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Mixed Methods Pilot Study of Peri-Diagnostic Exercise Behaviour Change Among Women With Suspected Breast Cancer

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Abstract

Approximately 1 in 9 Canadian women will develop breast cancer in their lifetime (CCS, 2013). Over the past 30 years, population-based screening programs have contributed to decreased mortality rates (CCS, 2013), however the psychosocial sequelae associated with screening for breast cancer cannot be ignored (Holland et al., 2010). Although the majority of women screened will receive a benign diagnosis, the threat of malignancy can induce elevated levels of distress (Andrykowski et al., 2002).

We conducted a mixed methods pilot study to assess the feasibility and acceptability of a 6-week self-managed exercise behaviour change intervention to attenuate distress in women with suspected breast cancer during the peri-diagnostic phase (N = 7). Patients were recruited through the Breast Care Program of St. Joseph's Hospital in London, Ontario. Facility-based exercise sessions and assessments were completed at the Exercise and Health Psychology Laboratory at the University of Western Ontario. Using concurrent mixed methods, we explored illness representations and coping responses among the women who participated in the program at one week and 12 weeks post-biopsy. Qualitative interviews were conducted with all participants at the one month follow-up study visit, and with clinic personnel at the recruitment site (N = 5).

Although the small sample size precludes computation of meaningful inferential statistics, self-reported exercise behaviour increased and subjective distress decreased from pre- to post-intervention. A deductive qualitative analysis revealed that exercising during the peri-diagnostic phase was an effective coping resource for these women. The inductive analysis revealed emergent themes that illuminated unique characteristics of this sample, e.g., resilience. The findings from this pilot study offer comprehensive insight into the challenges and future considerations associated with implementation of a

self-managed exercise intervention for women with suspected breast cancer in the peri-diagnostic phase.

Keywords: breast cancer; screening; exercise; behaviour change; self-regulation; Social Cognitive Theory; mixed methods.

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Chapter One

General Introduction

Breast cancer is the most common cancer among women worldwide (International Agency for Research on Cancer, 2012). The Canadian Cancer Society (2013) estimates that 1 in 9 women in Canada will develop breast cancer in their lifetime. Breast cancer mortality rates have steadily declined among Canadian women over the past 30 years, owing to an emphasis on population-based screening programs and improvements to biomedical treatments upon detection (CCS, 2013). In Canada, organized breast screening programs offer screening to asymptomatic women in all provinces, the Northwest Territories, and the Yukon Territory (Canadian Partnership Against Cancer, 2013). A typical trajectory illustrating outcomes of a provincial organized breast screening program and the diagnostic interval is depicted in Figure 1.

In the province of Ontario, women of average risk for breast cancer aged 50 to 74 years are eligible to receive one bilateral, 2-view mammogram every two years as part of the Ontario Breast Screening Program (OBSP; Cancer Care Ontario, 2013). In the year 2010, 7.8% of OBSP screening mammograms were identified as abnormal and recommended for follow-up (Cancer Care Ontario, 2013), which typically includes additional imaging of the suspicious lesion and clinical breast examination (CCS, 2013). In the event that ongoing evaluations indicate that the abnormality may be malignant, a biopsy of the suspicious area is required in order to ascertain a definitive diagnosis (CCS, 2013). Following diagnostic work-up, 85.4% of abnormal screens were confirmed as benign (*i.e.,* false positive; Cancer Care Ontario, 2013). However, benign breast abnormalities (*e.g*., atypical ductal hyperplasia, radial scars, lobular neoplasia) have been associated with an elevated risk for the subsequent development of invasive carcinoma (Fitzgibbons, Henson, & Hutter, 1998; Jacobs, Byrne, Colditz, Connolly, & Schnitt, 1999).

Although surgical biopsies are considered the gold standard in terms of accuracy when evaluating suspicious breast lesions, the incidence of psychological and physical morbidity is sufficiently higher in comparison to other less invasive biopsy methods (*e.g.,* core-needle biopsy; Montgomery & Bovbjerg, 2004). Furthermore, there is sufficient evidence to support the reliability of the prognostic and predictive information provided by core needle biopsies in terms of sensitivity and specificity for diagnostic accuracy (Agency for Healthcare Research and Quality, 2009; Rakha & Ellis, 2007). Nevertheless, there is a large body of literature documenting the psychological distress among women undergoing biopsies of the breast, regardless of the invasiveness of the procedure or the diagnostic outcome (Fentiman, 1988; Harcourt, Rumsey, & Ambler, 1999; Lebel et al., 2003; Montgomery & McCrone, 2010; Schnur et al., 2008), suggesting that individual beliefs and perceptions play an important role in the distress experience.

Perceptions of Peri-Diagnostic Distress

The subjective experience of the breast cancer peri-diagnostic phase *(i.e*., trajectory including time from indication of abnormality through to time surrounding diagnosis) has demonstrated acute and long-term adverse psychological consequences (Montgomery & McCrone, 2010). Although the majority of women undergoing diagnostic workup will be provided with a benign diagnosis, the threat of malignancy can induce elevated levels of distress (Andrykowski et al., 2002). The National Comprehensive Cancer Network (NCCN, 2013) highlight the diagnostic phase as a time of heightened risk; proposing the following definition for distress in cancer:

> a multifactorial unpleasant emotional experience of a psychological (cognitive, behavioral, emotional), social, and/or spiritual nature that may interfere with the ability to cope effectively with cancer, its physical symptoms and its treatment. Distress extends along a continuum, ranging from common normal feelings of vulnerability,

sadness, and fears to problems that can become disabling, such as depression, anxiety, panic, social isolation, and existential and spiritual crisis.

