cancer. Based on other researchers’ work showing that self-compassion is related to life satisfaction, optimism, and positive affect (Neff, Kirkpatrick, & Rude, 2007; Neff, Rude, & Kirkpatrick, 2007), more research is needed to determine how to best promote self-acceptance and self-compassionate attitudes toward oneself in this population.

Consistent with theoretical contention that body image influences people’s behaviour (Cash & Pruzinsky, 2002; White, 2000), the women in this study took action to manage the physical changes they experienced and to help them reconcile with their new physique. Similar to Harcourt and Frith (2008) and Rasmussen, Hansen and Elverdam’s (2010) findings, the women wore make-up, prosthetics, wigs, and scarves to camouflage the physical changes that resulted from their cancer treatment. In addition, they restricted the amount of food they ate and/or avoided certain foods to manage their weight. Considering the consequences of unhealthy eating, women should be encouraged to eat healthy and follow a balanced food regimen (Doyle et al., 2006). Last, the women viewed physical activity as means to manage their weight and obtain a toned and fit body. The use of this strategy by women as mechanisms to alter physical appearance is consistent with previous findings in a mixed cancer population by Hefferson et al.
(2010). Given the potentially hazardous messages about fast ways to lose weight in the media, health care providers should provide women with dietary and physical activity guidelines and assist them in following them to help them prevent weight gain and/or lose weight gradually and safely. In addition, women should be referred to allied health professionals (e.g., nutritionist, dietitians, physical activity counselors, physical therapist), if this is not already done. Accordingly, it is important to ensure that such professionals are trained to work with breast cancer survivors and available.

Women’s experiences with their bodies after breast cancer were comprehensively explored in this study; however, there are limitations that need to be addressed. We categorized the women’s experiences of their bodies into super-ordinate, main and subthemes which might have taken away from their own lived experience by thwarting the full picture of their experience. Nonetheless, we used direct quotes from the women to help us portray these data from the perspectives of the women. In addition, we interviewed a purposefully-sampled group of breast cancer survivors. Therefore, the findings of our study might only be applicable to a subset of the population of women recovering from breast cancer. Furthermore, the interviewer (first author) is a young woman without a history of breast cancer. Whereas she used various strategies to establish an honest and constructive relationship with the women (Lincoln & Guba, 1985), it is possible that the women might have revealed more had she been a breast cancer survivor of similar age. Last, as with other qualitative studies, women who were comfortable discussing sensitive issues related to their bodies volunteered to participate in our study. Emergent themes may be different for groups of women who did not volunteer because they were uncomfortable discussing these issues.
In summary, there are encouraging survival rates among women diagnosed with breast cancer, yet these women might face ongoing psychosocial sequelae. Following this phenomenological study, we have described women’s physique-related experiences related to breast cancer from their own perspective. The physical changes following breast cancer left the women feeling self-conscious about their bodies, particularly their weight, and had cognitive and emotional consequences. Diet and physical activity might effectively change women’s attitudes toward their bodies and help them manage their weight following treatment for breast cancer. Based on these findings, it might be beneficial to include psychoeducational strategies to multimodal interventions to best help women manage body-related self-perceptions, cognitions, emotions and behaviours. Self-compassion efforts (Neff, 2003) are also likely to help women cope with the physical changes, and interventions could include strategies to help nurture women’s feelings of self-kindness (i.e., ability to treat themselves with understanding and care), sense of common humanity (i.e., see that imperfections are universal), and mindfulness (i.e., placing one’s experiences into balanced perspective). This comprehensive approach might be beneficial for women’s psychosocial and physical health during survivorship.
Acknowledgments

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References


**Table 1**

*Participants Characteristics (N = 11)*

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Age (years)</th>
<th>Weight Status&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Cancer Stage</th>
<th>Time Since Treatment (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitty</td>
<td>50</td>
<td>Overweight</td>
<td>II</td>
<td>2</td>
</tr>
<tr>
<td>Fannie</td>
<td>54</td>
<td>Healthy weight</td>
<td>I</td>
<td>2</td>
</tr>
<tr>
<td>Mary</td>
<td>50</td>
<td>Healthy weight</td>
<td>II</td>
<td>6</td>
</tr>
<tr>
<td>Julia</td>
<td>62</td>
<td>Healthy weight</td>
<td>III</td>
<td>8</td>
</tr>
<tr>
<td>Sabrina</td>
<td>52</td>
<td>Healthy weight</td>
<td>II</td>
<td>2</td>
</tr>
<tr>
<td>Vienna</td>
<td>49</td>
<td>Overweight</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>Rose</td>
<td>59</td>
<td>Healthy weight</td>
<td>II</td>
<td>4</td>
</tr>
<tr>
<td>Bianca</td>
<td>47</td>
<td>Overweight</td>
<td>I</td>
<td>4</td>
</tr>
<tr>
<td>Kim</td>
<td>70</td>
<td>Healthy weight</td>
<td>I</td>
<td>2</td>
</tr>
<tr>
<td>Madeleine</td>
<td>67</td>
<td>Overweight</td>
<td>I</td>
<td>31</td>
</tr>
<tr>
<td>Ginger</td>
<td>60</td>
<td>Obese</td>
<td>I</td>
<td>6</td>
</tr>
</tbody>
</table>

<sup>a</sup>Normal weight: Body Mass Index (BMI) = 18.50-24.99 kg/m<sup>2</sup>. Overweight: BMI = 25.00 - 29.99 kg/m<sup>2</sup>. Obese: BMI ≥ 30.00 kg/m<sup>2</sup>.
Table 2

*Thematic Structure of the Results*

<table>
<thead>
<tr>
<th>Super-ordinate themes</th>
<th>Main themes</th>
<th>Subthemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A changed physique</td>
<td>Physical changes: What happened?</td>
<td>Visible: Loss of hair loss, skin elasticity, muscle mass and definition, altered hair texture, being ‘lop-sided’ or ‘disfigured’, weight gain, changed body size and shape</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Invisible: cessation of menstruation, hot flashes, numbness in fingers and toes, tenderness in the breast, difficulty sleeping, fatigue, and lack of energy</td>
</tr>
<tr>
<td>Emotional feelings and attitudes toward an altered physique</td>
<td>Dissatisfaction toward overall physique and specific body parts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Negative emotions and thoughts toward one’s physique, sexuality, appearance, inability to control what happened to their bodies and make desired changes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfaction with body’s functioning and strength</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physical self-acceptance and self-realization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positive emotions linked to successful</td>
<td></td>
</tr>
</tbody>
</table>
weight loss

- Nostalgia with previous physique
- Valued appearance
- Health concerns, self-presentation, emotional state and well-being were driving forces behind physical appearance preoccupation
- Camouflage strategies: make-up, wigs, prosthetics, scarves, clothes
- Change strategies: adopt healthy lifestyle
- Self-doubt ability to make changes because of treatment side effects and past failures
Bridging Text

The main findings from chapter four can be summarized as:

1) Women’s physiques change following breast cancer, and women become more self-conscious of how they look;

2) Women’s self-perceptions may forecast negative perceptions, feelings, and thoughts toward their bodies following breast cancer diagnosis and treatment;

3) Women often turn to physical activity to help them manage their private and public appearances.

Taken together, self-presentation processes, namely women’s desire to monitor and/or control the impressions other people form of them, may relate to physical activity behaviour. This proposition has been supported among young adults; however no studies have focused on examining the associations between self-presentation processes and physical activity behaviour among breast cancer survivors. Therefore, chapter five presents an investigation of the associations between self-presentation processes and physical activity behaviour. Gathering empirical evidence was deemed particularly important to provide support for self-presentation as a theoretical framework that holds value for explaining and predicting physical activity behaviour in this population. The first objective was to evaluate the psychometric properties of the Self-Presentation in Exercise Questionnaire to ensure that it could be used to examine the aforementioned associations. A second objective was to integrate social cognitive constructs within the framework of self-presentation to provide a more comprehensive account of the associations between self-presentation processes and physical activity behaviour.
Chapter Five

Self-Presentation and Physical Activity in Breast Cancer Survivors: The Moderating Effect

of Social Cognitive Constructs

Jennifer Brunet & Catherine M. Sabiston

McGill University, Montreal

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Abstract

This study examined (1) the relationships between self-presentation processes (i.e., impression motivation and impression construction) and moderate-to-vigorous physical activity (MVPA) among breast cancer survivors, and (2) if social cognitive constructs [self-presentational efficacy expectancy (SPEE); self-presentational outcome expectancy (SPOE); self-presentational outcome value (SPOV)] moderate these relationships. Breast cancer survivors (N = 169; M_age = 55.06, SD = 10.67 years) completed self-report measures. Hierarchical regression analysis, controlling for age and body mass index, indicated that impression motivation was a significant correlate of MVPA (β = .25). Furthermore, SPEE (β = .21) and SPOV (β = .27) were moderators of this relationship. The final models accounted for 12% to 24% of the variance in MVPA. The findings of this study suggest self-presentation processes (i.e., impression motivation) may indeed relate to breast cancer survivors’ MVPA. In addition, social cognitive constructs (i.e., SPEE, SPOV) moderated the relationship between impression motivation and MVPA. It may be effective to target impression motivation, SPEE and SPOV in interventions aimed at increasing MVPA among breast cancer survivors.

Keywords: Cancer survivors; health behaviour; impression management.
Introduction

Early detection and improved treatments for breast cancer have led to an increase in survival rates, resulting in a growing population of breast cancer survivors (Canadian Cancer Society, 2008). Although advancements in treatment options offer a positive outlook for surviving breast cancer, breast cancer treatments are associated with a number of notable physical and mental side effects such as fatigue, weight changes, muscle loss/weakness, depression, anxiety, and decreased well-being (Burstein & Winer, 2000). Breast cancer survivors are also at greater risk for developing second malignancies and other diseases (Jemal, Siegel, Xu, & Ward, 2010).

Physical activity may help prevent or minimize these negative cancer-related sequelae and co-morbidities among cancer survivors (Demark-Wahnefried & Jones, 2008). Physical activity at moderate and vigorous intensity can also provide a variety of physiological and psychosocial benefits for breast cancer survivors (McNeely et al., 2006; Sabiston & Brunet, 2011). Increasing physical activity levels after a cancer diagnosis is more strongly linked to quality of life outcomes compared to lifetime activity (Blanchard et al., 2003), underscoring the need to encourage physical activity in the immediate period after cancer treatment. As part of an effort to improve cancer survivors’ health, the American College of Sports Medicine has recommended that cancer survivors adopt a physically active lifestyle (Schmitz et al., 2010). As such, physical activity is increasingly being promoted as a safe, feasible and complimentary therapy for individuals following the completion of primary treatment for cancer. Unfortunately, although cancer survivors are capable of increasing their physical activity levels soon after treatment (Rabin, 2009), the majority are inactive (Littman, Tang, & Rossing, 2010). Thus,
targeted efforts are needed to address the state of physical inactivity in this population to promote optimal health and well-being.

It is important to time the delivery of interventions aimed at promoting physical activity. Researchers have shown that individuals diagnosed with cancer show interest in modifying their health behaviours post-treatment in order to prevent recurrence (Demark-Wahnefried & Jones, 2008). As such, the period after completion of primary treatment (i.e., surgery, chemotherapy, radiation) may represent a ‘teachable moment’ (Rabin, 2009), and thus, a good time to implement such interventions in this population. To intervene at this level, it is important to identify modifiable factors that may influence breast cancer survivors’ physical activity participation during this critical time period to develop tailored interventions.

Self-Presentation

Adopting a self-presentation perspective may be helpful when examining modifiable factors related to physical activity behaviour (Hausenblas, Brewer, & Van Raalte, 2004; Leary, 1992) since some breast cancer survivors may engage in physical activity for self-presentation motives (e.g., improve/maintain physical appearance, obtain/preserve a desired social identity; Leary, 1992). Self-presentation, also referred to as impression management, is defined as a goal-directed process individuals engage in an attempt to monitor and/or control the impressions other people form of them (Leary & Kowalski, 1990). The model of self-presentation (Leary & Kowalski, 1990) highlights two key component, namely impression motivation and impression construction. Impression motivation refers to an individual’s motivation to control how he/she is perceived by others. Impression construction involves deciding which impression to convey to others and the degree to which particular strategies, either implicit or explicit, are used to create this impression (Leary & Kowalski, 1990). The distinction between impression motivation and
impression construction is that the former deals with the motivation behind making an impression and the latter deals with the content and extent to which actions are taken to make that impression. Self-presentation processes were initially conceptualized at the global level; however, researchers have studied these constructs in the physical activity domain.

To assess self-presentation tendencies in physical activity, Conroy, Motl, and Hall (1998) developed the Self-Presentation in Exercise Questionnaire (SPEQ). The SPEQ is the only measure available in the physical activity domain that assesses both facets of self-presentation. Using the SPEQ, researchers have found positive associations between self-presentation processes and physical activity behaviour (Conroy, Motl, & Hall, 2000; Lindwall, 2005). For instance, Conroy et al. (2000) showed that impression motivation was positively associated with self-reported number of days per week of exercise, and impression construction was positively associated with the percentage of time spent exercising among college students. Similarly, Lindwall (2005) indicated that both impression motivation and impression construction were positively related to exercise frequency and duration for university students. However, findings are limited to healthy college and/or university student samples. The rationale for focusing on this segment of the population is often rooted in the premise that there is a paradox between the socially prescribed ideal physique and the development of the female body that occurs at the onset of puberty. In other words, the natural changes of the growing adolescent female body (e.g., increased body fat and weight, widened hips) are inconsistent with the social standard of physical attractiveness (e.g., being toned, thin, shapely). Yet, other life events (e.g., diseases) can result in physical changes that may also move people further away from the sociocultural ideal of beauty. Accordingly, self-presentation concerns may not be an area of concern restricted
only to young adults, but may also be pertinent to individuals who experience disease-related changes in appearance and be an important correlate of physical activity in these populations.

An important shortcoming of the literature in this area is that researchers testing the psychometric properties of the SPEQ have raised concerns regarding the scale composition and have limited psychometric assessments to college and/or university student samples (Conroy & Motl, 2003; Conroy et al., 2000; Gammage, Hall, Prapavessis, et al., 2004; Lindwall, 2005). Whereas the underlying two-factor structure of this measure has been confirmed across studies, different truncated versions of the scale have been developed to include between 8 to 14 items. Thus, it is not clear which version of the SPEQ should be used. An important step in testing the association between self-presentation processes and physical activity behaviour among breast cancer survivors is therefore to test and confirm the psychometric properties of the original SPEQ in this population.

**Breast Cancer, Self-Presentation and Physical Activity**

Women who have been diagnosed and treated for breast cancer have endured many treatments that may place them at risk of self-presentational concerns and subsequent low levels of physical activity. For example, over 50% of women treated for breast cancer gain weight and report unfavourable changes in body composition (Irwin et al., 2005) - changes that are inconsistent with society’s emphasis on being thin, toned, and shapely (Bordo, 1993). Other undesired physical changes, such as deformities or loss of the breast(s), tissue damage, alopecia, decreased range of motion and lymphedema, have also been reported (Ward, Kuta, Sanborn, & Burt, 2003). As a result, breast cancer survivors’ preoccupation with the way others perceive them may increase since appearance and weight are predominant concerns for women in general (Cash, Melnyk, & Hrabosky, 2004). These concerns may increase women’s desire to monitor
and/or control the impressions other people form of them, and in turn their participation in physical activity. Breast cancer survivors may engage in physical activity based on the belief that it may help them to convey their desired image and influence how others perceive them by regulating their weight, improving their body tone, and/or developing a social image of someone who is fit. There is evidence that breast cancer survivors engage in exercise to appear athletic and increase their muscle mass (McDonough, Sabiston, & Crocker, 2008; Sabiston, McDonough, & Crocker, 2007). Viewed from a self-presentation perspective, it is possible that this reflects survivors’ desire to enhance their public image and create a particular impression in the eyes of others (i.e., attempts to self-present). However, the relationship between self-presentation processes and breast cancer survivors’ physical activity behaviour is not well-understood, and therefore, further research into this association is needed.

Although breast cancer survivors may engage in physical activity for self-presentation reasons, some may avoid it for the same reasons if they are concerned about their ability to convey an attractive image in front of others (Hausenblas et al., 2004; Leary, 1992). Some women experience body-related anxiety as a result of the changes associated with breast cancer treatment and perceive that others negatively evaluate them as ‘lopsided’, ‘mis-shaped’ or ‘disfigured’ (McDonough et al., 2008). These women may worry that others will negatively evaluate them, and therefore avoid engaging in activities where their physique is on display (i.e., physical activity). In fact, Leary (1992) has suggested that individuals who are concerned about being perceived as incompetent, unfit and/or unskilled may not engage in physical activity as this may highlight these undesirable characteristics. Similarly, McAuley et al. (1995) contended that the main reason why overweight female exercisers avoided exercising in public was their
apprehension associated with being observed and evaluated by others. This suggests self-presentation processes may be positively or negatively associated with physical activity.

**Moderators of the Link between Self-Presentation and Physical Activity**

Since self-presentation processes may either promote or hinder physical activity participation, research aimed at identifying potential moderator variables is warranted (Gammage, Hall, & Martin Ginis, 2004; Gammage, Hall, Prapavessis, et al., 2004; McAuley et al., 1995; Woodgate, Martin Ginis, & Sinden, 2003). Social cognitive constructs may help explain why some people who are highly motivated to impression manage decide to engage in physical activity, whereas others avoid it (Gammage, Hall, & Martin Ginis, 2004; Woodgate et al., 2003). Based on social cognitive models (e.g., Bandura, 1986, 1997), self-efficacy and outcome expectations may moderate associations between self-presentation processes and behavioural outcomes such as physical activity. Self-efficacy refers to the belief one has regarding his/her ability to perform a task to produce the desired outcome, whereas outcome expectation is the belief one has regarding the outcomes that will result from performing a specific task. Based on outcome-expectancy theories (e.g., Bandura, 1997) and social learning theory (Rotter, 1954), outcome value may also be a potential social cognitive moderator. Outcome value refers to the importance individuals place on an expected outcome. Researchers have operationalized these social cognitive constructs from a self-presentation perspective (Maddux, Norton, & Leary, 1988). From this perspective, self-efficacy (or self-presentational efficacy expectancy; SPEE), refers to the perceived probability of successfully conveying one’s desired impressions to others, outcome expectation (or self-presentational outcome expectancy; SPOE) refers to the degree to which one perceives certain behaviours will lead to a desired
impression, and outcome value (or self-presentational outcome value; SPOV) reflects the importance placed on making a desired impression (Maddux et al., 1988).

Empirical studies have provided evidence that self-presentation processes and these three social cognitive moderators may interact to determine people’s tendency to engage in or avoid physical activity (Gammage, Hall, & Martin Ginis, 2004; Woodgate et al., 2003). Based on findings from these studies, it is plausible that among breast cancer survivors who want to monitor and/or control the impressions other people form of them, only women who are optimistic about their ability to make their desired impressions to others (i.e., SPEE), believe that physical activity will help them make their desired impression (i.e., SPOE), and/or value making a desired impression (i.e., SPOV) will likely participate in physical activity. In contrast, women who are pessimistic about these beliefs will likely avoid participating in physical activity. Thus, integrating self-presentation theory and social cognitive constructs may provide insight into the equivocal links between self-presentation processes and physical activity.

**Purpose, Objectives and Hypotheses**

This study examined the association between self-presentation processes (i.e., impression motivation and impression construction) and moderate-to-vigorous physical activity behaviour among breast cancer survivors. The specific objectives of this study were to: (1) evaluate the psychometric properties of the SPEQ; (2) examine the relationships between self-presentation processes and moderate-to-vigorous physical activity behaviour; and (3) determine if SPEE, SPOE, and SPOV moderate the relationships in (2). It was hypothesized that an oblique two-factor model, representing impression motivation and impression construction as two distinct, yet related constructs, would be supported by confirmatory factor analysis (CFA). It was also hypothesized that SPEE, SPOE and SPOV would moderate the relationships between self-
presentation processes and physical activity behaviour, such that participants reporting high levels of impression motivation or impression construction coupled with high levels of SPEE, SPOE or SPOV will be more active than participants reporting high levels of impression motivation or impression construction coupled with low levels of SPEE, SPOE or SPOV.

Methods

Participants and Procedures

This study represents a baseline cross-sectional analysis from an on-going prospective longitudinal study examining the impact of physical activity on breast cancer survivors’ physical and mental health. Baseline data were collected in 2009-2010. Following University and Hospital Ethics approval, participants were recruited through advertisements and oncologist referrals from various local medical clinics and hospitals. Interested participants were asked to contact the research team by phone to obtain additional details on the study and were screened for eligibility. Women were eligible to participate in the study if they met the following criteria: (a) women of 18 years of age or older, (b) 0-20 weeks post primary treatment (i.e., surgery, chemotherapy, radiation therapy), (c) diagnosed with stage I-III breast cancer, (d) ability to provide written informed consent, read and speak in English or French, and (e) report no health concerns that prevent them from engaging in physical activity. One hundred and sixty-nine women met the eligibility criteria, provided written consent and completed a pencil-and-paper self-administered survey.

Measures

Demographics. Personal (i.e., age, height, weight, education, self-identified ethnicity, menopausal status) and disease related characteristics (i.e., stage of breast cancer, treatment history, and time since diagnosis) were assessed and used for descriptive purposes (see Table 1).
**Self-presentation processes.** The 20-item version of the SPEQ (Conroy et al., 1998) was used to assess self-presentation processes. The SPEQ includes an 11-item impression motivation subscale that assesses an individual’s motivation to be perceived as an exerciser (e.g., “I want to be thought of as a person who exercises”), and a 9-item impression construction subscale which assesses the degree to which strategies are used to convey such impressions (e.g., “I emphasize my athletic ability around those who do not yet know that I am an exercise nut”). Each item was scored on a 6-point Likert scale anchored at the extremes by *strongly disagree* and *strongly agree*. After reverse-coding item 6 (i.e., “appearing fit or healthy to others is not important to me”), mean impression motivation and impression construction scores were calculated by summing the respective items and dividing by the total number of responses for each subscale. Although researchers have raised concerns regarding the validity, factor structure and composition of the SPEQ (Conroy & Motl, 2003; Conroy et al., 2000; Gammage, Hall, Prapavessis, et al., 2004; Lindwall, 2005), this questionnaire remains the only measure currently available in the physical activity domain that is based on Leary and Kowalski’s (1990) two-component model of self-presentation and has allowed research on self-presentation and physical activity to progress. Nonetheless, it is important to note that various versions of the SPEQ have been used (e.g., 8-items, 9-items, 11-items, 14-items; Conroy & Motl, 2003; Gammage, Hall, Prapavessis, et al., 2004). These versions were derived based on studies with college and/or university students. Thus, the SPEQ merits psychometric testing in this sample of breast cancer survivors.