In qualitative interviews conducted with post-mastectomy women, 83% of the sample (N = 50) recalled the pre-diagnostic period as the most distressing experience of their disease trajectory (Northouse, 1989). In their 2010 systematic review of the diagnostic distress literature, Montgomery and McCrone concluded that distress in the breast diagnostic phase is predominantly characterized by anxiety, and predicted by demographic factors, medical history, social support, and the personality traits of dispositional optimism and anxiety. Although this review did not include a methodological critique of the studies, the authors cautioned that psychological distress in the diagnostic phase may influence treatment outcomes and impact upon future screening behaviours (Montgomery & McCrone, 2010).

Breast Diagnostic Distress Interventions. Despite the methodological and theoretical limitations of the evidence, a dearth of studies have been conducted examining interventions intended to mitigate the psychological distress associated with breast screening and diagnoses. Interventions targeting distress in this time period are predominantly classified as complementary and alternative medicine (CAM; Park, 2013) approaches. Other interventions have included psycho-educational and radiology (*e.g.,* rapid diagnostic) orientations. Of the CAM interventions, pre-surgical hypnosis was shown to be effective at decreasing pre-biopsy anxiety (d = 0.85) among women undergoing excisional breast biopsy compared to an attention control group (Schnur et al., 2008). The preliminary efficacy of Reiki (*i.e.,* therapeutic touch) did not yield promising results, with no differences in anxiety between women exposed to the Reiki intervention or usual care prior to excisional breast biopsy (Potter, 2007) or stereotactic core breast biopsy (Frank et al., 2007). Interventions with music have produced equivocal results. In one

study, participants randomized to receive music therapy demonstrated significantly decreased levels of pre-biopsy state anxiety compared to usual care (Haun, Mainous, & Looney, 2001). By contrast, in a randomized controlled trial, state anxiety did not differ between women randomized to music therapy or usual care, but significantly declined in participants who received an oral anxiolytic medication prior to the biopsy procedure (Bugbee et al., 2005).

Institutional intervention efforts have demonstrated more potential. In Japan, nurses were trained to deliver diagnoses using standardized communication skills training methods (Fukui, Ogawa, Ohtsuka, & Fukui, 2008). Patients notified of their diagnosis by a nurse trained in this technique reported significantly lower levels of anxiety compared to patients randomized to receive usual notification methods (Fukui et al., 2008). Another nurse-led intervention that has demonstrated encouraging results is the implementation of patient navigators during the diagnostic interval (Ferrante, Chen, & Kim, 2008). Following an abnormal mammogram, women randomized to patient navigator care reported significantly lower anxiety than did women in standard care (Ferrante et al., 2008). Radiology interventions have conferred short-term but not sustainable decreases to anxiety. Rapid diagnostic clinics, in which women can receive a same day diagnosis following an abnormal screen, have been found to impact only acute anxiety (*i.e.,* within 24 hours). Anxiety levels did not significantly differ between groups at 3 weeks or 3 months post-diagnosis (Dey et al., 2002).

Psycho-educational interventions have generally demonstrated weak findings. Contrary to the study hypothesis, women randomized to receive an educational intervention in the form of an illustrated informed consent process experienced significantly higher levels of anxiety than did women randomized to the standard informed consent process (Walker et al., 2007). In another study, women were randomized to receive a radiology intervention (*i.e.,* immediate notification of results), psycho-

educational intervention with coping strategies, or usual care (Barton et al., 2004). The psycho-educational intervention did not impact anxiety, but women randomized to the radiology intervention demonstrated decreases to anxiety at initial follow-up (Barton et al., 2004). Similar to the radiology intervention conducted by Dey and colleagues (2002), the effects of the intervention on anxiety were not sustained at the 3-month follow-up (Barton et al.).

Methodological Considerations

Quantitative and qualitative examinations of distress pre- and post-biopsy among women with suspected breast cancer have been conducted at various timepoints throughout the diagnostic interval, and have indicated fluctuations to psychological morbidity across the peri-diagnostic phase. However, there has been a lack of consistency in the operationalization and measurement of the distress-related constructs at the conceptually distinct milestones that comprise the peri-diagnostic phase. In prospective studies of diagnostic distress, “distress” has been typically measured using anxiety inventories at three timepoints: (a) notification of suspicious abnormality and need for biopsy; (b) prior to biopsy procedure, and (c) following notification of biopsy results (Liao, Chen, Chen, & Chen, 2008; Pineault, 2007). The notification of the need for a biopsy exacerbated anxiety scores, which were significantly highest at the two timepoints prior to biopsy, and attenuated but remained elevated post-diagnosis (Liao et al., 2008; Pineault, 2007) and persisted until after surgery among women diagnosed with cancer (Stanton & Snider, 1993).