**Social cognitive constructs.** The Self-Presentation Efficacy Scale (SPES; Gammage, Hall, & Martin Ginis, 2004) was used to assess SPEE, SPOE and SPOV. The SPEE subscale asked participants to indicate the degree to which they are confident in performing behaviours
and presenting images that would lead to specific self-presentation outcomes (5-items; e.g., “How confident are you that other people will think that you are in good shape”) using a 100-point scale ranging from not at all confident to completely confident. The SPOE and SPOV subscales asked participants to rate the extent to which they believe that specific self-presentation outcomes will result from exercising (5-items; e.g., “By exercising regularly, other people will that my body looks fit and toned”) and the value they place on achieving these outcomes (5-items; e.g., “I place a lot of value of being known as someone who is in good shape”), respectively. These items were rated on a 6-point Likert scale ranging from strongly disagree to strongly agree. A mean score for each subscale was calculated by summing the respective items and dividing by the total number of responses for each subscale. The internal consistency coefficients for the SPEE, SPOE, and SPOV scores exceeded Nunnally’s (1978) suggested criteria of .70 in previous research in the physical activity domain with young and older adult samples (Gammage, Hall, & Martin Ginis, 2004; Lamarche & Gammage, 2010; Woodgate et al., 2003) and in the current study (see Table 2).

**Physical activity.** Physical activity was assessed using the first item from the 2-item 7-day recall Leisure Time Exercise Questionnaire (LTEQ; Godin & Shephard, 1985). The item, which was modified from the original scale, asked participants to report the frequency per week and average duration of strenuous, moderate, and mild physical activity sessions. The modification, to ask women to report on the average length of time for each session rather than capping it at 15 minutes or more, was identical to previous studies assessing physical activity among breast cancer survivors (e.g., Andrykowski, Beacham, & Jacobsen, 2007; Courneya et al., 2009; Vallance, Plotnikoff, Karvinen, Mackey, & Courneya, 2010). This modification was made both to capture more information on physical activity in this population as well as to enable
meaningful comparisons across studies. Scores were transformed into weekly metabolic equivalents (METS) by multiplying weekly minutes of strenuous, moderate, and mild physical activity by nine, five and three respectively (Andrykowski et al., 2007). A moderate-to-vigorous physical activity score was calculated by summing strenuous and moderate METS. Researchers have reported acceptable reliability coefficients (i.e., two-week test-retest reliability $r = .74$), as well as evidence for the construct validity of the LTEQ scores by showing moderate positive correlations with subjective and objective measures of physical activity (e.g., accelerometer $r \geq .32$) and fitness in various populations ($VO_{2\text{max}} r \geq .24$; Godin & Shephard, 1985; Jacobs, Ainsworth, Hartman, & Leon, 1993; Kowalski, Crocker, & Kowalski, 1997; Motl, McAuley, & DiStefano, 2005).

**Data Analysis**

The data were examined for missing data. Multiple imputation (expectation-maximization algorithm; Dempster, Laird, & Rubin, 1977) was used to estimate and replace missing observations since less than 2% of the scores were missing at random. First, CFA for ordered-categorical data was conducted in LISREL using robust maximum likelihood estimation methods to test the hypothesized two-factor model of the SPEQ in this study. Model fit was assessed using robust estimates including root mean square error of approximation (RMSEA, values close to .06 indicate acceptable fit), standardized root mean squared residual (SRMR, values close to .08 indicate acceptable fit), and comparative fit index (CFI, values close to .95 indicate acceptable fit; Hu & Bentler, 1999). If fit indices were below suggested values, modification indices were examined to see where improvements could be made. Then, descriptive statistics (e.g., means, standard deviations, Cronbach alpha coefficients) for measured variables were computed. Whereas the observed variables were treated as ordinal in the CFA
analyses, impression motivation and impression construction total scores were treated as continuous in the descriptive and regression analyses because the total scores reflect continuous-level data.

Main analyses involved hierarchical multivariate linear regression analysis to examine the associations between self-presentation processes (i.e., impression motivation, impression construction) and physical activity behaviour, and whether SPEE, SPOE, and SPOV moderate these relationships. Prior to these analyses, study variables were examined for violations of the assumptions of multivariate analysis. Separate models were conducted for each potential moderator to maintain parsimony of models. Each model controlled for age and body mass index (BMI = weight in kilograms/height in meters squared) since they were significantly related to self-presentation processes and/or physical activity. Of note, disease related characteristics were also initially entered as covariates. This did not change the pattern or statistical significance of any of the results. Therefore, these additional covariates were not included in any of the analyses reported here. Prior to the analyses, impression motivation, impression construction and social cognitive moderator scores were centered (Aiken & West, 1991). Entry was specified a priori where age and BMI were included in the first step of the regression model as covariates. Impression motivation and impression construction were entered in the second step. SPEE was entered in the third step and the interaction terms between impression motivation and SPEE and between impression construction and SPEE were included in the final step to test moderation. These analyses were repeated to test the moderating effects of SPOE and SPOV. A moderating effect was supported when the interaction term was significant and the variance accounted for in the regression equation significantly increased when the moderator
term was added to the equation. To analyze the significant interactions, significant interactions were graphed and a simple slopes analysis was conducted (Aiken & West, 1991).

Results

Preliminary Results

Sociodemographic and disease characteristics of the sample \((N = 169)\) are presented in Table 1. Previously established models of the SPEQ (i.e., 14-item; 11-item; 9-item; 8-item) were initially tested to see if one of these models resulted in a good fitting model. Because none of these models provided an acceptable fit to the data in this sample, an iterative process using the original 20-item SPEQ was followed to obtain a good fitting model. Only the CFI value for the CFA revealed the 20-item model had acceptable fit \([\text{Satorra-Bentler Scaled } \chi^2 = 338.97, df = 169, \text{ RMSEA} = .09, \text{ CFI} = .97, \text{ SRMR} = .11]\). The LISREL modification indices indicated that allowing the measurement errors between item 10 and items 8 and 14 to correlate would significantly improve the fit of the model. The measurement errors between these items were allowed to correlate. Also, the factor loadings were low for items 5 (i.e., .23; “I try to appear toned or fit to others”) and 6 (i.e., .11; “appearing fit or healthy to others is not important to me”). These items were deleted one at a time, followed by re-estimation of the model. This iterative process resulted in the deletion of item 6 because of the considerable improvement in model fit. Deletion of item 5 did not result in a change of fit indices and was therefore retained. Re-estimation of the 19-item model was found to have acceptable fit indices \([\text{Satorra-Bentler Scaled } \chi^2 = 234.97, df = 149, \text{ RMSEA} = .06, \text{ CFI} = .98, \text{ SRMR} = .08]\) and all items loaded significantly on their respective factor \((p < .001)\). At this point, the modification indices did not suggest any further changes in the model that could be interpreted in a substantive manner. Thus, an oblique two-factor model which consisted of 19 items (excluding item 6), allowed the
measurement errors between item 10 and items 8 and 14 to correlate, and represented impression motivation and impression construction as two distinct, yet related constructs, was supported and used in the remaining analyses.

Means, standard deviations, score ranges, bivariate correlations and reliability coefficients for study variables are reported in Table 2. In general, participants reported moderate levels of impression motivation and low levels of impression construction relative to the scale range. The distributional properties of each variable suggested that the assumptions of normality, homoscedasticity, and linearity required for the multivariate regression analyses were met. In addition, there was no evidence of multicollinearity based on the correlations and variation inflation factors (VIF) indices in the preliminary regression analyses.

Main Results

Table 3 contains a summary of the hierarchical regression analyses. Age and BMI (step 1) accounted for 5% of the variation in physical activity. Impression motivation and impression construction (step 2) contributed to a further 5% of the variance, with impression motivation making a significant independent contribution. SPEE, SPOE and SPOV explained an additional 4%, 1%, and 3% of the variance in physical activity, respectively, when entered on step 3 in the separate regression models. The addition of the ‘impression motivation x SPEE’ and ‘impression construction x SPEE’ interaction terms (step 4) explained an additional 10% of the variance in physical activity, with the ‘impression motivation x SPEE’ interaction term making a significant independent contribution. As can be seen in Figure 1, participants who had high levels of impression motivation coupled with high levels of SPEE reported highest levels of physical activity, whereas participants who had high levels of impression motivation but low levels of SPEE reported the lowest levels of physical activity. Furthermore, the simple slopes
analysis demonstrated that impression motivation was significantly related to physical activity when participants reported high levels of SPEE ($\beta = .34, p < .01$), but not when SPEE was low ($\beta = -.18, p > .05$). A similar pattern was observed for SPOV (see Figure 2), where impression motivation was significantly related to physical activity when participants reported high levels of SPOV ($\beta = .29, p < .01$), but not when SPOV was low ($\beta = -.07, p > .05$). The interaction terms involving SPOE did not significantly increase the variance explained in physical activity.

**Discussion**

The current study extended previous research focused on self-presentation in the physical activity domain by examining the associations between self-presentation processes and physical activity among an under-represented population in self-presentation research (i.e., breast cancer survivors). An important first step was to test the psychometric properties of the SPEQ with this sample. An oblique two-factor model that included 19 items from the original SPEQ and that estimated impression motivation and impression construction as two distinct, yet related constructs, while specifying the measurement errors between item 10 and items 8 and 14 to correlate, was found to be an adequate measure of self-presentation processes in this sample. It could therefore be used to examine the associations between self-presentation processes and physical activity in this study. Impression motivation was a significant positive correlate of physical activity, and SPEE and SPOV were moderators of this relationship. These findings provide insight into the theoretical relationships suggested to exist among self-presentation processes and physical activity in a population of breast cancer survivors. Taken together, these findings indicate that there is considerable scope for examining self-presentation processes and social cognitive constructs in future research that seeks to understand participation in MVPA in this population.
motivation, impression construction) and their influence on physical activity among breast cancer survivors in this study. It should be noted that the resulting SPEQ model in current study differs from models reported in previous studies in that previous studies have deleted more items than in the current study (Conroy & Motl, 2003; Conroy et al., 1998; Conroy et al., 2000; Gammage, Hall, Prapavessis, et al., 2004). Furthermore, these results are limited to the current sample and the scale should be validated with a separate sample. This would increase the likelihood that the model obtained in the current study holds across different samples of breast cancer survivors. Moreover, research is needed to determine whether it is possible to obtain a consistent measure of self-presentation processes across studies and populations or whether the lack of consistency is indicative of different conceptualization of these constructs for different populations.

In addition to testing the psychometric properties of the SPEQ, this study is the first to examine levels of and associations between self-presentation processes and physical activity among breast cancer survivors. Using the 19-item SPEQ, this study adds to the literature by showing that moderate levels of impression motivation and low levels of impression construction were reported by women in the early stages of cancer survivorship. The lack of research on these constructs in this population makes it difficult to compare the current data with other studies and draw conclusions about the levels of impression motivation and impression construction among breast cancer survivors. Direct comparison with studies in other populations is also difficult because different versions of the SPEQ were used across studies. Nonetheless, it appears that reported means in the current study are comparable to previous research with young adults reporting moderate levels of impression motivation (Conroy & Motl, 2003; Conroy et al., 2000; Cumming & Thøgersen-Ntoumani, 2011; Gammage, Hall, Prapavessis, et al., 2004) and
low levels of impression construction (Conroy & Motl, 2003; Conroy et al., 2000; Gammage, Hall, Prapavessis, et al., 2004). This suggests self-presentation concerns are not restricted to young adults, but may also be pertinent to breast cancer survivors.

Moreover, this study adds to the literature by demonstrating that impression motivation was significantly and positively associated with physical activity in a sample of breast cancer survivors. This is consistent with findings from previous studies (Conroy et al., 2000; Cumming & Thøgersen-Ntoumani, 2011; Lindwall, 2005). For example, Lindwall (2005) found that impression motivation was positively associated with frequency and duration of physical activity. Similarly, Conroy et al. (2000) found that the number of days per week individuals participated in physical activity, but not the number of hours per week, was higher among individuals who were motivated to create the impression of being fit and an exerciser than among those who were less motivated to create these impressions. Collectively, these findings support and extend theoretical perspectives (Leary, 1992) that people’s motives to engage in physical activity often mirror self-presentation motives. Accordingly, these findings provide a basis for integrating impression motivation into theories designed to explain and predict physical activity behaviour in breast cancer survivors. In spite of finding that impression motivation may be a driving force that motivates breast cancer survivors to engage in physical activity, it is important to note that theories of motivation (e.g., self-determination theory; Deci & Ryan, 1985) outline the importance of engaging in a behaviour for intrinsic reasons (e.g., positive health benefits, enjoyment and fun), rather than extrinsic reasons (e.g., guilt, pressure, obtain an outcome that is separable from the activity itself, pleasing others). Indeed, the former has been shown to be a better predictor of long-term physical activity (Mullan & Markland, 1997). Based on goal content perspectives (Vansteenkiste, Lens, & Deci, 2006), it could be reasoned that
impression motivation is an extrinsic reason because people are motivated to engage in the activity to obtain an outcome that is separable from the activity itself. Researchers have provided initial support for the notion that self-presentation motives may be similar to a controlled orientation towards behaviours (Lewis & Neighbors, 2005; Paternoster, Brame, Mazerolle, & Piquero, 1998), which in turn may lead people to the pursuit of behaviours for extrinsic reasons. Thus, interventions promoting enjoyable activities and intrinsic motivation are needed in order to promote the maintenance of a physically active lifestyle in this population.

Contrary to the hypothesis and findings reported by Lindwall (2005), impression construction was not significantly related to physical activity. This finding is in line with findings from Conroy et al.’s (2000) study and suggests that delineating impression motivation and impression construction is valuable because they appear to have different links with physical activity. Speculatively, self-regulation depletion may explain why impression construction was not related to physical activity. Vohs, Baumeister and Ciarocco (2005) provided evidence that engaging in self-presentation actions that defy one’s view of him/herself depletes self-regulatory resources. This is because impression construction, contrary to impression motivation which does not involve actions per se, requires effortful planning and altering of one’s behaviour in order to convey the intended self-image which may consequently impair one’s behaviour. Based on this view, the treatment side effects of cancer (e.g., hair loss, weight gain, loss of muscle mass, fatigue) may make breast cancer survivors’ desired image even more distant from their perceived current image. This would mean that they need to use considerable effort (i.e., self-regulation) to engage in the process of creating a desired image (i.e., impression construction) because it may be hard to make a desired impression under such conditions. Thus, impression construction may deplete self-regulation and this may help explain why impression construction
was not related to physical activity in this population. Researchers should consider integrating both self process theories, and examine whether SPEE and SPOV counteract self-regulation depletion.

The final hypothesis of this study was partially supported in that SPEE and SPOV, but not SPOE, were found to be significant moderators of the relationship between impression motivation and physical activity. Examination of the interaction terms indicated that women who wanted to create the impression of being athletic, lean and fit and believed that they could successfully do so (i.e., SPEE), or place a lot of importance on making this impression (i.e., SPOV), were more active. In contrast, women who wanted to create this impression but doubted their ability, or did not place a lot of importance on making this impression, were less active. These findings are consistent with those reported by Gammage, Hall and Martin Ginis (2004). Specifically, the authors reported that low- (physically active ≤ 2 days/week) and high- (≥ 3 days/week) frequency exercisers reported similar levels of impression motivation; however high-frequency exercisers reported higher perceptions in their ability to convey a desired impression (i.e., SPEE) and placed more importance on portraying the desired impression (i.e., SPOV) than low-frequency exercisers. Furthermore, Woodgate et al. (2003) found that SPEE was a moderator such that older women with high SPEE and low social physique anxiety (SPA; a construct closely related to self-presentation processes), were more likely to exercise than women with low SPA and low SPEE. Collectively, these findings partially support theoretical perspectives (Bandura, 1986, 1997; Rotter, 1954), and demonstrate the importance of considering social cognitive variables, namely SPEE and SPOV, since they may help explain whether women reporting high impression motivation will engage in or avoid physical activity.
There are limitations pertaining to this study. It should be noted that results are based on a convenience sample of breast cancer survivors. In addition, this cross-sectional study design prevents conclusions regarding causality. Furthermore, item 5 on the SPEQ was retained in the analyses since it did not compromise the fit of the CFA model. The low factor loading for this item suggests it may not be salient to the assessment of impression motivation in this sample of breast cancer survivors. Future research is needed to understand why this item exhibited a low factor loading in this population. A related limitation is the fact that the SPEQ assesses a subset of strategies used for constructing desired images (Conroy & Motl, 2003; Gammage, Hall, Prapavessis, et al., 2004). Thus, although the current findings provided support for the internal consistency and validity (i.e., factor structure, composition) of the SPEQ scores in this study, an important next step in this regard would be to test the scale in an independent sample of breast cancer survivors, and develop and test additional items to enable the exploration of a greater range of strategies used to create impressions. This may help improve the measurement of self-presentation processes within this population and help explain a greater proportion of the variance in physical activity behaviour. Finally, the use of a self-report measure to assess physical activity behaviour may have inherent limitations (e.g., inability to recall activities, intensity and duration, social desirability). Researchers should consider using a combination of self-report questionnaires and objective assessments (e.g., accelerometers, heart-rate monitors or pedometers) to obtain accurate estimates of energy expenditure.

Despite these limitations, the findings from this study make a contribution to theory and research. First, they provide new insight on the relationships between self-presentation processes, social cognitive constructs and physical activity among breast cancer survivors. Accordingly, this study provides support for the integration of self-presentation
processes and social cognitive variables into theories used to study physical activity behaviour among breast cancer survivors. Second, women who had recently completed treatment for cancer were targeted. It has been suggested that the completion of primary treatment for breast cancer is a ‘teachable moment’ for promoting health behaviours such as physical activity (Demark-Wahnefried & Jones, 2008), yet many studies that have focused on elucidating correlates of physical activity among breast cancer survivors have included long-term survivors. As such, this study provides novel insight into the associations between psychosocial variables and physical activity during this key time when women may be coping with their altered physical selves and general inactivity (Irwin et al., 2004). This finding is unique since studies adopting a self-presentation framework in exercise psychology have focused on young adult samples and little is known about modifiable factors related to physical activity among breast cancer survivors. Thus, this preliminary exploration may also help guide future practice in this area. Based on the current findings, researchers should examine whether interventions targeting impression motivation, self-presentational efficacy expectancy and outcome value effectively increase physical activity in this population.
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References


Table 1

*Baseline sample characteristics (N = 169)*

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<th>Variables</th>
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<td>Marital status (% married/living with partner)</td>
<td>66.9%</td>
</tr>
<tr>
<td>Menopausal status (% post-menopausal)</td>
<td>64.8%</td>
</tr>
<tr>
<td>Household income ($)</td>
<td>92,923 (70,190)</td>
</tr>
<tr>
<td><strong>Education level</strong></td>
<td></td>
</tr>
<tr>
<td>Did not complete high school (%)</td>
<td>5.3</td>
</tr>
<tr>
<td>High school diploma (%)</td>
<td>13.0</td>
</tr>
<tr>
<td>College or technical diploma/certificate (%)</td>
<td>21.3</td>
</tr>
<tr>
<td>University degree (%)</td>
<td>52.1</td>
</tr>
<tr>
<td><strong>Disease characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Treatment type</td>
<td></td>
</tr>
<tr>
<td>Lumpectomy (% yes)</td>
<td>79.3</td>
</tr>
<tr>
<td>Mastectomy (% single or double)</td>
<td>42.6</td>
</tr>
<tr>
<td>Chemotherapy (% yes)</td>
<td>80.5</td>
</tr>
<tr>
<td>Radiation therapy (% yes)</td>
<td>87.0</td>
</tr>
<tr>
<td>Hormonal therapy (% yes)</td>
<td>68.6</td>
</tr>
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</table>
Cancer stage

<table>
<thead>
<tr>
<th>Stage</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5.3</td>
</tr>
<tr>
<td>I</td>
<td>28.4</td>
</tr>
<tr>
<td>II</td>
<td>46.7</td>
</tr>
<tr>
<td>III</td>
<td>18.4</td>
</tr>
<tr>
<td>IV</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Time since diagnosis (months) 10.59 (3.55)

Time since primary treatment \(^a\) (months) 2.89 (2.86)

*Note.* \(^a\) Primary treatment = surgery, chemotherapy, radiation.
Table 2

*Mean scores, standard deviations, score ranges and reliability coefficients for study variables (N = 169)*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Range</th>
<th>Mean (SD)</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>α&lt;sup&gt;a&lt;/sup&gt;</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IM</td>
<td>1-6</td>
<td>3.18 (.91)</td>
<td>-.44</td>
<td>-.27</td>
<td>.85</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. IC</td>
<td>1-6</td>
<td>2.02 (.77)</td>
<td>.27</td>
<td>-1.21</td>
<td>.90</td>
<td>.66**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. SPEE</td>
<td>0-100</td>
<td>55.83 (22.33)</td>
<td>-.60</td>
<td>-.21</td>
<td>.94</td>
<td>.32**</td>
<td>.18*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. SPOE</td>
<td>1-6</td>
<td>3.45 (1.19)</td>
<td>-.52</td>
<td>.001</td>
<td>.94</td>
<td>.46**</td>
<td>.39**</td>
<td>.35**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5. SPOV</td>
<td>1-6</td>
<td>3.47 (1.21)</td>
<td>-.41</td>
<td>-.01</td>
<td>.93</td>
<td>.63**</td>
<td>.45**</td>
<td>.35**</td>
<td>.62**</td>
<td>-</td>
</tr>
<tr>
<td>6. MVPA (METS)</td>
<td>0-860</td>
<td>200.75 (187.41)</td>
<td>1.27</td>
<td>1.76</td>
<td>-</td>
<td>.22**</td>
<td>.12</td>
<td>.30**</td>
<td>.18*</td>
<td>.28**</td>
</tr>
</tbody>
</table>

*Note. IM = impression motivation. IC = impression construction. SPEE = self-presentational efficacy expectancy. SPOE = self-presentational outcome expectancy. SPOV = self-presentational outcome value. MVPA (METS) = mean sum of weekly moderate and strenuous metabolic equivalents.*

<sup>a</sup>Cronbach alpha coefficients.