In addition to patient-reported outcome measures of anxiety, diagnostic distress has also been assessed using inflammatory biomarkers (Kamath et al., 2012), and inventories that measure other negative affective states; predominantly depression (Lampic, Thurfjell, Bergh, & Sjoden, 2001; Montgomery & McCrone, 2010). Clearly, the

content validity of the construct of “distress” is difficult to discern. Unfortunately, the conceptually and methodologically distinct approaches employed to assess the psychological distress associated with screening for breast cancer have been synthesized to inform a potentially misleading knowledge base. The extant evidence of the diagnostic distress experience impedes our understanding of the significance of this problem. Indeed, these fundamental errors impact on the development and design of evidence-based interventions to address the psychosocial consequences of breast cancer detection practices.

Theoretical Considerations

In order to advance our understanding of the distress associated with breast cancer detection practices, it is important to consider the theoretical underpinnings of the antecedents to psychological distress during this timeframe. The individual differences in emotional and coping responses across the peri-diagnostic phase imply that perceptions and coping processes require further consideration.

Illness Representations

Individual experiences of distress are informed and influenced by personal beliefs and not necessarily aligned with objective medical information (Diefenbach & Leventhal, 1996). In the face of an ambiguous health threat (*e.g.,* suspicious breast lesion), it is especially important to consider the dynamic patient experience surrounding the diagnostic process; beliefs that are rarely sought in medical consults yet have the potential to inform and improve communication and health outcomes (Petrie & Weinman, 2006). In a recent study, women awaiting diagnostic breast biopsies reported significantly higher levels of stress and anxiety and similar depressive symptomatology as women awaiting riskier and more invasive treatments for liver cancer (*i.e.,* hepatic chemoemabilization) and benign uterine fibroids (*i.e.,* fibroid embolization; Flory & Lang, 2011). Similarly, a prospective study of patients undergoing

vascular procedures revealed that patients reported significantly higher levels of anxiety for diagnostic procedures in comparison to more complicated therapeutic treatments (Mueller, Biswal, Halpern, Kaufman, & Lee, 2000). These findings suggest that the uncertainty of the outcome may be more salient to the patient experience than the invasiveness of the procedure, underscoring the importance of understanding individual illness perceptions.

Self-Regulatory Theory. When faced with a health threat or illness, individuals form beliefs and expectations (i.e., illness representations) that guide their emotional and coping responses (Petrie & Weinman, 2006). The interpretation of these illness representations is central to self-regulatory theories, and influence individual appraisals of health threats and subsequent adherence to treatment recommendations (Petrie & Weinman, 1997). It is postulated through Leventhal's self-regulatory model (Leventhal, 1990; Leventhal, Meyer, & Nerenz, 1980) that illness representations can trigger health behaviours through the parallel processing of cognitive and emotional interpretations of a stimuli (*e.g.,* breast abnormality*).* Leventhal elaborated upon his original self-regulatory theory to form a "common sense model of illness" as a framework to guide research efforts into the appraisals and coping mechanisms employed by individuals for the management of illness and health (CSM; Leventhal, Diefenbach, & Leventhal, 1992). According to the CSM, illness representations determine appropriate coping and self-regulatory responses, and are influential in the evaluation of coping outcomes (Leventhal et al., 1992). The theoretically and empirically derived CSM framework characterizes six components of illness representations:

1. Identity: the label assigned to the threat and its associated symptoms.
2. Timeline: the perceived trajectory of the threat (acute, cyclical or chronic).

3. Consequences: the perceived psychological, physical, social, and economic impact of the threat.
4. Cause: the aetiological mechanism attributed to the threat (*e.g.*, internal, external, hereditary, modifiable).
5. Control: the perceived potential for cure and for personal control over the threat (Lau & Hartman, 1983).
6. Coherence: the extent to which an individual understands the health threat (Weinman, Petrie, Moss-Morris, & Horne, 1996).

It is posited that the creation of illness representations is informed through a process of filtering information comprising general knowledge (*e.g.,* media, family and cultural context) and environmental or social influences (*e.g.,* physician communication) (Hagger & Orbell, 2003; Leventhal et a., 1980). The representation of the illness or health threat is then informed by individual perceptions of the current experience, which may involve symptoms (*e.g.,* breast lump) and knowledge from prior analogous experience (*e.g.,* coping response to previous health threat; Diefenbach & Leventhal, 1996; Hagger & Orbell, 2003). Diefenbach and Leventhal (1996) argue that the CSM is a dynamic framework, allowing it to capture the formation of illness representations guided by inputs susceptible to changing circumstances. The process from detection to diagnosis of an ambiguous threat such as a suspicious breast lesion is indeed dynamic and the CSM may be a suitable framework to delineate the perceptions that ultimately influence individual coping responses.

Coping and Personal Control

Lazarus and Folkman (1984) offered a conceptual analysis of individual coping responses to stress that conceives coping as a set of cognitive and behavioural efforts put forth to manage or mitigate the interference of a given stressor. This analysis classified coping responses in two categories: (a) problem-focused (*i.e.,* problem-solving efforts to reduce or change the source of the stressor), or (b) emotion-focused (*i.e.*, efforts to decrease or manage the appraisal and emotional responses to

the stressor). Although this distinction in coping responses is important to acknowledge, it presents a potentially oversimplified representation that may not adequately capture the available coping responses that individuals employ (Carver, Scheier, & Weintraub, 1989). For example, emotion-focused coping responses include strategies that are generally considered adaptive (*e.g,* positive reframing), in addition to more problematic responses (*e.g.,* denial) — conceptually distinct strategies with different implications for successful outcomes. To address the limitations associated with this classification, Carver, Scheier, and Weintraub (1989) proposed 13 theoretically derived and conceptually distinct dimensions of coping responses:

1. Active coping: employing direct actions to mitigate the effects of a stressor.
2. Planning: creation of an action plan to address the stressor.
3. Suppression of competing activities: avoidance of external events unrelated to the stressor.
4. Restraint coping: waiting for the appropriate time to initiate direct actions to cope with the stressor.
5. Seeking instrumental social support: the act of gathering information, resources, advice.
6. Seeking emotional social support: the act of seeking emotional support from others.
7. Focusing on and venting of emotions: allowing oneself to focus on the emotional burden of the stressor and to express the associated emotions.
8. Behavioural disengagement: the act of decreasing one's effort in coping with a stressor.
9. Mental disengagement: engaging in activities to distract oneself from the stressor.
10. Positive reinterpretation and growth: efforts to reframe the stressor and its impact using a positive perspective.
11. Denial: the refusal to acknowledge the existence of the stressor.
12. Acceptance: the process of accepting a stressor as reality.
13. Religion: the act of turning to religion when faced with a stressor.

The extent to which coping is dispositional or situation-specific is debated in the literature. In their cognitively oriented theory of coping, Folkman and Lazarus (1986) argue that it is a dynamic process that changes according to the nature of the stressor. By contrast, it has been posited that individuals develop a repertoire of coping strategies aligned with personality dimensions (McCrae, 1982), supporting the notion that coping is dispositional. However, the assumption that coping is a dichotomy of dispositional or situational orientation discounts the dynamic interactions at play when individuals are faced with a stressful event (Carver et al., 1989). Although individual differences likely influence the coping process, the precise personality factors contributing to coping outcomes have not yet been elucidated (Krohne, 1996).

The acknowledgement of the integral role of personal control in the coping process allows for a more meaningful delineation of the rich interplay between individuals and their environments during stressful encounters (Folkman, 1984). Perceptions of controllability have the potential to influence the coping process as an antecedent (*i.e.,* the formation of appraisals), a mediator between a stressor and coping outcomes (*e.g.,* distress), and as an outcome (*i.e.,* coping response to a stressful event) (Folkman, 1984). Beliefs about personal control over a stressor can be situation-specific or generalized; parallel to Bandura's (1977) constructs of efficacy beliefs and outcome expectations, further delineated in his Social Cognitive Theory (Bandura, 1986). SCT expands upon self-regulatory models by emphasizing the active role of individuals in the shaping of their environments and attainment of goal-directed actions (Bandura, 1986).

Purpose

The general purpose of this dissertation was to utilize Social Cognitive Theory (Bandura, 1986), and in particular the construct of self-efficacy, to develop a self-managed exercise behaviour change intervention targeting distress among women with suspected breast

cancer in the peri-diagnostic phase, and to assess the feasibility and acceptability of the intervention.

Considerations. Although the psychological distress associated with the detection practices for breast cancer appears to be well documented, the methodological limitations cannot be ignored. Furthermore, the interventions that have been implemented across the peri-diagnostic phase are predominantly based on inconsistent conceptualizations of distress and lack the theoretical underpinnings that enhance the potential for sustained effects. The aim of this dissertation is to explore the utility of a self-managed exercise intervention in the peri-diagnostic phase to attenuate subjective distress, as measured by the impact of the stressor (*i.e.,* breast abnormality). Given the dearth of evidence, we conducted a pilot study using quantitative and qualitative methods to explore the feasibility and acceptability of this exercise behaviour change intervention (Study 2). We aimed to gain a deeper understanding of the illness representations and coping responses of the women in our sample to better inform our interpretations of the study outcomes (Study 1). The behaviour change process of this intervention was guided by the tenets of Social Cognitive Theory (Bandura, 1986), with the goal of fostering self-efficacy beliefs for the development of a sustainable behavioural repertoire of self-regulatory strategies for the management distress through regular exercise.