* p < .05. ** p < .001.
Table 3

Hierarchical regression analysis examining associations between self-presentation processes, self-presentation efficacy variables and physical activity behaviour, controlling for body mass index (BMI) and age

<table>
<thead>
<tr>
<th>Variables</th>
<th>SPEE moderation model</th>
<th>SPOE moderation model</th>
<th>SPOV moderation model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>R²</td>
<td>ΔR²</td>
</tr>
<tr>
<td>Step 1:</td>
<td>4.57*</td>
<td>.05</td>
<td>.05</td>
</tr>
<tr>
<td>BMI</td>
<td>-6.75</td>
<td>2.50</td>
<td>-.21*</td>
</tr>
<tr>
<td>Age</td>
<td>2.36</td>
<td>1.36</td>
<td>.13*</td>
</tr>
<tr>
<td>Step 2:</td>
<td>4.58*</td>
<td>.10</td>
<td>.05</td>
</tr>
<tr>
<td>IM</td>
<td>50.84</td>
<td>20.96</td>
<td>.25*</td>
</tr>
<tr>
<td>IC</td>
<td>-7.83</td>
<td>24.42</td>
<td>-.03</td>
</tr>
<tr>
<td>Step 3:</td>
<td>5.05*</td>
<td>.14</td>
<td>.04</td>
</tr>
<tr>
<td>SPEE</td>
<td>1.54</td>
<td>.61</td>
<td>.21*</td>
</tr>
<tr>
<td>SPOE</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPOV</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 4:</td>
<td>6.99*</td>
<td>.24</td>
<td>.10</td>
</tr>
<tr>
<td>IMxSPEE</td>
<td>2.16</td>
<td>.78</td>
<td>.30*</td>
</tr>
<tr>
<td>ICxSPEE</td>
<td>.45</td>
<td>1.10</td>
<td>.05</td>
</tr>
<tr>
<td>IMxSPOE</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICxSPOE</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMxSPOV</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICxSPOV</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. IM = impression motivation. IC = impression construction. SPEE = self-presentational efficacy expectancy. SPOE = self-presentational outcome expectancy. SPOV = self-presentational outcome value. MVPA = minutes per week of moderate-to-vigorous physical activity.

* p < .05.
Figure 1. Graph of the interaction effect of impression motivation and self-presentational efficacy expectancy on moderate-to-vigorous physical activity (MVPA). IM = impression motivation. SPEE = self-presentational efficacy expectancy. MVPA (METS) = mean sum of weekly moderate and strenuous metabolic equivalents.
Figure 2. Graph of the interaction effect of impression motivation and self-presentational outcome value on moderate-to-vigorous physical activity (MVPA). IM = impression motivation. SPOV = self-presentational outcome value. MVPA (METS) = mean sum of weekly moderate and strenuous metabolic equivalents.
Bridging Text

The main findings from chapter five can be summarized as:

1) A 19-item version of the Self-Presentation in Exercise Questionnaire is reliable and valid, and therefore, an adequate measure of self-presentation processes in this sample of breast cancer survivors;

2) Women’s desire to monitor the impressions other people form of them (i.e., impression motivation) was significantly and positively associated with physical activity behaviour;

3) Women who want to create the impression of being athletic, lean and fit, and believe they can successfully do so (i.e., self-presentation self-efficacy) or place a lot of importance on making this impression (i.e., self-presentation outcome value), are more active than women who want to create this impression but doubt their ability or do not place a lot of importance on making this impression.

Although these findings make contributions to literature on self-presentation, the cross-sectional design of the study precluded testing of the relationships between self-presentation processes and physical activity behaviour at the within-person levels. Therefore, chapter six addresses this limitation and presents an investigation of both within- and between-person self-presentation processes and their relation to physical activity behaviour.
Chapter Six

A Prospective Investigation of the Relationship between Self-Presentation and Physical Activity in Breast Cancer Survivors

Jennifer Brunet\textsuperscript{1}, Patrick Gaudreau\textsuperscript{2}, & Catherine M. Sabiston\textsuperscript{1}

\textsuperscript{1}McGill University, Montreal

\textsuperscript{2}University of Ottawa, Ottawa

Submitted to a peer-reviewed journal
Abstract

In the current study, we: (1) describe naturally occurring changes in self-presentation processes (i.e., impression motivation, impression construction) and moderate- and vigorous-intensity physical activity (MVPA) over a period of six-months among women who were treated for breast cancer, (2) evaluate the associations between cancer-specific factors and self-presentation processes, and MVPA, and (3) examine the within- and between-person associations between self-presentation processes and MVPA. For this prospective longitudinal study, women (n = 128; M_age = 55.14) completed questionnaires post-treatment for breast cancer (M_time since treatment = 3.96 months), as well as 3 and 6 months later. Based on the findings of the multilevel analysis, self-presentation processes remained stable over time, whereas MVPA levels changed over time [B_linear = 6.11, SE = 2.44, B_quadratic = -3.41, SE = 1.23]. Radiotherapy was related to impression motivation (B = -.40, SE = .19) and impression construction (B = -.45, SE = .15), and chemotherapy was related to impression motivation (B = .31, SE = .15). Impression motivation at the between-person level was associated with MVPA (γ01 = 5.72, SE = 1.22), and impression construction at the between- and within-person levels was associated with MVPA (γ01 = 3.45, SE = 1.49; γ10 = 3.67, SE = 1.66). There is a need to integrate MVPA interventions as women approach the six month post-treatment mark. Including self-presentation processes into theoretical frameworks aimed at explaining MVPA behaviour in this population, as well as into future interventions designed to promote MVPA, might be useful.

Keywords: Impression management, oncology, survivorship, health behaviour, longitudinal design.
**Introduction**

Breast cancer treatments result in a number of side effects such as pain, lymphedema, nausea, fatigue, lung fibrosis, cardiomyopathy, cardiotoxicity, weight gain, muscle loss/weakness, osteoporosis, and decreased well-being (Burstein & Winer, 2000; Ward, Kuta, Sanborn, & Burt, 2003), with effects spanning several years. Physical activity at moderate-to-vigorous intensity (MVPA) has been identified as a nonpharmacological alternative to prevent or relieve many of the side effects resulting from treatment for breast cancer (Demark-Wahnefried & Jones, 2008). MVPA has also been linked to a variety of health benefits in this population, such as improved cardiorespiratory fitness, muscle strength, aerobic fitness, physical functioning, quality of life, as well as reduced fatigue, anxiety, depression, and risk of mortality (McNeely et al., 2006; Sabiston & Brunet, 2011). In light of this evidence, there is wide consensus that women treated for breast cancer should adopt a physically active lifestyle (Brunet, Sabiston, & Meterissian, in press, see Appendix A; Schmitz et al., 2010).

Despite the reported benefits of MVPA, the majority of women treated for breast cancer are not sufficiently active at levels known to yield health benefits (Devoogdt et al., 2010; Harrison, Hayes, & Newman, 2009; Littman, Tang, & Rossing, 2010). Identifying factors related to MVPA among women treated for breast cancer is an important research endeavor to develop targeted and effective intervention to help offset the adverse physical changes experienced and maintain optimal health and well-being. In this study, we used self-presentation as a guiding theoretical framework to examine factors associated with MVPA over time among women in the period shortly following completion of primary treatment for breast cancer.
**Breast Cancer: The Impact on Women’s Self-Image**

Breast cancer survivorship is a critical period when many women experience notable changes in their body weight and shape (Irwin et al., 2005). Women might perceive that their physique post-treatment is far from the idealized female body, which is characterized by flawless skin, thinness, and well-developed breast in Western societies (Cash & Pruzinsky, 2002). As such, breast cancer may act as a catalyst for the development of negative physical self-perceptions (Fobair et al., 2006; Frith, Harcourt, & Fussell, 2007). Breast cancer may also increase women’s awareness of how their physique is viewed by others because people’s impressions of others are often influenced by physical appearance.

Physically attractive individuals are “perceived as more sociable, dominant, intelligent, socially skilled, and adjusted” than unattractive individuals (Leary, 1996, p. 25). Women who experience changes in their physical appearances as a result of breast cancer treatments might become motivated to control the impressions others form of them. This goal-directed process that is known as self-presentation or impression management (Leary & Kowalski, 1990). Women might engage in self-presentation to make desirable impressions, as well as to thwart potential cancer stigmas and decrease their fear of social rejection (Holland & Reznik, 2005). According to Leary (1996), stigmatized individuals are negatively evaluated and treated differently by others. Thus, women might want to self-present in ways that minimize the impact of the cancer stigma.

Moreover, women’s motivation to present a physically attractive physique might motivate them to use strategies that mitigate the physical changes associated with breast cancer and help them obtain the ideal body morphology and structure. Physical activity is likely one such strategy because it has been shown to help women lose weight, avoid weight gain, gain
muscle tone, and lose body fat (Cadmus et al., 2009; Irwin et al., 2009). From this perspective, women might engage in physical activity to help them improve their appearances and shape the impressions formed by others. However, the associations between self-presentation processes and physical activity have not been examined among women during the months following treatment when they are negotiating their new bodies and reactions of others.

**Self-Presentation Framework**

The self-presentation model of Leary and Kowalski (1990) may provide a framework to examine this research question. In this two-component model, two discrete sets of processes are identified: impression motivation and impression construction. *Impression motivation* refers to how motivated individuals are to control how they are perceived by others in a particular social encounter. *Impression construction* involves deciding which impression to convey to others and the particular strategies in which individuals engage in, either implicitly or explicitly, to create this impression (Leary & Kowalski, 1990).

Researchers have used the self-presentation model to better inform and enrich the understanding of various health behaviours, such as dieting, exercising and smoking (Conroy, Motl, & Hall, 2000; Gammage, Hall, & Martin Ginis, 2004; Mack, Strong, Kowalski, & Crocker, 2007; Martin Ginis & Leary, 2004; Martin & Leary, 2001). For example, Lindwall et al. (2005) reported that both impression motivation and impression construction were positively related to exercise frequency and duration for university students. Brunet and Sabiston (in press; see Chapter Five) found that impression motivation was positively associated with MVPA in a sample of women recently treated for breast cancer. Collectively, these researchers have provided a needed but static view of the relationships between self-presentation processes and physical activity across different samples; yet, they relied on cross-sectional study designs which
only allow for the examination of between-person associations (Curran & Bauer, 2011). Thus, testing the links between self-presentation processes and physical activity at the within-person level is needed to provide a superior test of the theoretical associations believed to exist between these processes and physical activity (Bliese, Chan, & Ployhart, 2007; Curran & Bauer, 2011).

Women’s physical activity levels change over time during the early stage of breast cancer survivorship (Harrison et al., 2009; Littman et al., 2010). It is equally possible that their motivation to convey a desired impression might change over time as they experience changes to their outward appearances and strive to minimize other’s negative reactions. Therefore, prospective longitudinal studies seem warranted to investigate whether changes in self-presentation processes are significantly related to physical activity over time. In this type of study, researchers could disentangle the relationships of both of impression motivation and impression construction with physical activity at both the within- and between-person levels of analysis (Curran & Bauer, 2011). Moreover, researchers should use analytic strategies (e.g., multilevel modeling) to simultaneously examine the degree to which the variability in physical activity levels of women is related to variability in their self-presentation processes (i.e., within-person), as well as whether women who on average report higher levels of self-presentation processes generally report higher levels of physical activity (i.e., between-person; Raudenbush & Bryk, 2002). Because within- and between-person relationships may differ in magnitude and direction (Snijders & Bosker, 1999), addressing these two different but complementary research questions can provide valuable information that can lead to a better understanding of the multi-level associations between self-presentation processes and physical activity.
The Current Study

The first objective of our study was to describe naturally occurring changes in women’s impression motivation, impression construction and MVPA over a period of six-months, with data collected three (Time 1), six (Time 2) and nine (Time 3) months following the completion of primary treatment for breast cancer. These relatively short time intervals will allow us to determine if there are fluctuating levels of impression motivation, impression construction and MVPA during the first few months following the end of treatment. Specifically, we will be able examine whether women keep increasing (or at least maintain) their MVPA levels or if a rapid increase is subsequently followed by a swift decline in MVPA levels.

Our second objective was to evaluate the associations between cancer-specific factors and impression motivation, impression construction and MVPA. Researchers have examined if women’s physical self-perceptions differ according to cancer-specific factors, but their findings have been mixed (Collins et al., 2011; Ganz, Rowland, Meyerowitz, & Desmond, 1998; Schover et al., 1995). Furthermore, there is an absence of data on self-presentation processes in this population and little has been done to examine if cancer-specific factors (e.g., treatment modalities, stage, time since treatment) explain individual differences in levels of MVPA that might exist among women treated for breast cancer (Andrykowski, Beacham, & Jacobsen, 2007; Devoogdt et al., 2010; Harrison et al., 2009; Irwin et al., 2004). Knowledge of the cancer-specific factors that can explain both the individual differences (i.e., between-person) and differing patterns of changes (i.e., within-person) in self-presentation processes and MVPA among women treated for breast cancer can help identify women in greater need of psychosocial interventions and physical activity programs. We hypothesized that women diagnosed with a higher cancer stage and who had surgery would report higher levels of impression motivation
and impression construction, and lower levels of MVPA than women diagnosed with a lower cancer stage and did not have surgery, respectively. We also hypothesized that women who received chemotherapy, radiotherapy and hormonal therapy would report higher levels of impression motivation and impression construction, and lower levels of MVPA than women who did not receive chemotherapy, radiotherapy and hormonal therapy, respectively. Furthermore, we hypothesized that time since treatment would be positively associated with impression motivation, impression construction, and MVPA. Our final objective was to disentangle the within- and between-person relationships of impression motivation and impression construction with MVPA, after controlling for age and body mass index. These variables were controlled for in the analyses based on previous findings (Brunet & Sabiston, in press, see Chapter Five). We expected women to report higher levels of MVPA at times when they reported higher levels of impression motivation or impression construction compared to times when they personally reported lower levels of impression motivation or impression construction (i.e., within-person hypothesis). In addition, we expected women reporting higher average levels of self-presentation processes to report higher levels of MVPA compared to the average of the sample (i.e., between-person hypothesis).

Methods

Procedures and Participants

Data were drawn from an ongoing longitudinal study examining the impact of physical activity on breast cancer survivors’ physical and mental health. Prior to starting recruitment, we obtained approval for our study from the Research Ethics Committee at the University and the Hospitals in [location withheld for review]. We recruited participants through advertisements and oncologist referrals from various local medical clinics and hospitals. Interested participants
were asked to contact the research team by phone to obtain additional details on the study and were screened for eligibility. Women were eligible to participate in the study if they met the following criteria: (a) women of 18 years of age or older, (b) 0-20 weeks post primary treatment (i.e., surgery, chemotherapy, radiation therapy), (c) diagnosed with stage I-III breast cancer, (d) ability to provide written informed consent, read and speak in English or French, and (e) report no health concerns that prevent them from engaging in physical activity.

For the current study, we asked participants to sign an informed consent form and complete a self-administered questionnaire at baseline (Time 1), three months later (Time 2), and six months later (Time 3). Out of the 197 participants who completed baseline questionnaires, 128 participants (65%) completed both follow-up assessments and had less than 2.0% of their data missing at each of the three time points. Participants were between the ages of 28 and 79 years ($M = 55.14$, $SD = 10.55$). The median household income was $70,000. The majority of participants were White (88.3%), 30.7% held a graduate degree, 65.4% were married or cohabitating, and 65.6% were post-menopausal. Most participants had been diagnosed with stage I or II breast cancer (73.8%). Mean time since diagnosis was 10.92 months ($SD = 4.08$) and since completion of systemic treatments was 3.96 months ($SD = 3.16$) at Time 1. The cancer treatments endured included: 73.8% lumpectomy, 37.4% single mastectomy, 26.9% double mastectomy, 77.0% chemotherapy, 87.5% radiotherapy, and 63.3% hormonal therapy. Group comparisons were conducted to examine whether women who provided data at all three time points differed from women who did not. Analysis of variance (ANOVA) was used to compare the continuous variables and chi-square ($\chi^2$) was used to compare the dichotomous and nominal variables. Results of the ANOVA indicated no differences according to age, household income, and time since primary treatment ($ps \geq .11$). Results of the $\chi^2$ analysis indicated no significant
difference between the groups based on ethnicity (White versus other), education, stage of
cancer, lumpectomy, mastectomy (single or double), chemotherapy, radiotherapy, and hormonal
therapy ($ps \geq .12$).

Measures

Demographics. We assessed personal and cancer-related characteristics at Time 1.
Personal characteristics included age (in years), level of education (0 = no certificate, diploma or
degree, 1 = high school certificate or equivalent, 2 = some post-secondary education, 3 = college
or technical diploma or certificate, 4 = university undergraduate degree, 5 = university degree
above the bachelor’s level), household income (in dollars), menopausal status (0 = peri-
menopausal, 1 = menopausal, 2 = post-menopausal), and self-identified ethnicity using the
categories provided by Census Canada. Ethnicity was dichotomized as women who reported
being white versus being non-white because of the small proportion of several of the groups of
non-white participants. Cancer-related characteristics included stage of breast cancer at
diagnosis (I, II, III), treatments received [lumpectomy (no = 0, yes = 1), single/double
mastectomy (no = 0, yes = 1), radiation therapy (no = 0, yes = 1), chemotherapy (no = 0, yes =
1), hormonal therapy (no = 0, yes = 1)], and dates of treatment completion (in days and months).

Self-presentation processes. We used the Self-Presentation in Exercise Questionnaire
(SPEQ; Conroy, Motl, & Hall, 1998) to assess self-presentation processes at each time point.
The SPEQ includes an impression motivation subscale (10-items, e.g., “I want to be thought of
as a person who exercises”) assessing an individual’s motivation to be perceived as an exerciser,
and an impression construction subscale (10-items; e.g., “I emphasize my athletic ability around
those who do not yet know that I am an exercise nut”) assessing the use of strategies (i.e.,
exercise) to convey such impressions. Each item is scored on a 6-point Likert scale anchored at
the extremes by *strongly disagree* and *strongly agree*. We calculate a total score by computing the mean value for each subscale, where higher scores represent higher impression motivation and impression construction. Based on previous psychometric testing of this measure with breast cancer survivors, we excluded item six (i.e., the only negatively worded item) in the computation of the mean scores (Brunet & Sabiston, in press; see Chapter Five).

**Physical activity.** We assessed physical activity at each time point using the first item from the 2-item 7-day recall Leisure Time Exercise Questionnaire (LTEQ; Godin & Shephard, 1985). Similar to previous research within this population (Andrykowski et al., 2007; Vallance, Plotnikoff, Karvinen, Mackey, & Courneya, 2010), we modified the question to ask participants to report the frequency per week and average duration of strenuous, moderate, and mild physical activity sessions. We transformed scored into weekly metabolic equivalents (METS) by multiplying weekly minutes of strenuous, moderate, and mild physical activity by nine, five and three respectively (Andrykowski et al., 2007). Then, we calculated MVPA scores by summing strenuous and moderate METS. Researchers have reported acceptable reliability coefficients (i.e., two-week test-retest reliability $r = .74$), as well as evidence for the construct validity of the first item of the LTEQ by showing moderate positive correlations with subjective and objective measures of physical activity (e.g., accelerometer $r \geq .32$) and fitness in various populations ($VO_{2max} r \geq .24$; Godin & Shephard, 1985; Jacobs, Ainsworth, Hartman, & Leon, 1993; Motl, McAuley, & DiStefano, 2005).

**Data Analyses**

We examined the data for accuracy of entry, patterns of missing data, potential outliers and for violations of the assumptions of multivariate analysis following the procedures outlined in the data screening strategies and recommendations from Tabachnick and Fidell (2007). We
used expectation maximization procedures (Dempster, Laird, & Rubin, 1977) to replace the missing data for each case. Then, we analyzed the data using multilevel modeling using Restricted Maximum Likelihood (REML) estimation in SPSS because it considers the non-independence of repeated measures and accounts for the hierarchical nature of the longitudinal data (i.e., repeated observations were nested within participants). First, we tested three unconditional models to provide information on the proportion of variance explained by within- and between-subject effects in impression motivation, impression construction and MVPA. We used these values to estimate the intra-class correlations using the following formula: \( \tau / (\sigma^2 + \tau) \), where \( \tau \) and \( \sigma^2 \) represents the between- and within-person variance, respectively. Second, we added linear and quadratic time effects to all three models as fixed and random effects to assess changes in impression motivation, impression construction and MVPA scores (Objective 1). We used a diagonal covariance matrix for the fixed effects (i.e., assumes independence of the correlated residuals between time points) and an unstructured covariance matrix for the random effects (i.e., assumes non-zero covariances among random effects). We centered the time variable at Time 1 (Time 1 = 0, Time 2 = 1, Time 3 = 2). Third, we added cancer-specific characteristics to the models as between-person factors to assess whether they were associated with the outcome variables (Objective 2). We tested separate models for each characteristic to conserve statistical power. Finally, we tested two models to examine the associations of impression motivation and impression construction with MVPA (Objective 3). In each of these models, we included the between- and within-person fixed effects to allow for the disaggregation of the between- and within-person effects of the independent variables (i.e., impression motivation or impression construction) on the dependent variable (i.e., MVPA; Raudenbush & Bryk, 2002). To enable the examination of the within- and between-person effects, we
calculated person-mean (also called group-mean) and grand-mean centered variables, respectively. For person-mean centered variables, we subtracted each person’s mean scores across the three time points from their time-specific scores. For grand-mean centered variables, we subtracted the average score of all individuals in the sample (pooled across the three times) from the average score of each individual (pooled across the three times; Curran & Bauer, 2011). We tested separate models for impression motivation and impression construction because these variables were highly correlated and the variance inflation factor provided evidence of multicollinearity in preliminary regression analyses. Of note, age and body mass index were tested as potential confounders by adding them to the multilevel models since they are related to self-presentation processes and/or MVPA (Brunet & Sabiston, in press; see Chapter Five). The analyses including these variables showed the same results. For reasons of parsimony, we only present results for the final models that excluded these potential confounders.

Results

Preliminary and Descriptive Analyses

Less than 2% of the data were missing and the assumptions of normality, homoscedasticity, and linearity required by regression analyses were met. Means, standard deviations, internal consistency coefficients, and effect sizes (small, medium and large effects = .20, .50, ad .80, respectively; Cohen, 1988) for all variables for each time point are presented in Table 1. Based on the unconditional models, 51%, 33% and 44% of the variance in these variables was explained by between-person effects.

Objective 1: Changes in Self-Presentation Processes and MVPA

There was no significant linear or quadratic effect for time on impression motivation [unstandardized $B_{\text{linear}} = -.02, SE = .10, p = .86$; unstandardized $B_{\text{quadratic}} = -.02, SE = .05, p = .73$]
and impression construction [unstandardized $B_{\text{linear}} = -.10, SE = .10, p = .28$; unstandardized $B_{\text{quadratic}} = .06, SE = .05, p = .22$] in the multilevel models including fixed and random effects. In contrast, significant linear and quadratic effects for time were found for MVPA [unstandardized $B_{\text{linear}} = 6.11, SE = 2.44, p < .05$; unstandardized $B_{\text{quadratic}} = -3.41, SE = 1.23, p < .01$]. Levels of MVPA increased from Time 1 to Time 2 and decreased from Time 2 to Time 3.