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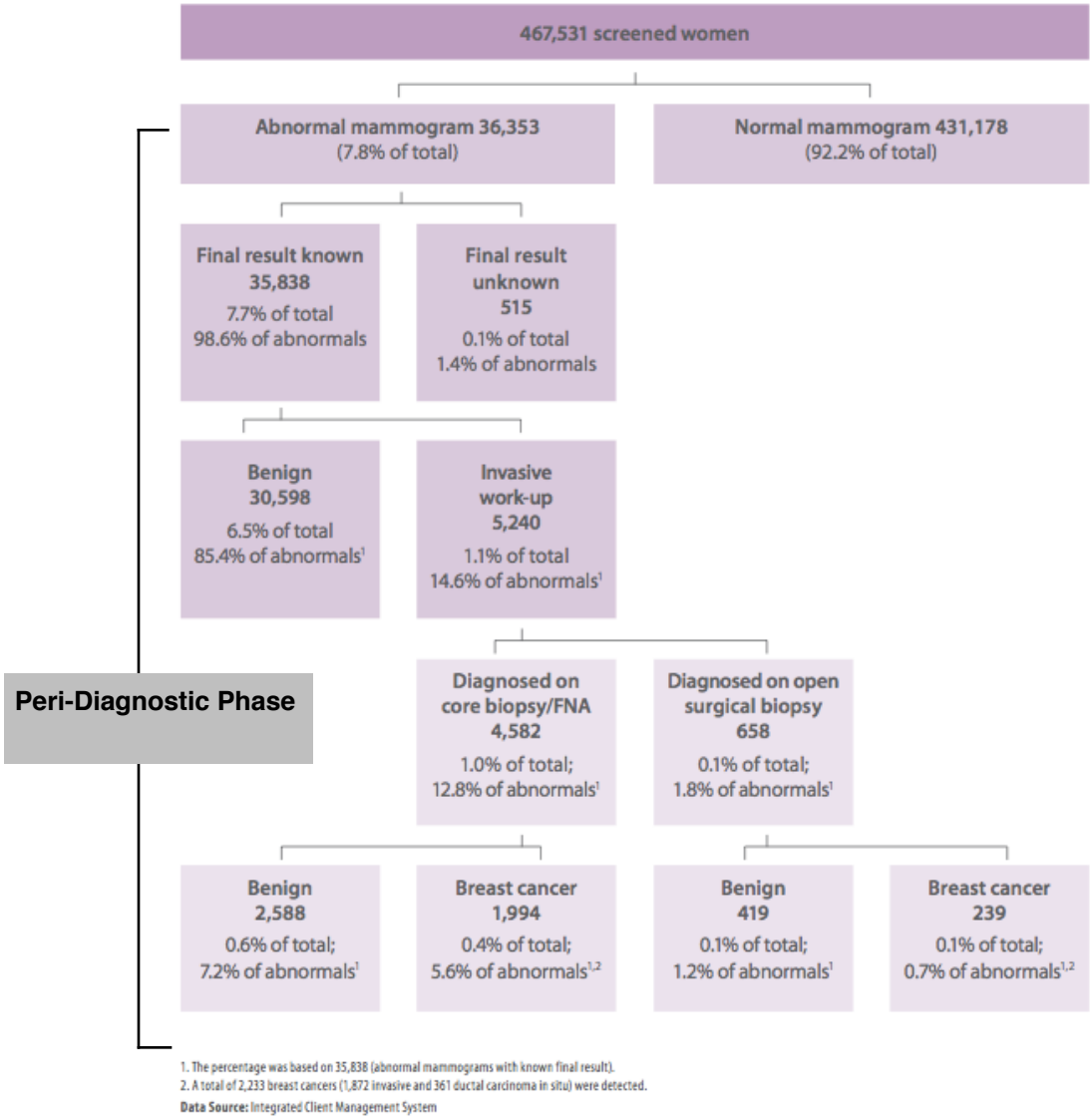
Figure 1

2010 Ontario Breast Cancer Screening Program Outcome Summary



Note. This figure represents a summary of screening outcomes of OBSP clients aged 50–74 at average risk for breast cancer (2010). This figure is adapted from the Ontario Breast Screening Program 2011 Report. (Cancer Care Ontario, 2013). Toronto, Canada.

Chapter Two

Jolted—Concurrent Mixed Methods Study of Breast Cancer Peri-Diagnostic Illness Representations and Coping Responses

Introduction

It is estimated that on every day of 2013, 65 Canadian women would be diagnosed and 14 would die of breast cancer, (Canadian Cancer Society Statistics, 2013). Although advances to biomedical treatments and early detection have increased disease survival rates, the psychosocial sequelae of cancer and its treatments have been recognized as a priority for cancer control initiatives (Institute of Medicine [IOM], 2008). Particular emphasis has been placed on the management of psychological distress across the cancer continuum (IOM, 2008), with the diagnostic waiting period highlighted as a time of heightened vulnerability for subjective distress (National Comprehensive Cancer Network, 2013).

There is considerable evidence that diagnostic breast biopsies are associated with elevated levels of psychosocial distress regardless of the ultimate diagnosis (Flory & Lang, 2011; Montgomery & McCrone, 2010). From the detection of a breast abnormality, anxiety levels have been reported to increase significantly, reaching a peak at the time of biopsy (Liao, Chen, Chen, & Chen, 2008). It has been suggested that the anxiety levels associated with benign and malignant biopsy findings manifest as physiological and psychological consequences with the potential to influence treatment outcomes or future screening behaviours (Lang, Berbaum, & Lutgendorf, 2009; Montgomery & McCrone, 2010). Thus, a deeper understanding of the subjective experience of the peri-diagnostic phase is warranted.