Objective 2: Links among Cancer-Specific Factors, Self-Presentation Processes and MVPA

The results from the multilevel models for cancer characteristics are summarized in Table 2. We entered each cancer characteristic in separate models as a fixed effect, in addition to the linear and quadratic effects of time. Radiotherapy was a significant independent predictor of impression motivation (unstandardized $B = -.40, SE = .19, p < .05$) and impression construction (unstandardized $B = -.45, SE = .15, p < .01$). In addition, chemotherapy was a significant independent predictor of impression motivation (unstandardized $B = .31, SE = .15, p < .05$). We added interaction terms between the cancer characteristics and time (linear and quadratic) to the models, but they were not significant and were removed from the final models. Radiotherapy and chemotherapy were significantly related to levels of impression motivation and impression construction, but not to linear or quadratic changes in these variables. Furthermore, none of the cancer-specific factors related to MVPA.

Objective 3: Links among Self-Presentation Processes and MVPA

We tested two separate multilevel regression models to examine the associations of impression motivation and impression construction with MVPA over time at the within- and between-person level. These results are presented in Table 3. In the first model, impression motivation at the between-person level was significantly associated with MVPA ($\gamma_{01} = 5.72, SE = 1.22, p < .001$), whereas impression motivation at the within-person level was not significantly
associated with MVPA. In the second model, impression construction at the between-person ($\gamma_{01} = 3.45, SE = 1.49, p < .05$) and within-person ($\gamma_{10} = 3.67, SE = 1.66, p < .05$) levels was significantly associated with MVPA.

**Discussion**

In this study, we used a prospective longitudinal design to examine (1) natural changes in self-presentation processes and MVPA during the early period of cancer survivorship, (2) differences in women’s patterns of impression motivation, impression construction and MVPA based on cancer characteristics, and (3) the association between self-presentation processes and MVPA over time at the within- and between-person level. We observed that self-presentation processes remained stable over time, whereas MVPA levels changed over time. We also found that levels of impression motivation and impression construction, but not MVPA, differed according to some cancer characteristics. Last, we established that self-presentation processes had both within- and between-person associations with MVPA.

Contrary to the hypothesis, women reported stable and moderate levels of impression motivation, and stable and low levels of impression construction. These findings suggest self-presentation processes are generally steady in the period shortly after completion of treatment for breast cancer. Given that this is the first study to assess changes in self-presentation processes over time and we examined natural changes in these processes, rather than intervene to change them, it would be premature to conclude that self-presentation processes are not malleable to change during survivorship. Indeed, self-presentation processes are believed to have situational manifestations and fluctuations (Leary & Kowalski, 1990). Thus, future experimental research is needed to determine if these processes can be manipulated through interventions. This line of inquiry into the state or trait nature of these constructs is consistent with questions pertaining to
similar constructs such as social physique anxiety (Hart, Leary, & Rejeski, 1989). For example, social physique anxiety was originally conceptualized as a trait characteristic (Hart et al., 1989), yet researchers have revealed that social physical anxiety can differ across contexts (Brunet & Sabiston, 2011; Ransdell, Wells, Manore, Swan, & Corbin, 1998). Based on the literature with similar constructs, impression motivation and impression construction levels might also vary across contexts. Thus, there might be other reasons for why change was not observed in our study. First, change in self-presentation processes might have occurred prior to breast cancer diagnosis and treatment. As women age, they frequently lose lean body mass and gain body fat, notice wrinkles and fine lines, and the size, firmness and fullness of their breasts might decrease (Heymsfield et al., 1994). Since the mean age in this sample was 55 years, many physical changes likely started prior to women’s breast cancer diagnosis and treatments, and their motivation to self-present desirable images might have increased then and is now stable. As such, fluctuations in self-presentation processes might be centered on age-related changes rather than cancer-related changes. Second, women may still have been focused on learning how to cope with the many issues brought on as a result of their diagnosis and treatments and trying to address their fears about relapse and survival. Thus, changes in self-presentation processes may occur later on during the survivorship period. Another reason we did not observe change is that the SPEQ may not be sensitive enough to allow researchers to detect changes as a result of breast cancer. Although researchers have assessed the reliability (i.e., internal consistency) and cross-sectional validity of the SPEQ (Brunet & Sabiston, in press; see Chapter Five; Conroy et al., 2000; Gammage, Hall, Prapavessis, et al., 2004), it has never been used to detect change. In light of the growing recognition of the need for longitudinal and experimental studies, conceptual and methodological advancements are required to determine if self-presentation processes are
trait and/or state characteristics, examine when these processes change, and develop a measure that can capture change over time in self-presentation processes.

Contrary to the hypothesis, MVPA did not increase during the early survivorship period. Rather, women’s levels of MVPA initially increased over the first three months, albeit not significantly, and decreased significantly thereafter. Similarly, Harrison et al. (2009) reported that women’s moderate-intensity physical activity levels initially increased and then decreased post treatment for breast cancer. In contrast, Pinto, Trunzo, Reiss, and Shiu (2002) showed that women’s MVPA levels did not change significantly during the first 12 months post-surgery. A possible explanation for the pattern of change we observed is that women diagnosed with cancer report motivation to modify their health behaviours shortly after treatment to prevent recurrence (Demark-Wahnefried & Jones, 2008). However, it might be difficult for women to sustain their activity levels over time when they re-engage in life roles and return to work. Returning to work has been cited as a period of heightened distress because of potential problems (e.g., loss of job, changed working conditions, demotion, difficulties with co-workers; Maunsell, Brisson, Dubois, Lauzier, & Fraser, 1999). Thus, as women regain their work and other responsibilities, they might have less time and opportunity to engage in physical activity. Alternatively, MVPA decreases might reflect a lack of interest and/or enjoyment in the physical activities women were engaging in, decreased support from family and friends to be active, or loss of motivation to remain active. Researchers should examine these propositions to identify predictors of MVPA decreases among women in the early survivorship phase. Furthermore, physical activity intervention strategies should be integrated into women’s treatment plan as they approach the six-month post-treatment timeframe given the decreases in MVPA we observed at this time.
Our second objective was to examine if cancer-specific factors related to self-presentation processes and MVPA. We found that women who received radiotherapy reported lower levels of impression motivation and impression construction than women who did not receive this treatment, and women who received chemotherapy reported higher levels of impression motivation than women who did not receive this treatment. Radiotherapy might result in tissue damage, pain, decreased range of motion, and fatigue (Shapiro & Recht, 2001; Ward et al., 2003). These changes are often invisible to others and can disrupt women’s ability to perform normal life roles, which might shift women’s concerns about their appearance toward regaining function. In contrast, chemotherapy can result in nausea, vomiting, skin tone and colour changes, alopecia, and weight gain (Goodwin et al., 1999; Shapiro & Recht, 2001). The latter three side effects are visible which likely heighten women’s perception that others will negatively evaluate them, and in turn their motivation to self-present. Notwithstanding this observation, it was surprising that the other treatments such as surgery and hormonal therapy, which might also exert visible side effects (Ward et al., 2003), were not associated with the self-presentation processes. However, researchers investigating women’s physical self-perceptions in relation to cancer treatments (e.g., surgery, adjuvant therapy) have found non-significant and positive associations (Collins et al., 2011; Ganz et al., 1998; Schover et al., 1995). More research focusing on the links between treatment side effects and self-presentation processes is needed to help explain the associations (or lack thereof) between these variables.

In line with the work of Hong et al. (2007), none of the cancer-specific factors were associated with MVPA. In contrast, others have documented that time from diagnosis, adjuvant treatment and cancer stage were related to decreases in physical activity (Devoogdt et al., 2010; Harrison et al., 2009; Irwin et al., 2003). Given that these variables have been shown to
influence change in MVPA from pre- to post-diagnosis, it is possible that cancer-specific factors no longer exert a significant influence on MVPA in the months following treatment. Accordingly, women should be encouraged to increase their MVPA levels following treatment for breast cancer, regardless of the treatments received, stage of cancer, and time since treatment.

Most theories developed to understand and predict physical activity focus on within-person processes to explain relations among variables within each individual. In addition, change occurs within individuals, highlighting the need to examine intra-person variations. However, researchers often utilize research designs and analytical strategies that focus on inter-person variations and between-person processes (Curran & Bauer, 2011). To fill this gap in the literature, we used a prospective study design, coupled with multilevel modeling, and provided support for between- and within-person relationships between self-presentation processes and MVPA. The between-person links show that women who reported higher overall levels of impression motivation and impression construction reported higher levels of MVPA. This is consistent with the findings from cross-sectional studies with women recently treated for breast cancer (Brunet & Sabiston, in press; see Chapter Five) and young adults in the general population (Gammage, Hall, & Martin Ginis, 2004; Lindwall, 2005; Motl & Conroy, 2000). Based on the within-person associations, women were more active at times when their levels of impression construction were higher relative to their average levels. This represents an important step in confirming Leary’s (1992) theoretical propositions by demonstrating tenable within-person processes.

The findings from our study should be interpreted with the following limitations in mind. Participants were a convenience sample of women and 35% of the sample recruited at Time 1 were not included in the analyses because they had dropped out of the study ($n = 25; 12.5\%$) or
had not completed Time 2 and 3 data collections at the time of the analyses (n = 44; 22.5%). However, demographic characteristics and medical factors of our analytical sample are comparable to samples in previous research and did not differ significantly on demographic and medical factors from those excluded from the analyses. Second, we used the SPEQ which was originally developed for non-cancer populations and has only been used in cross-sectional studies. Whereas the factor structure of the SPEQ has been confirmed within this population (Brunet & Sabiston, in press; see Chapter Five), this measure might not be sensitive enough to capture changes in women’s desire to control/monitor others impression of them. Finally, though the longitudinal nature of our study is a notable strength, having only three assessments did not allow us to explore more complex non-linear changes in these variables. Researchers should examine self-presentation processes and MVPA across more time points, as well as across different segments of the cancer continuum, to gain a better understanding of the patterns of change and associations between these variables and related constructs throughout the cancer continuum.

Despite these limitations, our study makes important contributions to self-presentation, physical activity and psychosocial oncology literatures. To date, many studies with women treated for breast cancer have included other types of cancer, other points on the cancer continuum (e.g., post-diagnosis/pre-treatment, long-term survivors), and included only one or two data points. We examined natural changes in impression motivation, impression construction and MVPA and had data that spanned the early survivorship period when women who survived breast cancer may be negotiating their new bodies and the resulting reactions of others. Also, our study is the first to collect data on self-presentation process and MVPA prospectively. Based on our results, there is a need to integrate physical activity interventions
before women approach the six month post-treatment mark because women’s levels decreased at this time. However, it is premature to make conclusions about whether self-presentation can be used as a guiding framework to promote change in MVPA in this population before interventions that target self-presentation processes are tested for their effectiveness in changing MVPA. Nevertheless, the use of Leary and Kowalski’s (1990) self-presentation framework in our study helped to expand current knowledge of the associations between self-presentation processes and MVPA and confirmed the utility of the framework within a breast cancer survivor population.
Acknowledgments

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References


SELF-PRESENTATION AMONG BREAST CANCER SURVIVORS


Table 1

Descriptive Statistics and Effect Sizes for Differences Across Time for Impression Motivation, Impression Construction and Physical Activity

<table>
<thead>
<tr>
<th>Variables</th>
<th>Range</th>
<th>αa</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Impression motivation</td>
<td>1-6</td>
<td>.83</td>
<td>3.16 (.90)</td>
<td>3.13 (.97)</td>
<td>3.06 (.93)</td>
<td>.06 .13</td>
</tr>
<tr>
<td>Impression construction</td>
<td>1-6</td>
<td>.91</td>
<td>1.99 (.79)</td>
<td>1.95 (.83)</td>
<td>2.03 (.84)</td>
<td>.08 .15</td>
</tr>
<tr>
<td>Physical activity (METS)</td>
<td>0-α</td>
<td>.</td>
<td>25.34 (20.04)</td>
<td>28.04 (18.85)</td>
<td>23.92 (18.55)</td>
<td>.18 .32</td>
</tr>
</tbody>
</table>

Notes. Physical activity (METS) = weekly metabolic equivalent units of moderate-to-vigorous intensity physical activity.
Table 2

*Results of the Multilevel Regressions of Cancer-Specific Factors on Self-Presentation Processes and Physical Activity Behaviour*

<table>
<thead>
<tr>
<th>Variables</th>
<th>IM Estimate</th>
<th>S.E.</th>
<th>IC Estimate</th>
<th>S.E.</th>
<th>MVPA Estimate</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer stage</td>
<td>.17</td>
<td>.10</td>
<td>.01</td>
<td>.09</td>
<td>-2.10</td>
<td>1.95</td>
</tr>
<tr>
<td>Time since treatment</td>
<td>-.03</td>
<td>.03</td>
<td>-.02</td>
<td>.02</td>
<td>-.33</td>
<td>.46</td>
</tr>
<tr>
<td>Lumpectomy (no = 0)</td>
<td>-.03</td>
<td>.15</td>
<td>-.04</td>
<td>.13</td>
<td>.25</td>
<td>2.85</td>
</tr>
<tr>
<td>Mastectomy (no = 0)</td>
<td>-.06</td>
<td>.15</td>
<td>.08</td>
<td>.12</td>
<td>-2.19</td>
<td>2.78</td>
</tr>
<tr>
<td>Chemotherapy (no = 0)</td>
<td>.31*</td>
<td>.15</td>
<td>.11</td>
<td>.13</td>
<td>2.10</td>
<td>2.97</td>
</tr>
<tr>
<td>Radiotherapy (no = 0)</td>
<td>-.40*</td>
<td>.19</td>
<td>-.45*</td>
<td>.15</td>
<td>.22</td>
<td>3.61</td>
</tr>
<tr>
<td>Hormonal therapy (no = 0)</td>
<td>-.02</td>
<td>.15</td>
<td>.01</td>
<td>.12</td>
<td>-.64</td>
<td>2.78</td>
</tr>
</tbody>
</table>

*Notes. a Separate models were tested for each characteristic to conserve statistical power. Parameters are unstandardized coefficients. Interaction effects of cancer characteristics by time (linear and quadratic) were also tested but were not significant, and thus removed from the analyses to conserve statistical power. IM = impression motivation. IC = impression construction. MVPA = weekly metabolic equivalent units of moderate-to-vigorous intensity physical activity. * indicates significance at p < .05.*
Table 3

*Results of the Multilevel Regressions*

<table>
<thead>
<tr>
<th>Model A: Impression motivation</th>
<th>Physical activity (METS)</th>
<th>Estimate</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept ^a</td>
<td></td>
<td>25.21</td>
<td>1.26***</td>
</tr>
<tr>
<td>Main effect of linear time</td>
<td></td>
<td>6.16</td>
<td>3.06*</td>
</tr>
<tr>
<td>Main effect of quadratic time</td>
<td></td>
<td>-3.36</td>
<td>1.47*</td>
</tr>
<tr>
<td>Main effect of impression motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between-person effect</td>
<td></td>
<td>5.72</td>
<td>1.22***</td>
</tr>
<tr>
<td>Within-person effect</td>
<td></td>
<td>2.54</td>
<td>1.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model B: Impression construction</th>
<th>Physical activity (METS)</th>
<th>Estimate</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept ^a</td>
<td></td>
<td>25.33</td>
<td>1.31***</td>
</tr>
<tr>
<td>Main effect of linear time</td>
<td></td>
<td>6.47</td>
<td>2.46**</td>
</tr>
<tr>
<td>Main effect of quadratic time</td>
<td></td>
<td>-3.42</td>
<td>1.23**</td>
</tr>
<tr>
<td>Main effect of impression construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between-person effect</td>
<td></td>
<td>3.45</td>
<td>1.49*</td>
</tr>
<tr>
<td>Within-person effect</td>
<td></td>
<td>3.67</td>
<td>1.66*</td>
</tr>
</tbody>
</table>

*Notes. ^a Intercept corresponds to the value of physical activity when level 1 and 2 predictors and time (linear and quadratic) equal zero. Parameters are unstandardized. Physical activity (METS) = weekly metabolic equivalent units of moderate-to-vigorous intensity physical activity.  
* Significance at p < .05. ** Significance at p < .01. *** Significance at p < .001.*
Chapter Seven

Summary and Conclusions

There are more than 2.5 million breast cancer survivors in North America and this number is expected to increase given the improvement in cancer detection and treatment (Jemal et al., 2011). Despite improved survival rates in developing countries (Canadian Cancer Society, 2011), breast cancer survivors often face ongoing psychosocial sequelae (Burstein & Winer, 2000). This has changed the focus of psychosocial oncology research where there is now an increased focus on the quality of life of women who survive breast cancer. There has been a specific focus on body image because breast cancer surgical treatments and adjuvant therapies may result in major alterations of body image through loss of the breast(s), disfigurement, weight gain, muscle loss, scars or skin changes (Demark-Wahnefried, Winer, & Rimer, 1993; Hopwood, Fletcher, Lee, & Al Ghazal, 2001; Irwin et al., 2005; Shapiro & Recht, 2001; Winningham et al., 1994). There has also been growing interest in promoting physical activity in this population since researchers and health care providers recognize the benefits of participating in physical activity. However, there is still much work to be done in these areas due to the notable theoretical, conceptual, and methodological limitations in the literature. The current research program was developed to address these shortcomings and involved three concurrent interrelated studies.

The first study was a qualitative interview study grounded in constructivist epistemology. The objective was to better understand women’s perceptual, attitudinal/cognitive, affective, and behavioural experiences with their changed physique following treatment for breast cancer. In this study, all women experienced changes to their bodies as a result of their breast cancer diagnosis and its treatments. In particular, women discussed various physical changes they had
experienced that were visible (e.g., loss of hair, altered hair texture, loss of skin elasticity, being ‘lop-sided’ or ‘disfigured’) and invisible (e.g., cessation of menstruation, hot flashes, numbness in fingers and toes, tenderness in the breast, difficulty sleeping, and being constantly tired) that were similar to those documented in the literature (Demark-Wahnefried et al., 2001; Goodwin et al., 1999; Irwin et al., 2005; Shapiro & Recht, 2001; Ward, Kuta, Sanborn, & Burt, 2003). Not surprising, these physical changes affected women in various ways because appearance was an important component of their life after breast cancer and was integral to their psychological and social well-being.

Women invested in their physical appearance as a strategy to control how others evaluated and treated them (i.e., self-presentation), as well as to maintain their physical health. Similar to previous research (Carver et al., 1998; Collins et al., 2011; Falk Dahl, Reinertsen, Nesvold, Fosså, & Dahl, 2010), women indicated that the physical changes experienced, particularly weight changes, elicited a wide range of emotions. Most of these emotions were negative; however, women also demonstrated acceptance towards their changed physique. This finding is in line with Neff’s (2003) notion that humans are capable of feeling compassion for themselves when there are perceived inadequacies, failures or general suffering. Women described various strategies they used to manage the physical changes they experienced and help them adapt to their new physique. Consistent with strategies that have been previously reported by breast cancer survivors to negate the side effects of the treatments (Harcourt & Frith, 2008; Rasmussen, Hansen, & Elverdam, 2010), women wore make-up, prosthetics, wigs, and scarves in order to camouflage the physical changes that resulted from their cancer treatment. In addition, women restricted the amount of food they ate and/or avoided certain foods and viewed physical activity as way to manage their weight and obtain a toned and fit body. The use of
physical activity as a strategy to alter physical appearance is consistent with strategies used by the general adult population (Bish et al., 2005; Klem, Wing, McGuire, Seagle, & Hill, 1997; Serdula et al., 1999). Based on the findings from this study, the multidimensional view of body image (Cash, Melnyk, & Hrabosky, 2004; Cash & Pruzinsky, 2002; White, 2000) was supported. Accordingly, researchers should consider perceptual, affective, cognitive and behavioural aspects related to women’s changed physique in future research in this population.

The second study was a cross-sectional quantitative study that examined the associations between self-presentation processes and physical activity among an under-represented population in self-presentation research (i.e., breast cancer survivors). An important first step was to test the psychometric properties of the Self-Presentation in Exercise Questionnaire (SPEQ) within this sample. Similar to past work (Conroy & Motl, 2003; Conroy, Motl, & Hall, 1998; Conroy, Motl, & Hall, 2000; Gammage, Hall, Prapavessis, et al., 2004), an oblique two-factor model that estimated impression motivation and impression construction as two distinct, yet related constructs was supported in this sample. However, slight modifications were necessary to obtain an acceptable fit of the model in this sample. Specifically, the measurement errors between two pairs of items in the SPEQ were allowed to correlate since these items were worded similarly and asked about clothing (i.e., “I often wear exercise clothing even when I am not exercising to ensure that others know I am an exerciser”; “I wear exercise/athletic clothing so other people will see me as an exerciser”; “I wear exercise clothes that are flattering or revealing so others can tell that I am fit and/or attractive”). Also, the only negatively worded item (i.e., “appearing fit or healthy to others is not important to me”) was deleted. The resulting SPEQ model in this study differed from models reported in previous studies (Conroy & Motl, 2003;
Conroy et al., 1998; Conroy et al., 2000; Gammage, Hall, Prapavessis, et al., 2004), yet was appropriate for the study sample.

Based on scores on this revised version of the SPEQ, women in the early stages of cancer survivorship had low levels of impression construction and moderate levels of impression motivation. Furthermore, consistent with findings from previous studies (Conroy et al., 2000; Cumming & Thøgersen-Ntoumani, 2011; Lindwall, 2005), impression motivation was found to be a significant positive correlate of physical activity. Also consistent with previous findings, self-presentation efficacy and outcome value moderated this relationship (Gammage, Hall, & Martin Ginis, 2004). Collectively, insight into the theoretical relationships suggested to exist among self-presentation processes and physical activity in a population of breast cancer survivors was gained from this study. Accordingly, the investigation of self-presentation and social cognitive factors that are related to physical activity behaviour in this population appears justified and further exploration using this theoretical framework is warranted.

The third study was a prospective longitudinal study that aimed to: (1) describe naturally occurring changes in breast cancer survivors’ self-presentation processes and physical activity behaviour over a period of six months, (2) evaluate the associations between cancer-specific factors and self-presentation processes, and physical activity behaviour, and (3) disentangle the within- and between-person relationships of impression motivation and impression construction with physical activity behaviour. Consistent with limited evidence (Harrison, Hayes, & Newman, 2009), physical activity levels changed over time during this study, whereby women’s levels of physical activity initially increased over the first three months of the study, albeit not significantly, and decreased significantly thereafter. In light of the physical activity patterns
observed in this study, physical activity interventions should target women before they approach the six month post-treatment mark.