Perceptions about illness and health threats are highly individual and do not necessarily align with factual medical information (Diefenbach & Leventhal, 1996). As such, it is important to consider individual illness

perceptions when investigating the psychosocial impacts of ambiguous health threats, such as a breast abnormality. Illness perceptions are central to self-regulatory models (Leventhal, 1970; Leventhal, Meyer, & Nerenz, 1980b), and refer to the beliefs and expectations that individuals hold with respect to a health threat; *i.e.,* an abnormal mammography finding. When faced with a health threat, it is postulated through self-regulatory models that individuals form parallel cognitive and emotional representations in response to stimuli (*e.g*., symptoms) in three phases: the formation of representations, adoption of coping responses and behaviours, and an evaluative appraisal of the selected coping response(s) (Leventhal et al., 1997).

Self-regulation theory is conceptualized as a parallel processing framework: beliefs are formed concurrently with emotional responses to the illness or health threat in question (Leventhal, Diefenbach, & Leventhal, 1992). Subsequently, the cognitions and emotions formed are posited to influence the adoption and adherence to health behaviours (Leventhal et al., 1992). Self-regulatory models were elaborated upon to form the “common sense model of illness” in order to address the dynamic nature of illness representations and the mechanisms of coping responses elicited (Leventhal et al., 1992).

The purpose of this mixed methods study was to describe the post-biopsy illness representations of a small group of women who initiated a 6 week behaviour change exercise program as a coping response to the threat of a breast abnormality. The theoretical approach was guided by the self-regulatory principles of the Common Sense Model (CSM; Diefenbach & Leventhal, 1996) to describe the cognitive and emotional illness representations and coping responses of this group of women following diagnostic stage core biopsy. The CSM has been recommended as a useful framework for understanding the impact of a breast cancer health threat on motivation and health-related coping behaviours (Cameron & Reeve, 2006).

Methods

Participant Selection

The sample consisted of seven women (M_{age} = 55.43 years, age range 40-69 years) with breast lesions suspicious for malignancy. Potential candidates were initially pre-screened for eligibility and identified during a standard post-biopsy consult with a nurse navigator at a comprehensive regional breast care centre in southwestern Ontario. Women were invited to participate in this study if they had undergone a diagnostic stage core breast biopsy and enrolled in our 6 week exercise intervention (*i.e.*, the Control and Recharge with Exercise [CaRE] program; outlined in Chapter 3 of this dissertation).

This study was granted ethical approval as an amendment to the CaRE research study, which had obtained full board approval from the Health Sciences Research Ethics Board at the University of Western Ontario (see Appendix C for Notice of Approval for this amendment).

Setting

Data were collected as part of the baseline and follow-up visits for the CaRE pilot study. The procedures for the concurrent mixed methods data collection for the CaRE study are described in Chapter 3 of this dissertation. Study visits were conducted at a research laboratory at the University of Western Ontario.

Measures

Sociodemographic and clinical characteristics. Demographic information was collected using a self-report questionnaire at baseline, and basic diagnostic workup, disease and treatment information were obtained through chart review. Clinical information collected included diagnostic procedures, diagnosis, follow-up recommendations, and treatments (where relevant) for all consenting patients. Sociodemographic information was collected for descriptive purposes and included ethnicity,

age, marital status, education, income, employment status, and typical exercise behaviour.

Illness representations. Cognitive and emotional representations of the breast abnormality were assessed in accordance with Leventhal's self-regulatory model of illness perceptions (Leventhal et al., 1997) using the Brief Illness Perceptions Questionnaire (Brief IPQ; Broadbent, Petrie, Main, & Weinman, 2006). The Brief IPQ comprises nine items: eight single items that assess perceptions on a continuous linear scale with responses ranging from 0 to 10, and one item to elicit causal beliefs. Five items are purported to assess cognitive representations of the health threat: consequences, timeline, controllability (personal control and perceived effectiveness of treatment), and identity (illness label and symptom experience). Emotional representations are measured with two items assessing worry and emotional consequences, with an additional item to assess coherence (understanding of health threat). One open-ended item is used to elicit up to three causal factors attributed to the threat (*i.e.*, breast abnormality) that are deemed "most important" by the respondent. In accord with published guidelines (Broadbent et al., 2006), the word "illness" can been replaced with an alternate term, such as "breast abnormality" to align with the health threat or illness under investigation. This inventory has acceptable test-retest reliability (0.63-0.70), and has demonstrated predictive validity and construct validity in comparison with measures of similar constructs. Further, a sum score can be obtained using this measure to ascertain overall perceptions of illness severity. The internal reliability of the total Brief IPQ scale in this study was acceptable, with an internal consistency coefficient of $\alpha = 0.64$.

Coping responses. The Brief COPE (Carver, 1997) is an abbreviated version of the COPE inventory (Carver et al., 1989) and was used to assess coping responses and behaviours. The Brief COPE comprises 28 items that assess 14 conceptually distinct coping

responses that are generally categorized as adaptive or problematic (Carver, 1997). This inventory has been used extensively with breast cancer populations and has demonstrated acceptable internal reliability and validity evidence (Fillion, Kovacs, Gagnon, & Endler, 2002).

Semi-structured interview guide. The quantitative assessment of illness representations and coping responses was supplemented with a complementary qualitative approach to gain a deeper understanding of the peri-diagnostic experiences of the women in this sample. The CSM (Leventhal, Meyer, & Nerenz, 1980a) was used as a conceptual framework to elucidate the influence of breast cancer peri-diagnostic illness representations on the coping responses employed throughout the diagnostic interval. This framework guided the development of the semi-structured interview guide, along with the interpretation and discussion of the qualitative data. The interviews opened with broad questions about the participant's post-biopsy experiences and understanding of the peri-diagnostic phase. In the next series of questions, participants were asked to describe appraisals of each dimension of illness representations specific to the breast abnormality. Finally, questions were posed about the typical coping responses of each participant and those specific to this particular health threat. Probes and follow-up questions were posed when necessary to help clarify or further refine participant responses to each question. Refer to Appendix A for the semi-structured interview guide.

Procedures

Data collection. All participants were enrolled in the CaRE pilot study, assessing the feasibility of self-managed exercise in the 6-week post-biopsy period. Study procedures for the CaRE pilot study are described in Chapter 3 of this dissertation. To summarize, participants completed the outcome measures of illness perceptions (Brief IPQ) and coping responses (Brief COPE) at home within 3 days of the initial study visit (one week post-biopsy; Week 1) and at the facility-based follow-up study visit (12 weeks post-biopsy; Week 11).

***In-depth individual interviews*.** Each participant was invited to take part in one face-to-face semi-structured interview during the follow-up study visit (Week 11) at a research laboratory of the host academic institution. All interviews were conducted by the same trained interviewer (AK) to ensure consistency and reliability. Individual interviews lasted approximately 30 minutes, and were audio-recorded and transcribed verbatim. Following a thorough comparison of the transcripts against the audio recordings, all identifying information was removed from the transcripts.

Design

This descriptive study employed mixed methods using quantitative (surveys) and qualitative (semi-structured interviews) techniques to elicit and describe the peri-diagnostic experiences of a group of women with suspected breast cancer who elected to adopt routine exercise over the 6-week period following diagnostic stage core biopsy.

An integrated concurrent mixed methods design was selected because the nature of the phenomenon under study could not be elucidated by quantitative or qualitative methods alone (Tashakkori & Teddlie, 2003). The qualitative description was of particular import given the extant literature describing this topic area, and thus a prerequisite to future quantitative investigations of perceptions and responses to the post-biopsy threat associated with a breast abnormality in the peri-diagnostic phase (Pope & Mays, 1995).

Data Analysis

The data collection and analysis of this concurrent mixed methods study design included the triangulation of quantitative and qualitative data sources. This method of data analysis and reporting allowed us to explore the consistency between the quantitative descriptions of the participants' post-biopsy experiences and their subjective interpretation as determined through the in-depth interviews.

Quantitative data. The small sample size for this mixed methods pilot study was not adequately powered to compute meaningful inferential statistics

(Leon, Davis, & Kraemer, 2011). Descriptive statistics of the sociodemographic and clinical characteristics of patients were summarized using means and standard deviations, or frequency and percentages, as appropriate. The responses on the Brief IPQ were used to compute descriptive statistic scores for each dimension of illness representations, and an overall score of illness perceptions. Descriptive statistics were also calculated for the adaptive and problematic coping responses of the Brief COPE inventory. Analyses for all quantitative data were conducted using the IBM SPSS Statistics 21.0 statistical software package.

Qualitative data. Data preparation, coding, and content analysis were conducted according to methods described by Hsieh and Shannon (2005) and Elo and Kyngas (2007). A deductive framework based on the interview guide was developed to organize the coding scheme (see Appendix B for the categorization matrix). Interview transcripts were read repeatedly and important themes or concepts identified. Subsequently, an inductive analysis was conducted to elucidate emergent themes and concepts. In this paper, we present only the key themes for the manifest content and supporting evidentiary quotes.

To enhance the reliability and validity of the analysis and research findings, steps were taken to address trustworthiness and credibility of the data (Graneheim & Lundman, 2004). Another experienced qualitative researcher (BE) independently reviewed the transcripts and tentative themes. Any discrepancies between preliminary themes and concepts were discussed and reconciled. Following a process of reflection and further discussion, the codes were sorted into themes, subthemes, and representative quotes. Qualitative data preparation and analysis were facilitated by NVivo 9 data management software (QSR Ltd., 2010).

Results

Participant Characteristics

Participant sociodemographic characteristics are displayed in Table 1 (N = 7). The nature of the diagnostic workup procedures per

lesion, in addition to treatment and follow-up protocols, as appropriate, are detailed in Table 2.

Recruitment. Data collection took place from March 27 to September 4, 2013 as part of the CaRE pilot study. All of the women who completed the CaRE program (*N* = 7*)* agreed to participate in this study of breast cancer peri-diagnostic illness representations and coping responses.

Illness Representations

Descriptive statistics for each of the Brief IPQ items assessing cognitive and emotional representations assigned to the breast abnormality at baseline and follow-up study visits are depicted in Table 3. At one week post-biopsy, the composite score of the total scale suggests that women reported a low to moderate perception of illness severity attributed to their breast abnormality (*M* = 35.3, *SD* = 13.0). At the follow-up visit (Week 11), the total score was substantially lower (*M* = 21.8, *SD* = 6.8), indicating a minimal perceived threat associated with the breast abnormality.