In contrast, self-presentation processes remained stable over time and were related to certain treatment modalities. Based on these findings, more research is needed to determine whether self-presentation processes should be conceptualized as state or trait characteristics or as having both state and trait components. Furthermore, women in the current study who had received radiotherapy reported lower levels of impression motivation and impression construction, whereas women who had received chemotherapy reported higher levels of impression motivation. Finally, self-presentation processes had both within- and between-person effects on physical activity behaviour in this study. The between-person effects showed that women who reported higher overall levels of impression motivation and impression construction reported higher levels of physical activity. These conclusions are consistent with the findings from the second study of this research program and in studies with young non-clinical adult samples (Gammage, Hall, & Martin Ginis, 2004; Lindwall, 2005; Motl & Conroy, 2000). This study is the first to have utilized a research design and analyses that permitted the examination of within-person processes, and as a result showed that women were more active at times when their levels of impression construction were higher relative to their average levels. Therefore, there is evidence that self-presentation can be used as a guiding framework to examine factors related to physical activity behaviour over time in this population.

Based on the findings from these three studies, researchers and health care providers who work with women should be cognizant that physical changes following breast cancer may be linked to a variety of emotional and behavioural experiences that could impact breast cancer survivors’ long-term health and well-being. There are a number of theoretical, conceptual,
methodological, and practical implications of this work for researchers and practitioners. Each is considered in turn.

**Theoretical Implications**

Self-presentation perspectives have guided work in the area physical activity psychology, where an emphasis has been placed on examining the relationships between self-presentation processes and physical activity behaviour. Although empirical results have been promising, they are limited to young adult samples. Further validation of the proposed pattern of associations in different populations is needed in order to validate the hypothesized links between self-presentation processes and physical activity and provide support for the generalizability of the theoretical framework. The current research represents the first attempt to empirically evaluate these associations in a breast cancer population. Self-presentation processes were related to physical activity behaviour in regression analyses with cross-sectional data, as well as in a multilevel modeling with longitudinal data. This corroborates Leary’s (1992) theorizing that individuals’ motives to engage in physical activity often mirror self-presentation motives, namely the desire to improve or maintain physical appearance and to obtain or preserve a desired social identity. Thus, this research provided evidence that theorized relationships hold among breast cancer survivors. An important next step would be to confirm these findings in other groups of cancer survivors who potentially have significant body image concerns.

Furthermore, few studies have explored the conditions under which the associations between self-presentation processes and physical activity behaviour would differ in magnitude or direction. For theoretical reasons, therefore, it is important to identify moderators in order to identify conditions when women’s physical activity levels are more or less likely to be related to their desire to monitor and/or control others impression of them. According to social cognitive
models (e.g., Bandura, 1986, 1997), outcome-expectancy theories (e.g., Bandura, 1997) and social learning theory (Rotter, 1954), self-efficacy, outcome expectation, and outcome value may moderate the associations between self-presentation processes and behavioural outcomes such as physical activity. Based on the findings from this program of research, it is when self-presentation efficacy and/or outcome value are high that women who are motivated to self-present to others will engage in physical activity. However, outcome expectation was not found to be a moderator of the associations between self-presentation processes and physical activity, which may be a result of the measure use to assess outcome expectation. The broader conceptualization of outcome expectancy includes positive and negative expectation (Bandura, 1997), yet the SPES only includes positive expectations. In a similar vein, outcome proximity is not assessed in the SPES. Breast cancer survivors might expect that physical activity will help them portray a desired image; however, the proximity of making this impression may be so distant that the expected outcome does not motivate them to be active. Nonetheless, the current findings provide evidence that the integration of social cognitive constructs (i.e., self-efficacy and outcome value) within a self-presentation framework provided a more comprehensive account of the associations between self-presentation processes and physical activity behaviour. This carries substantial implications for extending the self-presentation framework to incorporate additional explanatory variables and highlights the value of utilizing a theoretically integrated model. Moreover, this suggestion echoes recent calls to adopt theoretically integrated models as they may hold promise in providing a more complete explanation of health behaviours and the underlying processes involved (Hagger, 2009).
Conceptual Implications

The importance of appearance to breast cancer survivors is increasingly being acknowledged in the psychosocial oncology literature (Helms, O'Hea, & Corso, 2008; Moreira & Canavarro, 2010). Furthermore, researchers have posited that body image is a key aspect of women’s quality of life (Bloom, Stewart, Chang, & Banks, 2004; Collins et al., 2011; DeFrank, Mehta, Stein, & Baker, 2007; McDonough, Sabiston, & Crocker, 2008), and as a result, research focused on body image is beginning to emerge in quality of life models (see Helms et al., 2008 for review). Despite advancements made on body image in the field of psychosocial oncology, there are some limitations. Few studies examining the impact of breast cancer treatment on women’s physical appearance have been focused on the multiple dimensions of body image (i.e., perceptual, attitudinal, affective, cognitive, behavioural; Cash & Pruzinsky, 2002; White, 2000). These facets have been overlooked in quantitative research using unidimensional questionnaires and/or composite scores. As a result, some aspects of body image (e.g., attitudinal) have received much more attention than others (e.g., perceptual). This has likely hindered progress in understanding the impact breast cancer has on the various dimensions of body image in this population in order to guide psychosocial interventions aimed at relieving distress and promoting well-being. Based on the findings of this research program, investigators should consider using a multidimensional framework of body image to guide their research aimed at understanding the impact physical changes may have on women. Adopting this multidimensional approach may allow researchers to capture the complex issues facing breast cancer survivors.

Another implication emanating from this program of research is the need to gain a better understanding of the positive psychological and emotional changes women may potentially experience in the aftermath of their struggle with breast cancer. Researchers have commonly
focused on the negative consequences of breast cancer and this may not provide an accurate representation of the adjustment following diagnosis and treatment of malignant diseases. In support of the need to shift paradigms, both positive and negative emotions resulted from experiencing a breast cancer diagnosis in the current research. Indeed, a recent research trend in the literature is to examine both positive and negative body-related experiences. Some researchers have found that women not only report negative body-related emotions but also a set of positive emotions (Fleming et al., 2006; McHugh et al., 2008; Sabiston et al., 2010). However, there has been little attention paid to the positive body-related emotional experiences of breast cancer survivors. Therefore, it is important to focus on understanding the positive views women may have in regards to their changed physique in addition to the consistent focus on the more negative cognitions and affect, as positively and negatively outcomes may co-occur.

**Methodological Implications**

Researchers concur that the use of combined qualitative and quantitative methods can yield more valuable information than any single method (Creswell, 2003). The pervasive use of a single methodology has likely masked women’s unique perception and experiences with the wide range of physical changes resulting from breast cancer and how these link to perceptual, cognitive, affective and behavioural outcomes. The use of a qualitative methodology in this program of research enabled the exploration of body image from women’s perspectives in order to gain a greater understanding about the impact of breast cancer on the different dimensions of body image among breast cancer survivors. In particular, the constructivist epistemology approach used in one of the studies provided women an opportunity to share their complex personal and subjective experiences with their changed bodies, whereas interpretative
phenomenological analysis allowed for the interpretation of these experiences. This ensured that the insights gained reflected breast cancer survivors’ lived experiences.

Also, the use of quantitative methodology provided an opportunity to make progressions on the measurement of self-presentation processes in this population. Reliability (i.e., degree or consistency of a measure) and validity (i.e., degree to which a measure assess what it claims to measure) are key criteria for judging the quality of measures (Thomas, Nelson, & Silverman, 2010). Researchers (Conroy & Motl, 2003; Conroy et al., 1998; Conroy et al., 2000; Gammage, Hall, Prapavessis, et al., 2004; Lindwall, 2005) have devoted attention to these measurement characteristics of the SPEQ, but most of this work was conducted with young adult samples and may not be generalizable across different populations. The current research represents the first attempt to assess self-presentation processes among breast cancer survivors. Based on the results, a 19-item SPEQ scale could be used to examine self-presentation processes and their relationship with physical activity behaviour among breast cancer survivors.

Importantly, establishing the validity and reliability in this sampled ensured that it could be used to examine the relationships between self-presentation processes and physical activity behaviour within this program of research. However, altering the SPEQ to improve its fit to the data using data-driven modifications (i.e., LISREL modification indices) could have led to capitalization on chance since the characteristics of the sample may have influenced the suggested modifications (MacCallum, Roznowski, & Necowitz, 1992). Thus, although there was logical rationale for the modifications made to re-specify the initial SPEQ model, it is recommended that additional studies be conducted to cross-validate these findings with an independent sample breast cancer survivors to obtain a more defensible SPEQ (Hoyle, 1991; MacCallum et al., 1992).
Despite calls for longitudinal research, few studies have examined self-presentation processes and physical activity behaviour within breast cancer survivor populations over time. In fact, the majority of self-presentation research is based on cross-sectional findings which can only examine between-person association (Curran & Bauer, 2011). The general conclusion drawn from these studies is that individuals reporting greater impression motivation and/or impression construction are more active (Conroy et al., 2000; Cumming & Thøgersen-Ntoumani, 2011; Lindwall, 2005). However, researchers in other fields (i.e., management and organizational behaviour) have shown that positive associations observed in cross-sectional analyses (i.e., between-person associations) between self-efficacy and personal goals were in contrast to the negative associations observed longitudinal analyses (i.e., within-person associations; Vancouver, Thompson, & Williams, 2001). Similarly, researchers have indicated that some variables have explanatory power in cross-sectional analyses, but not in longitudinal analyses (Ilies, Scott, & Judge, 2006). Although these findings are not based in the self-presentation literature, they clearly demonstrate the importance of testing the relationships between self-presentation processes and physical activity behaviour at the within- and between-person levels. To this end, the prospective quantitative longitudinal approach used in this research allowed for the use of multilevel modeling analyses to yield insights into the relationships between these constructs at the within- and between-person levels (Curran & Bauer, 2011). In addition to filling an important void in the literature by demonstrating that within-level effects of self-presentation processes were also important for predicting physical activity behaviour, this research provided a superior test of theoretical associations believed to exist between these processes and physical activity behaviour (Bliese, Chan, & Ployhart, 2007;

To date, no data were available regarding the natural development of self-presentation processes. Thus, observational studies where the researchers observe and systematically collect data on self-presentation processes over time, without intervening to change these processes, were needed. The prospective longitudinal design used in this program of research provided a unique opportunity to examine the natural development of self-presentation processes over time and enabled the observation of these processes as they occur in the real world, which helps to establish the ecological validity of the findings (Thomas et al., 2010). It was observed that these processes were generally stable in the period shortly after completion of treatment for breast cancer. This raises questions as to whether self-presentation processes should be conceptualized as state or trait characteristics or both as a stable trait and as a changing state. However, given that there was no experimental manipulation and women had recently completed treatment and may still have been focused on recovering, concluding that self-presentation processes are trait characteristics would be premature. Future experimental studies should be conducted to examine whether these self-presentation processes can be manipulated through interventions. It also raises additional questions related to the measure used to assess self-presentation processes. The SPEQ may not be sensitive enough to allow researchers to detect changes as a result of breast cancer. Although researchers have assessed the reliability (i.e., internal consistency) and cross-sectional validity of the SPEQ (Conroy et al., 2000; Gammage, Hall, Prapavessis, et al., 2004), it has never been used to detect change. In light of the growing recognition of the need for longitudinal and experimental studies, conceptual and methodological advancements are required in order to determine whether self-presentation processes have trait and/or state characteristics.
and to develop a measure that has to the potential to capture change over time in self-presentation processes.

**Practical Implications**

There are some important clinical implications that can be drawn from this program of research. Based on the findings from this research program, breast cancer survivors may face ongoing psychosocial sequelae as a result of the physical changes they experienced. Therefore, interventions are needed in order to help offset the adverse physical changes and maintain optimal health and well-being among breast cancer survivors. Given that women involved in the current research conceptualized physical activity as a mechanism to help them manage their appearances and improve their physique, and researchers have demonstrated the effectiveness of this behavioural strategy (Goodwin et al., 1998; Jen et al., 2004; Schwartz, 2000), promoting physical activity participation in this population is an important endeavor for researchers and health care providers.

In spite of physical activity being safe and feasible for breast cancer survivors and increasingly being considered a complimentary therapy both during and following the completion of primary treatment, most women decrease their activity levels during treatment and remain inactive (Devoogdt et al., 2010; Littman, Tang, & Rossing, 2010). This evidence underscores the need for targeted efforts to address the state of physical inactivity in this population. Based on the findings of this program of research, self-presentation self-efficacy and outcome value may be important to consider when designing interventions for women who report a strong desire to monitor how others perceive them. Looking at the broader psychology literature, Bandura’s (1997) self-efficacy theory is well suited to inform interventions aimed at enhancing such perceptions with breast cancer survivors. In Bandura’s (1986, 1997) view, the
extent to which women’s perceptions of self-efficacy and outcome value are fostered depends on their personal mastery experiences, vicarious experiences and physiological and emotional states, as well as their perceptions of encouragement or persuasion from others. Thus, it is important to ensure that women set realistic physical activity goals and successfully meet them as this will provide them with evidence that they have what it takes to be active. In addition, observing similar others engage in physical activity can provide women with the belief that they themselves possess the ability to master comparable activities. For instance, a sedentary breast cancer survivor who has not been active for years may see another woman who was just like her who now has an active lifestyle, and she may feel she too could do this. A final technique involves providing inspirational talks to these women and giving them positive feedback.

Despite finding that self-presentation processes may be driving forces that motivate breast cancer survivors to engage in physical activity, it is important to note that theories of motivation (e.g., self-determination theory; Deci & Ryan, 1985) outline the importance of engaging in a behaviour for intrinsic reasons (e.g., positive health benefits, enjoyment and fun). Indeed, the former has the greatest potential for resulting in long-term physical activity behaviour (Mullen & Markland, 1997). It could be argued that self-presentation is an external contingency for individuals to engage in physical activity because there are tangible benefits that are separable from the activity itself (e.g., impressing others). Therefore, it is not clear how effective promoting self-presentation processes over time would be for the maintenance of physical activity. This may be a key strategy to get women to initiate physical activity, but these incentives may not be sufficient by themselves to motivate long-term behaviour change. Approaches that foster self-determined motivation are likely needed for long-term maintenance. Self-determination theory provides strategies to promote self-determined motivation and
potentially increase the likelihood of behaviour being maintained long-term (Deci, Eghrari, Patrick, & Leone, 1994; Deci & Ryan, 1985). Specifically, individuals working with breast cancer survivors should seek to provide an autonomy-supportive environment by: (1) acknowledging women’s perspectives and feelings about physical activity, (2) providing women with a meaningful rationale for engaging and maintaining an active lifestyle, and (3) providing women with a choice of activities in which they can engage in (Deci et al., 1994). Thus, interventions that promote autonomy supportive interactions between researchers or health care providers and breast cancer survivors may help promote the maintenance of a physically active lifestyle in this population.

Last, information as to when interventions should be implemented was obtained from this program of research. Researchers have introduced the concept of a ‘teachable moment’ to highly a window of time following a health event where people are open to lifestyle change (Rabin, 2009). The completion of primary treatment for breast cancer (i.e., surgery, radiotherapy and/or chemotherapy) has been referred to as a ‘teachable moment’ for health behaviour change, suggesting women may be receptive and responsive to receiving physical activity recommendations (Demark-Wahnefried & Jones, 2008). However, this information does not indicate the specific period during survivorship that interventions are needed to increase breast cancer survivors’ physical activity behaviour. The pattern of change in physical activity behaviour observed in this program of research underscores the difficulty women likely experience in maintaining an active lifestyle. Interventions supporting physical activity behaviour change should therefore target women before they reach the six month post-treatment mark – before they decrease their activity levels. Seeing that women often have frequent appointments with health care providers at this time, one approach to improving long-term
behaviour change may be to incorporate ongoing physical activity counselling during these appointments. Indeed, the effectiveness of counselling to increase physical activity in primary care settings has been supported (Eden, Orleans, Mulrow, Pender, & Teutsch, 2002). Thus, health care providers may want to place a greater emphasis on physical activity as an integral component women’s treatment regimen as this may elicit behaviour change and maintenance.

Another strategy may be to provide women with continued clinic-based behavioural treatments with exercise specialists who provide them with education, training, reminders, and support to solve problems well beyond the completion of treatment phase. Although cancer was once conceptualized as an acute disease, it has been argued that it is a chronic disease (Beyer, 1995), and therefore, requires chronic treatment rather than acute care that consists of relatively short-term treatments with little follow-ups. The strategy to have women maintain frequent contact with health care providers is also justified by the observation that adherence to health recommendations declines as contact with behavioural interventionists ends (Miller, Hill, Kottke, & Ockene, 1997). Accordingly, the concept of continuing behavioural support for maintenance of physical activity has appeal. Although these strategies may be effective, studies specifically designed to test their effectiveness are needed.

Conclusions

In conclusion, this mixed-methods program of research has made a valuable contribution to the literature. In the broadest sense, it advanced the literature on the psychosocial issues breast cancer survivors face and how these affect women’s self-perceptions, attitudes, cognitions, emotions and behaviours. This knowledge can be used to guide future research and intervention strategies aimed at both reducing self-presentation concerns and increasing physical activity levels in a population of relatively inactive women. The combination of cross-sectional and
longitudinal research designs based on Leary and Kowalski’s (1990) self-presentation framework helped to expand current knowledge of the associations between self-presentation processes and physical activity behaviour and confirmed the utility of the framework within a breast cancer survivor population. Evidence on the psychometric properties of the SPEQ, the only available instrument designed to provide insight into the degree to which individuals desire to monitor and/or control the impressions other people form of them, was found. Furthermore, it provided insight into the relationships between self-presentation processes and physical activity behaviour, and identified potential moderators that are essential to helping understand these associations. Of these, self-presentation efficacy and outcome value were two social cognitive constructs that were moderators. Given that most breast cancer survivors are considered inactive, it is hoped that these findings will provide researchers with information that will assist in the development of theoretically and empirically based interventions aimed at increasing physical activity in this population – a population that includes over 2.5 million North American women.
References


Appendix A: Physical Activity and Breast Cancer Survivorship: Evidence-based Recommendations
Physical Activity and Breast Cancer Survivorship: Evidence-based Recommendations

Jennifer Brunet\(^1\), Catherine M. Sabiston\(^1\), & Sarkis Meterissian\(^{1,2}\)

\(^1\)McGill University, Montreal, Quebec

\(^2\)McGill University Health Center, Montreal, Quebec

Contributions of author and co-authors:

Author: Jennifer Brunet
Contributions: Conceptualized the study design, conducted systematic review of the literature, drafted manuscript, and was primary author.

Co-author: Catherine M. Sabiston
Contributions: Assisted in the conceptualization of the study design and edited the manuscript.

Co-author: Sarkis Meterissian
Contributions: Assisted in the conceptualization of the study design and edited the final version of the manuscript.

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Abstract

The completion of primary treatment for breast cancer has been referred to as a ‘teachable moment’ for health behaviour change, suggesting women are receptive to receiving physical activity counseling. However, the majority of breast cancer survivors are not sufficiently active. Health care providers may play a pivotal role in increasing patients’ physical activity behaviour, yet physician counseling for physical activity is not done regularly. One reason for this ‘failure’ may relate to the limited guidelines put forward to assist health care providers in how to best optimize the benefits of physical activity among breast cancer survivors. To help provide guidelines for physical activity counseling with breast cancer survivors, we synthesized evidence-based recommendations based on a review of 30 intervention studies. The evidence on (1) type, (2) intensity, and (3) frequency and duration of physical activity for this population was examined. On the basis of the reviewed studies, physical activity programs for breast cancer survivors should include aerobic training at least 3 times/week for 30 minutes, resistance training 2 to 3 times/week (6-12 exercises), and flexibility training 3 times/week for 50 to 60 minutes to obtain health benefits. The provision of these recommendations may facilitate effective and consistent delivery of physical activity counseling to breast cancer survivors.

Key words: Health behaviour, physical and mental health, oncology, counseling.
Physical Activity and Breast Cancer Survivors: Evidence-Based Recommendations

Introduction

The number of women diagnosed with breast cancer each year is increasing with over 125,000 new diagnoses per year in North America - yet early detection and improved treatments have led to an increase in survival rates. As a result, there is a growing population of breast cancer survivors (i.e., women who have completed active medical treatment) who are at increased risk for recurrence, secondary cancers, and both mental and physical health co-morbidities. In addition, many breast cancer survivors experience a number of short- and long-term physical and mental side effects as a results of the treatments endured (e.g. pain, lymphedema, nausea, fatigue, lung fibrosis, cardiomyopathy, cardiotoxicity, weight gain, muscle loss/weakness, osteoporosis, and decreased well-being). Studies have shown that physical activity may help prevent or minimize some of these health risks and side effects. Based on recent meta-analyses and systematic reviews, the most common benefits include improved physical fitness, overall functioning, quality of life, and reduced fatigue in breast cancer survivors. Furthermore, physical activity has been linked to lower levels of depression and anxiety, improved social and emotional well-being, body self-esteem, body image, body composition, survival rates, and reduced risk of breast cancer recurrence and death. Considering this evidence, the American College of Sports Medicine (ACSM) convened an expert committee consisting of clinical and research experts in the field to review existing evidence on the safety and efficacy of physical activity during and after adjuvant cancer therapy. The consensus was that physical activity is safe during and after cancer treatment and leads to better quality of life.
The completion of primary treatment for breast cancer (i.e. surgery, radiation and/or chemotherapy) has been referred to as a ‘teachable moment’ for health behaviour change, suggesting women may be receptive and responsive to receiving physical activity recommendations. However, the majority of breast cancer survivors (> 58%) are not sufficiently active. Targeted efforts are required to address the state of physical inactivity in this population.

Physician counseling on physical activity in the primary care setting may be an effective targeted strategy to increase physical activity. In fact, several reviews examining the impact of physical activity interventions in primary care settings have supported the effectiveness of counseling to increase physical activity. Unfortunately, physician counseling on physical activity is not done on a regular basis. This may partly be a result of the limited guidelines put forward to assist physicians in providing physical activity recommendations to their patients who have completed primary treatment for breast cancer. It is important to synthesize and disseminate evidence to physicians to help the implementation of physical activity counseling. Advancements have been made in this respect, such as the recommendations that cancer survivors follow the Physical Activity Guidelines for Americans with adaptations. However, explanations of the components included in the guidelines and specific guidelines for breast cancer survivors are still needed. Providing physicians with specific recommendations for breast cancer survivors, along with a concise description of the recommendations, may facilitate individual physical activity counseling to patients.

In order to facilitate more effective, efficient, and consistent delivery of physical activity counseling, this report introduces and explains evidence-based recommendations derived from the evidence available for physical activity for breast cancer survivors. Specifically, it provides
an overview of the physical activity parameters of (1) type, (2) intensity, and (3) frequency and duration for breast cancer survivors that have been shown to yield health benefits. This goal is different from the consensus statement published by the ACSM, it is intended to offer physicians practical recommendations to help them counsel their breast cancer patients who have completed active treatment.

**Materials and Methods**

Literature searches were performed using Medline, Cumulative Index for Nursing and Allied Health Literature (CINAHL), PubMed, Psycinfo, and Sportdiscuss electronic databases for studies. The following headings and keywords were used as search terms: “breast cancer” or “neoplasm” in combination with “exercise” or “physical activity.” Searches were limited to articles in English. Reference lists of included articles were scanned for additional relevant studies, as well as reference lists from meta-analyses and systematic reviews on this topic.

The first author conducted the initial screening of retrieved articles by examining the titles and abstracts to determine the relevance. Selected articles were fully reviewed. Inclusion criteria included: (i) women who had completed primary treatment for breast cancer (i.e. surgery, chemotherapy, and radiation), (ii) physical activity or exercise intervention studies only (because the effect of the physical activity intervention could not be separated from the effect of a multiple intervention program), (iii) data on change in one or more health outcomes, and (iv) published in a peer-review journal. Exclusion criteria included: (i) review, descriptive, correlational, observational or survey studies (other than for initial identification of articles), (ii) multi-component interventions, (iii) studies including survivors of multiple cancer types, (iv) unpublished dissertations, and (v) abstracts only. A total of 30 published studies based on 22 interventions met the study inclusion criteria. The mean age across studies varied
between 48 and 65 years and the majority of women were diagnosed with stage I-III breast cancer.

Data regarding the interventions and health outcomes were collected and summarized by the authors in Tables 1 to 4. Then, the physical activity recommendations were developed based on the evidence regarding what type(s), intensities, frequency and duration of physical activity effectively improved health outcomes.

**Types of Physical Activity**

Physical activity refers to “any bodily movement produced by skeletal muscles that results in energy expenditure above basal requirements.” There are different types of physical activities that meet this definition that can be categorized based on the main physiological systems they activate. The main types of physical activity are aerobic, resistance training, and flexibility training. Aerobic (or endurance) activity refers to any activity that uses large muscle groups, can be maintained continuously for a long period of time, and is rhythmic in nature. Examples include walking, jogging, running, cycling, dancing, skating, swimming, aerobics classes, and household chores (e.g. vacuuming, sweeping, mopping, and raking). Walking is a commonly reported aerobic activity that is also enjoyable to many breast cancer survivors. Resistance (or strength) training refers to any activity that uses resistance methods (e.g. free weights, an individual’s own weight, machines, and elastic bands) to increase one’s ability to exert or resist force. These activities involve concentric (i.e. lifting and pushing/pulling) and eccentric (i.e. controlled lowering/returning) muscle contractions and are done for each major muscle group (i.e. quadriceps, hamstrings, hip adductors/abductors, upper/lower back, abdomen, chest, shoulders, biceps/triceps, and neck). Flexibility training refers to activities that lengthen muscles to increase range of motion around the joints. These activities
can be static (i.e. stretch is held for a period of time), dynamic (i.e. fluid motion such as tai chi), or active (i.e. hold stretch while balancing such as yoga). These types of activities, alone or in combination, have been used in physical activity programs.

Of the reviewed studies, ten studies examined the effect of aerobic training alone, twelve examined the effect of aerobic training in combination with resistance training, five examined the effect of resistance training alone, and three examined the effect of flexibility training on various health outcomes. The majority of the reviewed studies focusing on aerobic training prescribed the activity for participants, while others allowed participants to choose their preferred aerobic exercise, or did not specify which aerobic activities were performed. Of the studies including resistance training, most had participants perform full body exercises, while the remaining studies either had participants perform upper and core body exercises, lower and core body exercises, or did not specify which muscle groups were targeted. Of the studies including flexibility training as a main component of the intervention, two had participants do Tai Chi Chuan, and one did not specify what types of stretching exercises were used. In addition, twelve studies included a flexibility component in the warm-up and/or cool-down, but did not describe it.

All of these studies concluded that physical activity led to improvements in physical and psychological health. The details for each exercise intervention and the main findings are found in Tables 1 to 4. The cumulative results of these studies suggest that all three types of physical activity (i.e. aerobic, resistance, and flexibility training) are positively associated with numerous physical and psychological health benefits. Of note, physical activity was not found to increase the incidence or severity of lymphedema in several studies. In one study, a change of
less than two centimeters in arm circumference was recorded.\textsuperscript{46} This finding is particularly important given clinical guidelines that previously cautioned against repetitive upper body exercise (e.g. upper body resistance training) to prevent the development or worsening of lymphedema.\textsuperscript{74} Based on the reviewed studies, physicians should recommend to patients that they engage in (1) resistance training for all major muscle groups, (2) aerobic training, and (3) flexibility training since all three types of physical activity optimize health outcomes. While a comprehensive program is ideal, survivors may start with one type of activity and progressively incorporate other activities. The physical activity compendium\textsuperscript{75} provides a broad list of physical activities from which survivors can choose to develop their individualized program.

**Intensity of Physical Activity**

The intensity of aerobic and resistance training is important as this may affect the effectiveness of a program to improve overall health. It refers to the magnitude of the effort that is exerted to perform an activity. Intensity is most often characterized as *light* (i.e. heart rate does not increase considerably above resting heart rate), *moderate* (i.e. heart rate and sweating increases; can still maintain a conversation), or *vigorous/strenuous* (i.e. fast and hard breathing, heart rate increases considerably, cannot maintain a lengthy conversation), and is monitored and measured using a variety of parameters. In nineteen of the aerobic training studies reviewed, aerobic training intensity was monitored using physiological parameters, namely a percentage of maximum heart rate (HRmax), heart rate reserve (HRR), or maximum oxygen consumption.\textsuperscript{21, 24, 28, 47-51, 53-59, 62, 67, 69-70} One study also monitored intensity using a rating of perceived exertion (RPE) which is a subjective parameter whereby a person self-evaluates their level of fatigue,\textsuperscript{24} while three studies did not specify how aerobic intensity was monitored.\textsuperscript{52, 64, 71}
There was considerable heterogeneity in the magnitude of intensity between the studies. One study focused on light intensity training, nine focused on low-to-moderate intensity training, four focused on moderate training, four focused on moderate-to-vigorous intensity training, and three focused on vigorous intensity training. Combining the evidence across studies which consistently demonstrate that moderate intensity activities lead to improvements in physical and psychological health, physicians should focus on promoting moderate intensity activity among patients. There are different approaches to monitoring aerobic intensity, and the preferred method of assessment may depend on each patient’s access and ability to acquire equipment. Based on the reviewed studies, physicians could suggest to patients that they monitor their intensity by wearing a heart rate monitor to ensure that they stay within a specific heart rate zone (i.e. a percentage of their HRmax, whereby HRmax is calculated as 220 – age in years). According to the Centers for Disease Control and Prevention (CDC), light intensity is exercising at less than 50% of one’s HRmax, moderate intensity is exercising within 50% and 70% of one’s HRmax, and over 70% of one’s HRmax is considered vigorous training. For example, the estimated maximum age-related heart rate for a patient of 55 years would be 165 beats per minute (bpm). In contrast, moderate intensity activity for this patient would require a heart rate between 83 and 116 bpm. It is important to note that de-conditioned patients will likely reach their target heart rate more quickly than conditioned patients.

Patients could also determine whether they are exercising within their target rate zone by taking their pulse. Alternatively, physicians could tell patients to become aware of the physical symptoms experienced during exercise. For instance, physicians could explain to them that moderate intensity aerobic activity will result in faster, less rhythmic, and often more shallow
breathing and should make carrying on a conversation more difficult but achievable. Regardless of the approach used to monitor intensity, it is important to note progressive aerobic training interventions (i.e. participants start at light intensities and progress to moderate or vigorous intensities) yield positive physical and psychological benefits. Accordingly, physicians should recommend to their patients that they initially focus on increasing overall aerobic activity, and then progress slowly to moderate intensity activities as their bodies adjust to the physical challenges.

Within the resistance training interventions, a common strategy used to monitor intensity was to manipulate the workload, which consisted of three components: (1) number of sets (i.e. series of repetitions performed without a break), (2) number of repetitions (i.e. a single cycle of lifting/lowering a weight), and (3) weight lifted. In relation to the first two components, the majority of studies had participants complete between 2 and 3 sets per exercise and between 8 to 12 repetitions per set. In regards to the weight lifted, most studies had participants start with no or light weight (i.e. 0-0.5 pounds) for upper body exercises. Alternatively, three had participants start at a percentage of their one-repetition maximum (1RM) effort, and five had participants select weights which invoked momentary feelings of muscle failure at the highest repetition being worked with. Most studies also had participants progressively increase the weight lifted by 5 or 10% or smallest increments possible during the program to foster adaptation. Using such principles to monitor resistance training intensity, study participants experienced physical and psychological health benefits when they engaged in 2 or 3 sets of 8 to 12 repetitions per exercise using light weights and progressively using heavier weights throughout the duration of the interventions. Accordingly, physicians should recommend to patients that they initially focus
on mastering the proper form and posture with a weight that is easy to lift and then progress slowly (i.e. smallest increments possible) to heavier weights. Breast cancer survivors may want to consult a physical therapist, physical activity counselor or licensed fitness professional to assist them with developing a progressive physical activity program that reflects these recommendations, as well as with learning proper and safe posture and form.

**Frequency and Duration**

Frequency refers to the number of times (or sessions) per week a person participates in physical activity. Of the reviewed studies, aerobic training sessions were performed 2 to 5 times per week with the majority being at least 3 sessions,\textsuperscript{21, 28-29, 47-51, 53-57, 62, 64, 67, 70-71, 76} resistance training sessions were performed 2 or 3 times per week,\textsuperscript{21, 29, 46, 48, 53-55, 57-59, 62-63, 65-66, 68, 70-71} and flexibility training sessions were performed 3 times per week.\textsuperscript{60-61, 76} Results from these studies demonstrated that breast cancer survivors experienced health benefits by engaging in physical activity at these frequencies. Thus, physicians should recommend to patients that they engage in aerobic training at least 3 times per week, resistance training 2 to 3 times per week, and flexibility training 3 times per week. Of note, within the twelve studies that included an aerobic and a resistance training component, more interventions had participants perform both types of activities during the same session which resulted in fewer (i.e. 2 or 3) sessions per week,\textsuperscript{21, 29, 54-55, 70-71} than when participants completed both types of activities on alternative days (i.e. 3 to 5 sessions/week).\textsuperscript{48, 53, 58-59, 62} However, given that both the concurrent training and alternative training interventions had positive effects on physical and psychological health, the approach used should depend on the patient’s preference and time availability. Physicians should therefore encourage patients to choose whether they prefer to engage in aerobic and resistance training sessions concurrently or on alternate days.
Duration refers to the length of time an exercise session lasts. The duration of the resistance training sessions was not consistently reported. When reported, the duration of these sessions varied between 40 and 90 minutes per session.\textsuperscript{46, 53, 58-59, 63, 65-66, 68} The sessions for which the duration was longer (i.e. 60 and 90 minutes)\textsuperscript{46, 63, 65-66, 68} also included aerobic training and/or warm-up and/or cool down components (i.e. easy stretching and light aerobic intensity activities) which makes it difficult to estimate the optimal duration for each type of activity. Despite this observation, some studies reported that the duration of the resistance training session was depended on the time it took participants to complete the number of sets and repetitions of each exercise.\textsuperscript{21, 29, 48, 55, 57, 62, 70-71} These latter studies reported that participants experienced health benefits by performing between 6 and 12 exercises, suggesting that physicians should recommend to patients that they complete between 6 and 12 strengthening exercises per session.

The duration for flexibility sessions was consistently between 50 and 60 minutes per session and health benefits were observed with these amounts.\textsuperscript{24, 60-61} Thus, physicians should recommend that patients participate in flexibility training sessions that last between 50 and 60 minutes. In contrast, there was substantial variation in the duration of aerobic training sessions (i.e. ranging from 10 to 50 minutes/session).\textsuperscript{21, 28-29, 47-51, 53, 55-57, 62, 64, 67, 69, 71, 76} However, the majority of studies had participants striving to perform upwards of 30 minutes of aerobic training per session.\textsuperscript{21, 28-29, 47-49, 53, 56, 62, 64, 67, 71} Given the evidence that breast cancer survivors experienced positive physical and psychological benefits by participating in 30 minutes of aerobic training per session, patients should be encourage to participate in aerobic training for at least 30 minutes.
Discussion and Recommendations:

This paper introduces and explains physical activity evidence-based recommendations for breast cancer survivors to facilitate more effective, efficient, and consistent delivery of physical activity counseling by physicians. The findings from the studies reviewed herein provide consistent evidence that physical activity is safe, feasible, and provides numerous physical and psychological health benefits.

On the basis of the results from the reviewed studies, a comprehensive program includes participation in aerobic training at least 3 times per week, resistance training 2 to 3 times per week, and flexibility training 3 times per week (see Table 5). These three types of activities can be done during one session (i.e. concurrently) or on alternative days depending on the patient’s preference and time availability. There are certain communalities between these guidelines and those put forward by the ACSM for cancer survivors most notably that both suggest that individuals should be active at moderate intensity levels and include both aerobic and resistance training as part of their physical activity program. However, in light of the current evidence regarding the safety of flexibility training for breast cancer survivors observed in this review, the current recommendations also support the inclusion of flexibility training as an independent component of a physical activity program.

The first step in providing physical activity counseling to breast cancer survivors is to inform them about the health benefits and provide them with clear evidence-based recommendations. Primary care physicians are optimally positioned to provide physical activity counseling because they provide ongoing care to survivors, which offers multiple opportunities to repeatedly convey this information. Physicians may want to distribute take-home handouts to their patients which include information on the benefits and recommended types, frequency,
duration and intensity of physical activity (see Table 5) since handouts have been effective in changing behaviour.\textsuperscript{77}

Physicians should also try to support behaviour change among patients. One approach to support physical activity behaviour change would be to encourage patients to engage in intermittent bouts of activity throughout the day until they are able to complete a continuous longer bout of activity. Adherence to physical activity programs is higher among breast cancer survivors who engage in shorter exercise bouts (i.e. three to four 10-minute bouts) than among breast cancer survivors who engage in longer bouts (i.e. one 30- to 40-minute bout).\textsuperscript{78} This approach may be effective as it may be more appealing to patients who cite lack of time as a barrier to physical activity, and may be better tolerated than continuous bouts among patients who cite fatigue resulting from treatment as a barrier. Shorter bouts may also be easier to accomplish, thus increasing enjoyment and motivation to persevere and enhancing longer-term adherence.\textsuperscript{79-80} Similarly, shorter bouts of activity may foster self-efficacy beliefs,\textsuperscript{81} which in turn are positively associated with longer bouts and more challenging physical activities.\textsuperscript{82} Accordingly, patients who successfully complete shorter bouts may start to believe in their ability to complete longer physical bouts.

Another strategy to increase physical activity is to promote \textit{lifestyle} physical activities. These activities are planned or unplanned activities that are part of everyday life such as leisure, occupational, household, and care-giving/childcare activities that provide an opportunity for patients to accumulate physical activity throughout the day.\textsuperscript{83} This lifestyle approach may be particularly beneficial for patients who are reluctant to begin a traditional physical activity program because they fear that intense activity may worsen their breast cancer related symptoms (e.g. fatigue, pain, nausea).
Successful physical activity counseling also requires that physicians and people trained to counsel special populations in physical activity recognize that breast cancer survivors may face the same common barriers to being physically active as healthy adults (e.g. lack of time, lack of motivation, lack of enjoyment), as well as disease/treatment specific barriers, such as feeling sick and tired, experiencing pain and being afraid to exercise. Thus, physicians interested in helping patients increase physical activity levels should address these barriers and offer strategies to overcome these barriers when counseling patients. According to Courneya and colleagues, breast cancer survivors should be encouraged to engage in physical activity when fatigue levels are lowest (e.g. morning), for shorter durations, at lower intensities, and perform interval training (i.e. alternate activity and rest bouts).

Another aspect to consider when providing physical activity recommendations to patients is the nature of the collaboration between physicians and patients. Although physicians can make suggestions to patients on how they can increase their physical activity levels, patients should be encouraged to make their own choices. There is evidence that providing choices for physical activity is associated with greater participation. Given that studies where breast cancer survivors selected their favorite and most convenient activity documented significant health benefits, physicians should encourage patients to choose activities that are of interest to them as this will likely motivate them to initiate and maintain a physical activity routine.

Whereas the findings from the reviewed studies indicate that breast cancer survivors who follow these guidelines will likely experience increased physical and psychological well-being (see Tables 1 to 4), it is important to keep in mind that the current physical activity recommendations were developed based on findings from published studies that have inherent
limitations, such as attrition bias of study participants, failure to fully describe intervention (e.g. rate of progression) and report adherence to intervention, and publication bias. Findings were also derived from studies that did not examine dose effects, such that the current recommendations suggest benefits are experienced by engaging in aerobic activity at minimum of 3 times per week for at least 30 minutes yet it is possible that engaging in physical activity less often also yields benefits (and/or increasing the frequency of physical activity yields additional benefits). Furthermore, the reviewed studies included samples of breast cancer survivors who were screened for eligibility. Many of the reviewed studies did not include samples that represent the complete spectrum of breast cancer survivors (i.e. survivors exhibiting a primary or secondary medical condition, metastases, and co-morbidities). Thus, although not reported in the reviewed studies, it is possible that physical activity may pose some risk (e.g. falls, bone fractures, increased pain) for some cancer survivors.88 It is recommended that physicians working with patients who have or who are predisposed to underlying medical conditions consult the guidelines for pre-exercise medical assessments and exercise testing forwarded by Schmitz et al.30 In addition, physicians may want to encourage patients to participate in physical activity sessions that are supervised by a fitness professional who has received certification from an international authority to work with special populations (e.g. ACSM; National Strength and Conditioning Association) – at least until their medical condition is under control.

Conclusions:

In conclusion, although the various treatment options offer a positive outlook for surviving breast cancer, there are a number of notable short- and long-term physical and mental side effects associated with them.5-9 It is therefore necessary to consider interventions that may
reduce the negative symptoms experienced by this population. Physical activity may help in the prevention and management of many of the side effects and is beneficial for breast cancer survivors. Thus, it is hoped that the evidence-based recommendations provided herein will facilitate more effective, efficient, and consistent delivery of physical activity counseling and that this will lead to improved patient outcomes in breast cancer survivors. To this end, physicians are encouraged to at least inform patients about the benefits and recommendations for physical activity. Subsequently, physicians may choose to refer patients to other allied health professional (e.g. physical activity counselors, physical therapist or exercise specialists) to help them develop and initiate a physical activity program. 89
References


**Table 1**

*Summary of Aerobic Training Studies with Breast Cancer Survivors*

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Study group</th>
<th>Prescribed intervention</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| Cadmus et al. (2009) | Intervention group  
• Mean age: 56.5 years  
• Stage 0-IIIA  
• Months since treatment: < 12  
Control group  
• Mean age: 55.1 years  
• Stage 0-IIIA  
• Months since treatment: < 12 | Aerobic training:  
• Walking or other forms of aerobic activity  
• 5 sessions per week  
• 15-30 minutes per session  
• 60-80% of predicted maximal HR  
• Progressive | • ↑ Social/family well-being and functioning among BCS with lowest baseline QOL  
• ↑ Lean mass  
• ↓ % Body fat  
• Maintenance of bone mineral density |
| Fairey et al. (2003) | Intervention group  
• Mean age: 59 years  
• Stage I-IIIA  
• Months since treatment: 14  
Waitlist control group  
• Mean age: 58 years  
• Stage I-IIIA  
• Months since treatment: 14 | Aerobic Training:  
• Recumbent or upright ergometer  
• 3 sessions per week  
• 15-35 minutes per session  
• 70-75% of maximal oxygen consumption  
Warm-up and Cool-down:  
• Recumbent or upright ergometer  
• 5 minutes  
• 50% of peak oxygen consumptions | • ↑ Peak oxygen consumption  
• ↑ Peak power output  
• ↑ Peak HR  
• ↑ Ventilatory equivalent for oxygen and carbon dioxide  
• ↑ Power output at the ventilatory equivalent for oxygen and carbon dioxide  
• ↑ Overall QOL  
• ↑ Happiness  
• ↑ Self-esteem  
• ↑ FACT-B  
• ↑ Physical and functional well-being  
• ↓ Insulin-like growth factor-I (IGF-I)  
• ↑ Insulin-like growth factor binding protein-3 (IGFBP-3)  
• ↓ IGF-I:IGFBP-3 molar ratio  
• ↑ Heart rate reserve  
• ↓ Triglycerides |
| Daley et al. (2007) | Intervention group  
• Mean age: 51.6 years  
• Stage not reported  
• Months since treatment: 17.6 | Intervention group:  
• Unspecified aerobic activity  
• 3 sessions per week  
• 50 minutes per session | Intervention group vs. usual care:  
• ↑ FACT-G  
• ↑ FACT-B  
• ↑ SWB |
<table>
<thead>
<tr>
<th>Study</th>
<th>Group</th>
<th>Intervention Details</th>
<th>Psychological Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exercise placebo group</strong></td>
<td>Unspecified body conditioning/stretching exercises</td>
<td>Mean age: 50.6 years, Stage not reported, Months since treatment: 18.2 months</td>
<td>↑ FWB, ↑ BCS, ↑ Physical conditioning competence, ↑ Physical self-worth, ↓ Depression, ↑ Aerobic fitness</td>
</tr>
<tr>
<td><strong>Usual care group</strong></td>
<td></td>
<td>Mean age: 51.1 years, Stage not reported, Months since treatment: 16.7 months</td>
<td>↑ FACT-B, ↓ Fatigue, ↑ Physical self-worth, ↓ Depression, ↑ Satisfaction with life, ↑ Aerobic fitness</td>
</tr>
<tr>
<td><strong>Exercise Placebo group</strong></td>
<td></td>
<td>Mean age: 50.6 years, Stage not reported, Months since treatment: 18.2 months</td>
<td>↑ Physical self-worth, ↓ Depression, ↑ Physical self-worth, ↓ Depression, ↑ Physical self-worth, ↓ Depression, ↑ Physical self-worth</td>
</tr>
<tr>
<td><strong>Payne et al. (2008)</strong></td>
<td>Intervention and waitlist</td>
<td>Mean age: 64.7 years, Stage not reported, Months since treatment: not reported</td>
<td>↑ Sleep quality, Shorter wake time and actual sleep time, ↓ Movement during sleep, ↓ Serotonin</td>
</tr>
<tr>
<td><em>Combined data provided only.</em></td>
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<tr>
<td><strong>Pinto et al. (2005)</strong></td>
<td>Intervention group</td>
<td>Mean age: 53.4 years, Stage 0-II, Months since treatment: not reported</td>
<td>↓ Vigor, ↓ Fatigue, ↑ Body esteem (i.e., ↓ physical condition concerns)</td>
</tr>
<tr>
<td><em>Waitlist control group</em></td>
<td></td>
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<tr>
<td><strong>Segar et al. (1998)</strong></td>
<td>Intervention group</td>
<td>Mean age: 47.5 years, Stage not reported, Months since treatment: 43.7 months</td>
<td>↓ Depression, ↓ State and trait anxiety</td>
</tr>
<tr>
<td><em>Exercise Placebo group vs. usual care:</em></td>
<td></td>
<td>Mean age: 50.6 years, Stage not reported, Months since treatment: 18.2 months</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- HR: Heart rate
- RPE: Rate of Perceived Exertion
- FACT-B: Functional Assessment of Cancer Therapy—Breast
- FWB: Functional well-being
- BCS: Body image
- Depression
- Physical self-worth
- Satisfaction with life
- Aerobic fitness
<table>
<thead>
<tr>
<th>Group</th>
<th>Description</th>
</tr>
</thead>
</table>
| Waitlist control group        | • Mean age: 51.8 years  
• Stage not reported  
• Months since treatment: 38.1  
• > 30 minutes per session  
• > 60% of age-predicted HRmax |
| Intervention group            | **Aerobic training:**  
• Walking on treadmill with a weight belt and backpack  
• 3 sessions per week  
• 10-45 minutes per session  
• Load: 1-5 pound weight loading  
• 50-75% of HRmax  
• Progressive  

**Warm-up and Cool-down:**  
• Unspecified exercises  
• 5 minutes each |

**Note.** AT = Aerobic training. HRmax = heart rate maximum
### Summary of Resistance Training Studies with Breast Cancer Survivors

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Study group</th>
<th>Prescribed intervention</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmed et al. (2006)</td>
<td>Intervention group</td>
<td>• Mean age: 52.3 years • Stage DCIS-III • Months since treatment: 13.4</td>
<td>Resistance: • 9 exercises using free weights and resistance machines • Upper and lower body (i.e., arms, back, chest, buttocks, legs) • Used free weights and resistance machines • 1-3 sets per exercise • 8-10 repetitions per set • 2 sessions per week • 60 minutes per session • Load • Upper body: 0-0.5 pounds (↑ smallest increments) • Lower body: most weight that allowed for completion of repetitions/sets Warm-up, cool down, stretching: • Details not reported • Progressive</td>
</tr>
<tr>
<td>Schmitz et al. (2005)</td>
<td>Intervention group</td>
<td>• Mean age: 51.7 years • Stage DCIS-III • Months since treatment: 13.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waitlist control group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speck et al. (2009)</td>
<td>Intervention group</td>
<td>• Mean age: 56 years • Stage I-III • Months since treatment: not reported</td>
<td>Resistance training: • 8 exercises (i.e., seated row, chest press, lateral or front raises, biceps curls, triceps pushdowns, leg press, back extension, leg extension, leg curl) • Upper, lower and core muscles • 2-3 sets per session • 10 repetitions per set • 2 sessions per week • 90 minute sessions (including</td>
</tr>
<tr>
<td>Schmitz et al. (2009)</td>
<td>Control group</td>
<td>• Mean age: 58 years • Stage I-III • Months since treatment: not reported</td>
<td></td>
</tr>
</tbody>
</table>
warm-up)
• Load: No or light weights (progressed to heavy weights)
• Progressive

Warm-up:
• Cardiovascular warm-up and stretching
• Unspecified duration and type

Note. HRmax = heart rate maximum
Table 3

Summary of Mixed Aerobic and Resistance Training Studies with Breast Cancer Survivors

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Study group</th>
<th>Prescribed intervention</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| Cheema et al. (2006) | Intervention group | **Aerobic training:**  
- Mean age: 57.7 years  
- Stage DCIS-III  
- Months since treatment: 5.2  
- Self-selected activities (e.g., treadmill, walking, stationary exercise cycling, aerobics classes, hiking)  
- 3 sessions per week  
- 15-30 minutes per session  
- 65-85% of HRmax  
- Progressive | **↑ VO2max**  
**↓ Sum of 5 skin folds**  
**↓ Waist and hip girth**  
**↑ Muscular strength and endurance**  
**↑ Flexibility (i.e., shoulder extension/flexion/abduction, lower body/trunk)**  
**↑ Psychological and overall QOL**  
**No incidents of lymphedema** |
| | | **Resistance training:**  
- 10 exercises (i.e., bench press, leg press, lat pull-down, leg curl, shoulder press, split squat, biceps curl, calf raise, triceps press-down, abdominal)  
- Upper and lower body  
- Mostly free-weights  
- 1-3 sets per exercise  
- 12 repetitions per set  
- 2 sessions per week  
- Duration of session not specified  
- Load - 8-12 repetitions maximum (RM)  
- Progressive | |
### Hayes et al. (2009)

**Intervention group**
- Mean age: 60 years
- Stage not reported
- Years since treatment: 69% > 5

**Waitlist control group**
- Mean age: 59 years
- Stage not reported
- Years since treatment: 69% > 5

**Aerobic and resistance training:**
- Unspecified aerobic exercise
- Unspecified number and duration of sessions
- Moderate intensity

**Cool-down:**
- Full-body static stretching

**Aerobic and resistance training:**
- No change in lymphedema

### Herrero et al. (2005)

**Intervention group**
- Mean age: 50 years
- Stage I-II
- Months since treatment: 36

**Waitlist control group**
- Mean age: 51 years
- Stage I-II
- Months since treatment: 35

**Aerobic Training:**
- Cycle-ergometer
- 3 sessions per week
- 20-30 minutes per session
- 70-80% of HRmax

**Progressive**

**Resistance Training:**
- 11 exercises (i.e., chest press, shoulder, press, leg extension, leg curl, leg press, leg calf raise, abdominal crunch, low back extension, arm curl, arm extension, lateral pull-down)
- Upper and lower body
- 1-2 sets for small muscle groups; 2-3 sets for large muscle groups
- 8-15 repetitions per set (15-20 for abdominal and lower back)
- 3 sessions per week
- 40-50 minutes per sessions

**↑ Overall QOL**
**↑ Physical function**
**↑ Muscle mass**
**↓ % Body Fat**
**↑ VO2peak**
**↑ Peak power output**
**↑ Peak ventilation**
**↑ Muscle strength**
<table>
<thead>
<tr>
<th>Hsieh et al. (2008)</th>
<th>Surgery alone group</th>
<th>Surgery and chemotherapy group</th>
<th>Surgery and radiation group</th>
<th>Surgery, chemotherapy, and radiation group</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mean age: 55.6 years</td>
<td>• Mean age: 55.6 years</td>
<td>• Mean age: 57.2 years</td>
<td>• Mean age: 63.1 years</td>
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<tr>
<td>• Stage not reported</td>
<td>• Stage not reported</td>
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<tr>
<td>• Months since treatment: not reported</td>
<td>• Months since treatment: not reported</td>
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<td>• Months since treatment: not reported</td>
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**Aerobic Training:**
- Outdoor or treadmill walking, stationary cycling, recumbent stepping, or walking on an AquaCiser underwater treadmill
- 2-3 sessions per week
- 60 minutes per session (including resistance training and stretching)
- 40-75% of HR reserve
- Progressive

**Resistance Training:**
- Upper and lower body exercises
- 2-3 sessions per week
- 60 minutes per session (including resistance training and stretching)
- Number of sets, repetitions, and load not specified
- Progressive

**Warm-up and Cool-down:**
- Unspecified exercises
- 10 minutes each
- Very light intensity

**Surgery alone group:**
- ↑ Predicted VO2max
- ↑ Treadmill time
- ↓ Behavioural, affective, and total fatigue

**Surgery and chemotherapy group:**
- ↑ Predicted VO2max
- ↑ Treadmill time
- ↓ Behavioural, affective, sensory, cognitive, and total fatigue

**Surgery and radiation group:**
- ↑ Predicted VO2max
- ↑ Treadmill time
- ↓ Behavioural, affective, sensory, cognitive, and total fatigue

**Surgery, chemotherapy, and radiation group:**
- ↑ Predicted VO2max
- ↓ Resting HR
- ↑ Forced vital capacity % of predicted
- ↑ Treadmill time
- ↓ Behavioural, affective, sensory,
### SELF-PRESENTATION AMONG BREAST CANCER SURVIVORS

<table>
<thead>
<tr>
<th>Study (Year)</th>
<th>Intervention Group</th>
<th>Control Group</th>
<th>Aerobic Training</th>
<th>Resistance Training</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hutnick et al. (2005)</td>
<td>Mean age: 48.5 years</td>
<td>Mean age: 52.3 years</td>
<td>Treadmill</td>
<td>8 exercises using Flex-bands</td>
<td>↑ Lymphocyte activation, ↑ VO2 max, ↑ Upper body strength</td>
</tr>
<tr>
<td></td>
<td>Stage I-III</td>
<td>Stage I-III</td>
<td>3 sessions per week</td>
<td>Upper and lower body</td>
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<tr>
<td></td>
<td>Months since treatment: not reported</td>
<td>Months since treatment: not reported</td>
<td>10-20 minutes per session</td>
<td>1-3 sets per exercise</td>
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<td></td>
<td></td>
<td></td>
<td>60-75% HRmax</td>
<td>8-12 repetitions</td>
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<td></td>
<td>Progressive</td>
<td>40-90 minutes per session</td>
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<td>(including aerobic training and warm-up)</td>
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<td></td>
<td>Load not specified</td>
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<td></td>
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<td>Progressive</td>
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<td></td>
<td><em>Warm-up:</em></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Light aerobic exercise and stretching</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Unspecified exercises</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>5 minutes</td>
<td></td>
</tr>
<tr>
<td>Lane et al. (2004)</td>
<td>Mean age: 52.4 years</td>
<td>Mean age: 52.3 years</td>
<td>Free-choice of activity</td>
<td>6 exercises (i.e., seated row, bench press, latissimus dorsi pull down, one arm bent-over rowing, triceps extension, biceps curl)</td>
<td>↑ Arm volume and circumference (similar for ipsilateral and contralateral sides), ↑ Muscular strength</td>
</tr>
<tr>
<td></td>
<td>Stage I-III</td>
<td>Stage I-III</td>
<td>3 sessions per week</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Months since treatment: &gt; 6</td>
<td>Months since treatment: not reported</td>
<td>30-45 minutes per session</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60% of HRmax</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Progressive</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td><em>Resistance training:</em></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 exercises (i.e., seated row, bench press, latissimus dorsi pull down, one arm bent-over rowing, triceps extension, biceps curl)</td>
<td></td>
</tr>
</tbody>
</table>
• Upper body
• 2-3 sets per exercise
• 10 repetitions per set
• Load: light weights (progressed to heavy weights)
• Progressive

*Dragon boating training:*
• Intermittent paddling activities
• 2 sessions per week
• 90 minute sessions (including 15 minute warm-up)
• Progressive increase in frequency, duration, and intensity (no detail reported)

*Warm-up:*
• 5-7 minutes of aerobic exercise (mode not specified)
• 5 minutes of stretching

*Cool-down:*
• Included but no specifications

<table>
<thead>
<tr>
<th>Ligibel et al. (2008)</th>
<th>Intervention group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean age: 52 years</td>
<td>Mean age: 53 years</td>
</tr>
<tr>
<td></td>
<td>Stage I-III (invasive)</td>
<td>Stage I-III (invasive)</td>
</tr>
<tr>
<td></td>
<td>Months since treatment: &gt; 3</td>
<td>Months since treatment: &gt; 3</td>
</tr>
</tbody>
</table>

*Aerobic training:*
• Choice of activity
• 90 minutes per week
• Number of sessions not specified
• 55-80% of HRmax
• Progressive

*Resistance training:*
• 8 exercises (i.e., leg press, quadriceps extension, hamstring curl, hip abductor/adductor, abdominal crunch, calf press, leg lift)

*↑ Strength*
*↓ Hip circumference*
*↓ Fasting insulin concentration*
• Lower and core muscles
• Used weight machines
• 2-4 sets per session
• 10 repetitions per set
• 2 sessions per week
• 50 minutes per session
• 80% of one-repetition maximum
• Progressive

Warm-up:
• 5 minutes per session of walking on treadmill at low-intensity
• 10 minutes per session of static stretching

<table>
<thead>
<tr>
<th>McKenzie et al. (2003)</th>
<th>Intervention group</th>
<th>Aerobic training:</th>
<th>Maintenance arm circumference and volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Mean age: 56.4 years</td>
<td>• Arm cycle ergometer</td>
<td>• Maintained arm circumference and volume</td>
</tr>
<tr>
<td></td>
<td>• Stage I-II</td>
<td>• 3 sessions per week</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Months since treatment: &gt; 6</td>
<td>• Five 1 minute bouts - 20 minutes continuous per session</td>
<td></td>
</tr>
<tr>
<td>Control group</td>
<td>• Mean age: 56.9 years</td>
<td>• 8.3-25 Watts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Stage I-II</td>
<td>• Progressive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Months since treatment: &gt; 6</td>
<td>• Resistance training:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 6 exercises (i.e., seated row, bench press, latissimus dorsi pull down, one arm bent-over rowing, tricep extension, bicep curl)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Upper and core muscle groups</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 3 sessions per week</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 2-3 sets per session</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 10 repetitions per set</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Load: light weights (progressed to heavy weights)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Progressive</td>
<td></td>
</tr>
</tbody>
</table>

Warm-up:
## SELF-PRESENTATION AMONG BREAST CANCER SURVIVORS

**5-7 minute aerobic exercise per session of walking or cycling**
- 5 minutes per session of stretching

### Cool-down:
- Unspecified exercises and duration

<table>
<thead>
<tr>
<th>Milne et al. (2008)</th>
<th>Intervention group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aerobic training:</strong></td>
<td>Cycle and rowing ergometers, mini-trampoline, step-up blocks</td>
<td>Cycle and rowing ergometers, mini-trampoline, step-up blocks</td>
</tr>
<tr>
<td><strong>Intervention group</strong></td>
<td>3 sessions per week</td>
<td>Supervised</td>
</tr>
<tr>
<td><strong>Mean age:</strong> 55.2 years</td>
<td>20 minutes per session</td>
<td>Progressive</td>
</tr>
<tr>
<td><strong>Stage I-IIIA</strong></td>
<td>Unspecified intensity</td>
<td></td>
</tr>
<tr>
<td><strong>Months since treatment:</strong> &gt; 12.6</td>
<td>Cycle and rowing ergometers, mini-trampoline, step-up blocks</td>
<td></td>
</tr>
<tr>
<td><strong>Control group</strong></td>
<td>Cycle and rowing ergometers, mini-trampoline, step-up blocks</td>
<td></td>
</tr>
<tr>
<td><strong>Mean age:</strong> 55.1 years</td>
<td>Cycle and rowing ergometers, mini-trampoline, step-up blocks</td>
<td></td>
</tr>
<tr>
<td><strong>Stage I-IIIA</strong></td>
<td>3 sessions per week</td>
<td>Cycle and rowing ergometers, mini-trampoline, step-up blocks</td>
</tr>
<tr>
<td><strong>Months since treatment:</strong> &gt; 13.4</td>
<td>20 minutes per session</td>
<td>Cycle and rowing ergometers, mini-trampoline, step-up blocks</td>
</tr>
<tr>
<td><strong>Resistance training:</strong></td>
<td>Unspecified intensity</td>
<td>Progressive</td>
</tr>
<tr>
<td>**12 exercises (i.e., chest press/extension, biceps curls, triceps extension, leg extension/curls, hip abduction/adduction, back extension, abdominal crunches, standing fly's and leg press)</td>
<td>3 sessions per week</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 sets per session</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 repetitions per set</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Load: light weights (progressed to heavy weights)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Progressive</td>
<td></td>
</tr>
</tbody>
</table>

### Warm-up and Cool-down:
- 5 minutes of cycle and rowing ergometers, mini-trampoline, step-up blocks
- Unspecified intensity
- 5 minutes of stretching at

- ↑ Overall QOL
- ↑ Functional assessment of cancer therapy-general
- ↑ Trial outcome index
- ↑ Physical, emotional, and functional well-being
- ↑ Breast cancer subscale
- ↓ Fatigue
- ↓ Social physique anxiety
- ↑ Aerobic fitness
- ↑ Muscular strength
<table>
<thead>
<tr>
<th>Study</th>
<th>Group Description</th>
<th>Intervention Details</th>
<th>Baseline/75W Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nieman et al. (1995)</td>
<td><strong>Intervention group</strong></td>
<td>- Mean age: 60.8 years</td>
<td>- Mean age: 51.2 years</td>
</tr>
<tr>
<td></td>
<td>• Stage not reported</td>
<td>- Months since treatment: not reported</td>
<td>- Months since treatment: not reported</td>
</tr>
<tr>
<td></td>
<td>• Aerobic training:</td>
<td>- Walking (indoor track)</td>
<td>• ↑ Aerobic fitness</td>
</tr>
<tr>
<td></td>
<td>• 3 sessions per week</td>
<td>- 30 minutes per session</td>
<td>• ↑ Muscular strength</td>
</tr>
<tr>
<td></td>
<td>• 75% of HRmax</td>
<td>• Progressive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Progressive</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Waitlist control group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mean age: 51.2 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Stage not reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Months since treatment: not reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinto et al. (2003)</td>
<td><strong>Intervention and waitlist groups</strong></td>
<td>- Aerobic training:</td>
<td>• ↓ Baseline and 75W systolic and diastolic blood pressure</td>
</tr>
<tr>
<td></td>
<td>• Mean age: 52.5 years</td>
<td>• 3 aerobic exercises per session</td>
<td>• ↓ Peak systolic blood pressure</td>
</tr>
<tr>
<td></td>
<td>• Stage 0-II</td>
<td>(choices: treadmill walking, arm and leg ergometers, arm cycling, stationary cycling</td>
<td>• ↓ HR at 75W</td>
</tr>
<tr>
<td></td>
<td>• Days since treatment: 323.5</td>
<td>and rowing)</td>
<td>• ↑ Body esteem (i.e., ↓ physical condition and weight concerns)</td>
</tr>
<tr>
<td></td>
<td><em>Combined data provided only.</em></td>
<td>• 3 sessions per week</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 60-70% HRmax</td>
<td>• 30 minutes per session</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Progressive</td>
<td>• 60-70% HRmax</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Progressive</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Resistance training (incorporated during last month)</strong></td>
<td>• Upper body and core muscles (i.e., triceps, biceps, pectoral muscles, shoulders,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>upper back, stomach)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Unspecified number of sets and repetitions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Load: light weights (1-5 lbs handheld weights)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Progressive</td>
<td></td>
</tr>
<tr>
<td>Turner et al. (2004)</td>
<td>Intervention group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean age: 47 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stage not reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Months since treatment: not reported</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Aerobic training:
- Low-impact aerobics, ergometers, and water based activities
- 1-3 sessions per week
- 40-70 minutes per session (including resistance training, warm-up and cool down)
- 70-90% of HRmax
- Progressive

### Resistance training (Introduced during the final weeks)
- Unspecified muscle groups
- Used free- and machine-weights
- 2-3 sets per exercise
- 8-12 repetitions per set
- Load: most weight that allowed for completion of repetitions/sets
- Progressive

### Warm-up and Cool-down:
- Unspecified type and duration

### Warm-up and cool-down:
- 10 minutes per session each
- Cardiovascular and flexibility (unspecified type and intensity)

**Note.** HRmax = heart rate maximum

**Results:**
- ↑ Overall QOL
- ↑ Motivation
- ↑ Hope
- ↑ Confidence
- ↑ Self-esteem
Table 4

Summary of Flexibility Training Studies with Breast Cancer Survivors

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Study group</th>
<th>Prescribed intervention</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mustian et al. (2004)</td>
<td>Tai Chi Chuan group</td>
<td>Tai Chi Chuan: 10 minutes of stretching and basic Chi Kung 40 minutes of Tai Chi Chuan (i.e., 15-move short form of Yang Style) 10 minutes of regulatory breathing, imagery, and meditation 3 sessions per week Low-to-moderate intensity</td>
<td>⬆ HQOL ⬆ Self-esteem ⬆ Aerobic capacity ⬆ Muscular strength ⬆ Flexibility</td>
</tr>
<tr>
<td></td>
<td>Psychosocial support group</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mean age: 52 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Stage 0-IIIB</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Months since treatment: 1-30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. See Daley et al. (2007) in Table 1 for additional flexibility study.
Table 5.

**Recommended Characteristics of Exercise Program for Physical and Psychological Health Benefits.**

<table>
<thead>
<tr>
<th>Types</th>
<th>Frequency (sessions/week)</th>
<th>Duration (minutes/session)</th>
<th>Intensity (magnitude of effort exerted to perform activity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic (or endurance)</td>
<td>3 or more</td>
<td>30</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>(e.g., walking, jogging, running, cycling, dancing, skating, swimming, aerobics classes, household chores)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistance (or strength)</td>
<td>2 or 3</td>
<td>6 to 12 exercises;</td>
<td>Progressive (light to strenuous)</td>
</tr>
<tr>
<td><em>(e.g., chest press/extension, biceps curls, triceps extension, leg extension/curls, hip abduction/adduction, back extension, abdominal crunches)</em></td>
<td></td>
<td>2 or 3 sets of 8 to 12 repetitions for each exercise</td>
<td></td>
</tr>
<tr>
<td>Flexibility</td>
<td>3</td>
<td>50 to 60</td>
<td>Light</td>
</tr>
<tr>
<td><em>(e.g., yoga, Tai Chi)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B: Qualitative Study Consent Form
CONSENT FORM

Title of research project: The impact of physical activity on breast cancer survivors’ physical and mental health.

Principle investigator: Jennifer Brunet, Ph.D. candidate, McGill University

Supervisor: Catherine M. Sabiston, Ph.D., McGill University

Purpose:
The purpose of this study is to explore what self-presentational concerns breast cancer survivors experience. We are asking for your participation in this research so that we can better understand how you feel about yourself following your treatment for breast cancer. Results from this study will be presented at scientific conferences, will be published in academic journals, and will be widely distributed for health promotion efforts.

Study procedures:
If you agree to participate in this study, you will be interviewed face-to-face and it will take approximately an hour and a half. During this time, you will be asked to answer a series of questions pertaining to self-presentation concerns. We will meet at a location that is convenient, comfortable, and has an appropriate level of privacy. Audio tapes will be used to record the interview. Following the interviews, written transcripts will be made of the audio tapes. Every attempt will be made to remove any uniquely identifying information in the transcripts in order to protect your confidentiality.

Benefits and risks to participants:
There are no foreseeable risks associated with your involvement in this study. The likely benefits to you are minimal; however, the overall impact for the breast cancer survivor community’s physical and mental health will be significant.

Confidentiality:
Information gathered during this study will be used for research purposes only (i.e., preparation of academic research publications and presentations). A number of precautions will be taken to guarantee the confidentiality of the information that you will provide. Results from this study will be analyzed in group form and participants from this study will be identified as ‘women who have been treated for breast cancer’. Furthermore, in all databases and documentation, participants will be identified by unique identification number only. No persons other than the
members of the research team will have access to the data, or any other supporting documentation, which will be securely stored for five years. After this time, the principal investigator will destroy all related study documents.

Participants concerns:
- Your participation in this study is voluntary.
- If you decide not to take part, you will not lose any health care benefits or services to which you are otherwise entitled.
- If you decide to participate in this study, you may refuse to answer any questions you are uncomfortable with or withdraw from this study at any time.
- By signing this consent form to participate in this study, you do not waive any legal rights.
- There are no known conflicts of interest on the part of the researchers or McGill University.

Contact information about your rights as a participant in this study: If you have any questions or concerns about the treatment or rights of research participants, you may anonymously contact the Research Ethics Officer, Lynda McNeil, at 514-398-6831.

Contact information about the study: If you have any questions concerning the procedures of this study or desire further information, you may anonymously contact the principal investigator (Jennifer Brunet) at 398-4184 ext.: 0481. In addition or alternatively, you may contact her supervisor, Dr. Catherine Sabiston, at 514-398-4184 ext.: 00890.
PARTICIPANT CONSENT FORM

Title of research project:
The impact of physical activity on physical and mental health among breast cancer survivors over time.

This study has been explained to me and I accept the terms of this study. I have had an opportunity to ask questions and my questions have been answered to my satisfaction. I have been informed that I may refuse to participate or withdraw at any time without any loss of health care benefits to which I am otherwise entitled. I voluntarily agree to participate in this study, which involves being interviewed during the next month.

Your signature below indicates that you freely consent and voluntarily agree to be interviewed twice:

________________________________________________________________________________________
Date                                        Participant’s signature                     Printed name

________________________________________________________________________________________
Date                                        Investigator’s signature                    Printed name
Appendix C: Interview Guide
Interview Guide

Welcome

Thank you for agreeing to participate in this interview. My name is Jennifer Brunet and I am a PhD candidate at McGill University in the Department of Kinesiology & Physical Education.

The reason I invited you here is that I am talking to women who have been treated for breast cancer about health-related issues, specifically, body image.

I would like you to respond to some questions regarding your experience with breast cancer and things that may affect your body and how you feel about it.

This interview will last between 60 and 90 minutes.

Before we begin, I'd like to review a few things that are useful to know about this interview.

1- I am audio recording the session so we make sure that I get all the information and exactly as you said it.
2- All your comments will be confidential, meaning no one will know if you made a specific comment.
3- There are not right or wrong answers. Feel free to say whatever you want. Anything you're thinking is important and interesting. I want to hear your thoughts and opinion.

Any questions before we begin?

[Have them sign the consent form]
A. Opening Questions

1. Tell me a little about yourself.
   a. When were you diagnosed?
   b. How did you find out?
   c. Tell me about the treatment decision process?
      - For surgery?
      - For adjuvant therapy?

B. Key Questions

1. Describe to me what you think the “ideal” women looks like.
   (Clarify whether this is her personal ideal)
   a. Tell me about her physical appearance
   b. How much does she weigh?
   c. What does her body/silhouette look like?
   d. What does her hair look like?
   f. What is her dress size?
      - What has influenced you to think that women should look this way?

2. How would you compare yourself to this ‘ideal’?
   [If there is a discrepancy, then ask]
      - Why do you think you compare favorably/ unfavorably to this ideal?

3. Sometimes women compare themselves to other women. How much do you think you compare yourself to other women on the basis of physical looks?
   a. Can you explain your answer to me…why do you think you make/don’t make comparisons?
   b. Have you always been this way?
   c. How does it make you feel when you compare yourself? Why?

4. Can you describe how do you feel about your body? How has cancer influenced these feelings?
   a. What specifically about breast cancer has influenced how you feel about your body?
      - Probes: diagnosis, treatment, surgery? How so.
   b. What did you like/dislike about your body before your cancer diagnosis and treatment?
   c. What do you like about your body now?
   d. What do you dislike about your body now?
   e. Why do you like/dislike these aspects of your body?

5. Some women are very concerned about how they look to other people. How has the amount of time you spend thinking about your appearance changed since your breast cancer diagnosis and treatment?
   [Depending on how they answer]
   a. Tell me about what is different now that makes you feel like you need to pay
[more attention/less attention] to how you look?

6. Can you describe your level of satisfaction/dissatisfaction with your weight? Shape? Appearance?
   a. What do you think contributes to this satisfaction/dissatisfaction?
   b. In your opinion, how has it changed since you learned you had breast cancer?
   Why?
   c. How important is it for you to look a certain way?
   d. Do you find yourself being more careful now than before your diagnosis about watching your weight?
   [Depending on how they answer]
   - What are the reasons that you think you are more/less careful now about watching your weight?

7. Tell me about some of the strategies you now use to change your body size, shape, weight and appearance?
   a. What types of things do you do to watch or control your weight?
   b. How have these strategies changed since you’ve been diagnosed and treated for breast cancer?
   c. Tell me about your confidence to change your body using these strategies.

8. What are the factors that influence how you feel about your body?
   a. Can you tell me how the presence of other people around you influence how you feel about your body.
   b. Around whom do you feel it is more or less important for you to look a certain way?
   c. Tell me about the type of things people say that affect how you feel about your body.
   d. Tell me about the type of things that people might do that affect how you feel about your body.
   e. Who would you say currently influences your feelings about your looks the most?
      How? Why?
   f. Who has influenced you the most in the past? How? Why?
   g. Describe for me “the way” you want to look in front of your partner? Family? Friends? Strangers?

9. Do you feel pressure to “look good” all the time or just in certain situations?
   a. If in all situations: What do you think the reason is that you feel pressure to always look good?
   b. If is certain situations: Which situations do you feel pressured to “look good”?
   c. In your opinion what is it about the situation that makes you feel this way?
   d. How important is it to look a certain way when you leave your house to go somewhere?
   e. What types of things do you do when you get ready to go somewhere?

10. What do you do to help yourself feel better when you aren’t feeling good about how you look?
    a. How do these actions help you to feel better about how you look?
b. In your opinion, do you rely on these strategies more now than you did before being treated for breast cancer? Why?

C. Ending Questions

1. After all we've talked about, whom and what do you think has the biggest influence on how you feel about your body?

2. In your opinion, what could health professionals do to help women treated for breast cancer feel better about their body image?

3. Is there anything else that I should know about being a breast cancer survivor and how that influences how you feel about body size, shape, weight and appearance?

Thank you for your time. I appreciate your feedback and insights.
Appendix D: Background and Demographics Questionnaire
Background and Demographics Questionnaire

**Personal Information**

1. Identification number: ____________________

2. 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?
   - Chinese?
   - South Asian (e.g., East Indian, Pakistani, Sri Lankan)?
   - Black?
   - Filipino?
   - Latin American?
   - Southeast Asian (e.g., Cambodian, Indonesian, Laotian, Vietnamese)?
   - Arab?
   - West Asian (e.g., Afghan, Iranian)?
   - Japanese?
   - Korean?
   - Other – Specify __________________________________________

4. What language you speak most often at home?

   - English
   - French
   - Arabic
   - Chinese
   - Cree
   - German
   - Greek
   - Dutch
   - Portuguese
   - Punjabi
   - Spanish
   - Tagalog (Pilipino)
   - Ukrainian
   - Vietnamese
   - Arabic
   - Persian
   - Hunagrian
   - Hindi
   - Italian
5. What is your marital status?

☐ Single
☐ Married or living with a life partner
☐ Separated
☐ Divorced
☐ Widowed

Breast Cancer Information

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

2. What stage of breast cancer were you diagnosed with?

☐ Stage 0
☐ Stage I
☐ Stage II
☐ Stage III
☐ Stage IV

3. Indicate which medical treatments have you 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</td>
<td>☐ No</td>
</tr>
<tr>
<td>Lumpectomy</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Single Mastectomy</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Double Mastectomy</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Reconstructive surgery</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Radiotherapy</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Hormonal therapy</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Other (Please specify):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Please list:
   
a. The type of chemotherapy you were prescribed: ____________________

b. The location of radiation you received: _______________________

c. The hormones you have been prescribed: _______________________

5. What was your usual weight, in pounds, before breast cancer diagnosis? _______lbs

6. What is your weight, in pounds? _______

7. What is your height, in feet and inches? ________ft, ________in.

8. Are you:

   [ ] Pre-menopausal
   [ ] Going through menopause
   [ ] Post-menopausal
Appendix E: CIHR Project Description
CIHR Project Description

Physical Activity among Breast Cancer Survivors: Understanding the Impact on Biological Risk Factors and Psychological Health over Time

Principal Investigator: Sabiston, C. M.

Co-Investigators: Wrosch, C., O’Loughlin, J.

Collaborators: Andersen, R. A., Keyserlingk, J., Ahmed, R., Doucette, N.

Agency: Canadian Institutes of Health Research

Dates: October 2008 to September 2011

Total amount of grant: $452,352

Summary of Proposal

According to the Canadian Cancer Society, one in nine women will be diagnosed with breast cancer during her lifetime, and upwards of 85% of these women will survive the disease. Relative to same-aged women without cancer, breast cancer survivors are at increased risk for other chronic illnesses including cardiovascular disease, diabetes, osteoporosis, physical function declines, and depression. The increased risk for comorbid chronic illnesses may stem from genetic predisposition and/or the cancer treatments endured, but also from lifestyle-related factors including age, low levels of physical activity, and overweight status. Nearly 50% of Canadian breast cancer survivors are overweight or obese, and sedentary is more prevalent for these women compared to healthy-weight survivors.

Appropriate participation in physical activity is beneficial for both physical and emotional health, and there is evidence that breast cancer survivors who participate in regular vigorous exercise have improved their strength, aerobic fitness and body composition. In addition, regular exercise is associated with improved sleep, improved cardiovascular risk
profiles, and enhanced subjective well-being through experiences of psychological growth and decreases in emotional distress. Despite the known health benefits of exercise, few breast cancer survivors incorporate exercise routinely into their lives - with over 55% of these women classified as inactive.

Lifestyle physical activity is a strategy to help sedentary individuals adopt more active lifestyles. This paradigm encourages the daily accumulation of at least 30 minutes of self-selected activities, either planned or unplanned, including all leisure, occupational, and household tasks that are at least moderate in intensity. Based on our own work, lifestyle physical activity is a gateway to traditional exercise among sedentary, overweight women. However, the longitudinal impact of lifestyle physical activity on subjective wellbeing, biological functioning, and physical health among overweight breast cancer survivors has not yet been investigated. Therefore, this study aims to examine the influence of lifestyle physical activity on subjective wellbeing, biological functioning and physical health outcomes over time among overweight breast cancer survivors. In addition, we will investigate psychological factors that are likely related to lifestyle physical activity behaviour. In aging populations, individuals who are motivated to address their health threats, and who are capable of disengaging from unattainable goals and reengaging in new goals, have more adaptive physical and emotional health outcomes. We hypothesize that breast cancer survivors with these characteristics are more likely to engage in lifestyle physical activity. The current study therefore also seeks to identify the psychological factors that may be involved in the process of adopting lifestyle physical activity.

To address these objectives, self-report and objective data are being collected from women on self-regulatory strategies (control of health threats, goal disengagement/reengagement), lifestyle physical activity (pedometers, accelerometers, self-report), subjective
wellbeing (psychological growth, emotional distress), biological functioning (cortisol, c-reactive protein), and physical health problems (general and breast cancer-specific) at six times during the first 18 months following treatment for breast cancer. The objective of this research program is to provide evidence that lifestyle physical activity is an antecedent to physical and emotional health among breast cancer survivors. This study is a first step towards better understanding active living in a vulnerable group of women, and the findings will help shape health promotion efforts and policy focused on effective strategies for early breast cancer survivorship.
Appendix F: Consent Form – Cross-Sectional and Longitudinal Studies
CONSENT FORM

Project funded by: The Canadian Institutes of Health Research & Canadian Breast Cancer Research Alliance

Title of research project: The impact of physical activity on physical and mental health among breast cancer survivors over time.

Principle investigator: Catherine M. Sabiston, Ph.D., McGill University

Co-investigators: Carsten Wrosch, Ph.D., Concordia University; Jennifer O’Loughlin, Ph.D., L’Université de Montréal (CHUM)

Collaborator: Dr. Sarkis Meterissian (Surgical Oncologist, McGill University Hospital Center)

Purpose:
The purpose of this study is to examine the importance of lifestyle physical activity on short- and long-term physical and mental health among breast cancer survivors. We are asking for your participation in this research so that we can better understand emotional and physical health over time, following your treatment for breast cancer. Results from this study will be presented at scientific conferences, will be published in academic journals, and will be widely distributed for health promotion efforts.

Study Procedures:
You will be asked to complete five questionnaires over the next 12 months. The survey takes approximately 30 minutes to complete, and is available in paper/pencil format or an electronic copy can be mailed to you. On five occasions in the next 12 months, you will also be asked to wear an accelerometer (a small device that goes on your waist and tracks your physical activity levels) for seven days, to collect saliva samples on a small gauze pad on three non-consecutive days as you go about your regular routines, and to provide a blood sample (via a finger prick). You will be asked to come to the McGill University exercise psychology laboratory for baseline measures and final assessments (heart rate and blood pressure). Alternatively, we can meet you at the Cedars Breast Center (MUHC) or your home for the baseline measures. We will mail you the remaining kits for collection during the 12 month period. You may also be asked to wear a pedometer at least 3 days a week throughout the study.
**Benefits to Participants:**
There may or may not be a direct medical benefit to you for taking part in this study; however, the overall impact for the breast cancer survivor community’s physical and mental health will be significant.

**Risks to Participants:**
There are no foreseeable risks associated with your involvement in this study.

**Compensation:**
You will receive a total of $150.00 over the course of the study. This compensation is based on providing you with $25.00 at the end of each of the 4 first sessions and $50.00 and the end of the last one. Additionally, you will be reimbursed for parking/transportation expenses while at McGill University for the baseline and final measures.

**Confidentiality:**
Information gathered during this study will be used for research purposes only (i.e., preparation of academic research publications and presentations). A number of precautions will be taken to guarantee the confidentiality of the information that you will provide. Results from this study will be analyzed in group form and participants from this study will be identified as ‘women who have been treated for breast cancer’. Furthermore, in all databases and documentation, participants will be identified by unique identification number only. The Institutional Review Board of the Faculty of Medicine may access the study data to ensure proper data management and to verify the ethical conduct of the study. No additional persons other than the members of the research team will have access to the completed questionnaires, or any other supporting documentation, which will be securely stored for five years as required by McGill University. After this time, the principal investigator will destroy all related study documents.

**Participants concerns:**
- Your participation in this study is voluntary. Also, you will be advised of any new information that may influence your decision to participate in this study.
- If you decide not to take part, you will not lose any health care benefits or services to which you are otherwise entitled.
- If you decide to participate in this study, you may refuse to answer any questions you are uncomfortable with or withdraw from this study at any time. By signing this consent form to participate in this study, you do not waive any legal rights.
- There are no known conflicts of interest on the part of the researchers or McGill University.

**Contact information about your rights as a participant in this study:**
If you have any questions about the treatment or rights of research participants, you may anonymously contact the Senior Ethics Administrator, Ilde Lepore, at 514-398-8302.

**Contact information about the study:**
If you have any questions concerning the procedures of this study, you may anonymously contact Sylvie Moisan (project manager) at 398-4184 ext: 0481.
PARTICIPANT CONSENT FORM

Title of research project:
The impact of physical activity on physical and mental health among breast cancer survivors over time.

This study has been explained to me and I accept the terms of this study. I have had an opportunity to ask questions and my questions have been answered to my satisfaction. I have been informed that I may refuse to participate or withdraw at any time without any loss of health care benefits to which I am otherwise entitled. I voluntarily agree to participate in this study, which involves the pre-determined completion of 5 questionnaires, the collection of saliva on 3 non-consecutive days, a small finger prick to collect one drop of blood onto a sterile pad, and the wearing of an accelerometer for a 7-day period at 5 points in time during the next 12 months, and wearing a pedometer throughout the duration of the study. I have signed and received a copy of this form for my records.

Date Participants signature Printed name

Date Investigator/Co-investigator’s signature Printed name
Appendix G: Main Questionnaire
Main Questionnaire

1. Please read each of the following statements carefully and indicate with a check or « x » in the appropriate box the degree to which the statement is characteristic or true of you, according to the following scale.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Moderately disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Moderately agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I value the attention and praise of others when they regard me as being in good shape.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I want others to see me with friends who are exercising.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I enjoy the praise I often received for exercising.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I prefer to exercise in groups so more people will view me as an exerciser.</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>I try to appear toned or fit to others.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Receiving praise while exercising makes me want to exercise more.</td>
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<td></td>
<td></td>
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<tr>
<td>I often wear exercise clothing even when I am not exercising to ensure that others know I am an exerciser.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I want to be thought of as a person who exercises.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I wear exercise/athletic clothing so other people will see me as an exerciser.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I emphasize my athletic ability around those who do not yet know that I am an “exercise nut”.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I value the attention and praise offered by others in regard to appearing physically fit.</td>
<td>Strongly disagree</td>
<td>Moderately disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Moderately agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>When I exercise, it is important to appear that I am not trying too hard.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I exercise so that regular exercisers will like me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I try to make other people aware that I exercise.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I want to be thought of as a person who exercises.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I exercise because it is important to look fit around others.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is important that others perceive me as being fit and active.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I wear exercise clothes that are flattering so others can see that I am fit.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I believe that other people form desirable impressions of me when I exercise.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Think about the physical activity you are involved in. Using any value from 0% to 100%, please indicate in the boxes provided below how confident you are for each of the following:

<table>
<thead>
<tr>
<th>Not at all confident</th>
<th>Completely confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% ------------------</td>
<td>50% ------------------</td>
</tr>
<tr>
<td>100% -----------------</td>
<td>-----------------------</td>
</tr>
</tbody>
</table>

**How confident are you that...**

<table>
<thead>
<tr>
<th>Other people will think that you have good physical coordination.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other people will think that your body looks fit and toned.</td>
</tr>
<tr>
<td>Other people will think that you have good stamina.</td>
</tr>
<tr>
<td>Other people will think that you are someone who works out regularly.</td>
</tr>
<tr>
<td>Other people will think that you are in good shape.</td>
</tr>
</tbody>
</table>

3. Please indicate the extent to which each of the statements below describes you.

<table>
<thead>
<tr>
<th>By exercising regularly...</th>
<th>Strongly disagree</th>
<th>Moderately disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Moderately agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other people will think that I have good physical coordination.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people will think that my body looks fit and toned.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people will think that I have good stamina.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people will think of me as someone who works out regularly.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people will think that I am in good shape.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I place a lot of value...</td>
<td>Strongly disagree</td>
<td>Moderately disagree</td>
<td>Disagree</td>
<td>Agree</td>
<td>Moderately agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>----------</td>
<td>------</td>
<td>-----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>On looking like I have good physical coordination.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On having a body that looks physically fit.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On being known as someone who has good stamina.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On being known as someone who works out regularly.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On being known as someone who is in good shape.</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
4. 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>Exercise Description</th>
<th>Times per week</th>
<th>Average duration (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>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>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>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>
</tbody>
</table>
Appendix H: Pilot Data for Fear of Negative Evaluation, Self-Presentation Efficacy, Physical Activity in a Sample of Breast Cancer Survivors ($N = 36$)
Pilot Data for Fear of Negative Evaluation, Self-Presentation Efficacy, Physical Activity in a Sample of Breast Cancer Survivors (N = 36)

<table>
<thead>
<tr>
<th>Variables</th>
<th>α&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Score Range</th>
<th>Mean (SD)</th>
<th>α&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Score Range</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FNE</td>
<td>.90</td>
<td>1.00-4.58</td>
<td>2.55 (.74)</td>
<td>.86</td>
<td>2.08-3.33</td>
<td>2.48 (.41)</td>
</tr>
<tr>
<td>SPE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPEE</td>
<td>.90</td>
<td>12.50-100.00</td>
<td>59.18 (26.97)</td>
<td>.95</td>
<td>18.00-80.00</td>
<td>63.28 (20.65)</td>
</tr>
<tr>
<td>SPOE</td>
<td>.96</td>
<td>1.00-6.00</td>
<td>3.80 (1.53)</td>
<td>.91</td>
<td>1.00-6.00</td>
<td>3.90 (1.38)</td>
</tr>
<tr>
<td>SPOV</td>
<td>.95</td>
<td>1.00-5.45</td>
<td>3.45 (1.43)</td>
<td>.95</td>
<td>1.00-5.25</td>
<td>3.85 (1.34)</td>
</tr>
<tr>
<td>PA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTEQ1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-</td>
<td>8.00-91.00</td>
<td>37.60</td>
<td>-</td>
<td>15.00-92.00</td>
<td>46.20 (25.25)</td>
</tr>
<tr>
<td>LTEQ2&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-</td>
<td>1.00-3.00</td>
<td>2.04 (.77)</td>
<td>-</td>
<td>1.00-3.00</td>
<td>1.90 (.57)</td>
</tr>
</tbody>
</table>

Note. FNE = Fear of Negative Evaluation. SPE = self-presentation efficacy. SPEE = self-presentational efficacy expectancy. SPOE = self-presentational outcome expectancy. SPOV = self-presentational outcome value. PA = physical activity. <sup>a</sup>Scale reliabilities are Cronbach’s alpha coefficients. <sup>b</sup>LTEQ1 is the physical activity measure in metabolic equivalent units (METS). <sup>c</sup>LTEQ2 is the frequency physical activity measure.