Cognitive representations. On average, women reported a moderate level of impact or intrusion associated with the consequences of the breast abnormality one week post-biopsy. At the follow-up visit, perceived impact was minimal. With respect to the perceived timeline of the breast condition, women reported a low to moderate duration at both assessments. Participants reported a low degree of personal control over their breast abnormality at both assessments, and reported similar levels of perceived treatment effectiveness. The estimations for treatment efficacy were stronger at the time of the follow-up assessment. On average, this sample of women was asymptomatic and attributed little illness identity to somatic sensations at either assessment point.

Emotional representations. At the first assessment, patients reported moderate levels of concern and emotional consequences of the breast abnormality. These negative emotional representations had considerably attenuated by the time of the follow-up assessment.

Coherence*.* Although reported coherence was initially somewhat high, scores declined at the follow-up assessment, representing a moderate level of understanding of the breast abnormality at the time of follow-up.

Causal factors. In response to an open-ended question, participants had the opportunity to identify up to three factors they considered "most important" in the aetiology of their breast abnormality. Half of the responses collected (50%) attributed causality to external variables over which they would have had little or no control; including environmental factors such as exposure to pesticides and other chemicals, previous breast screening, and family history of cancer. In 42.8% of responses, participants also endorsed modifiable lifestyle factors (*i.e.,* diet and exercise) as causal factors in their abnormal screen. In one instance, a participant reported that she did not perceive any causal factors as relevant to her diagnostic experience.

Coping Responses

Descriptive statistics for the adaptive and problematic coping responses and behaviours are outlined in Tables 4 and 5, respectively.

Adaptive coping responses. Overall, participants reported engaging in a moderate frequency of coping responses and behaviours that are generally considered as adaptive, including: active coping, planning, positive reframing, acceptance, humour, religious coping, instrumental support, and emotional support. With the exception of support-seeking, the frequency of adaptive coping responses was relatively stable from the first study visit to the follow-up at Week 11. By contrast, the extent to which participants endorsed the use of instrumental and emotional support declined over the trajectory of the study period.

Problematic coping responses. With the exception of self-distraction and denial, there was little variability in the reported frequency of coping responses and behaviours that are generally categorized as problematic. Overall, participants reported infrequent use of venting, substance use, behavioural disengagement, and self-blame as coping strategies. The extent to

which participants reported using techniques of self-distraction and denial was moderately low.

Qualitative Responses

In-depth individual interviews were conducted with study participants from June to September 2013, and ranged from 12 to 46 minutes in duration. The qualitative content analysis revealed similar findings to the quantitative description of the formation and content of illness representations of the breast abnormality and the resultant coping responses. The qualitative interviews however, allowed for a deeper understanding of the quantitative description of these constructs attained in this small sample using standardized questionnaires. Although the peri-diagnostic experiences of respondents assessed quantitatively was relatively consistent with their interpretation of these subjective experiences as described in the qualitative interviews, not all constructs of the CSM and coping responses were well represented in the interview transcripts. As such, only the content domains assessed in the Brief IPQ and Brief COPE inventories that garnered discussion among participants are represented in the results and interpretation of the deductive analysis.

Peri-Diagnostic Experiences. An inductive qualitative content analysis revealed an overarching theme of *control* that was central to the formation of perceptions and coping responses throughout the peri-diagnostic phase, and thus aided our interpretation of the meaning assigned to these constructs. In this instance, *control* can be defined as the extent to which women reported feelings of power and helplessness related to the breast abnormality and peri-diagnostic experience. One participant attributed her strong sense of control over her experience to her professional, in-depth knowledge of the health care system. By contrast, the majority of participants described themselves as powerless in their navigation of the health care system throughout this experience: "*I did not feel like I had any control – once I was booked for a biopsy you just go with the flow. Wait for the biopsy, wait for results*".

Although participants spent a great deal of time discussing this relinquishment of control, all women spoke of "*things [they] have control over*",

including exercise, household and recreational activities, hobbies, and screening behaviours. One common element of all pursuits described as mechanisms of "*taking control*" was the characterization of "*tangible results*" or "*concrete outcomes*". Although many participants spoke of hobbies or recreational pursuits that were undertaken to distract themselves from the uncertainty of the diagnostic experience, these women expressed dissatisfaction with activities that did not result in objective feedback during this time period. For instance, one participant described her preferences for coping with stress as follows:

> I think how I manage is to keep myself busy, whether it's going for a walk or keeping busy doing things around the house… I find gardening is a real big stress reliever… If I'm stressed, I just go outside… the nice thing about gardening is that you work hard but then you see the results, so to me that's a big stress reliever. … If I'm stressed out I can't sit and read a book. To me, I have to keep busy and doing things that are - to me reading a book is not productive. I like to see results and that's just the way I cope.

Teachable moment. Participants described their post-biopsy experiences within this overarching theme of *control* as manifesting in a variety of health behaviours, revealing a subtheme representative of a teachable moment. This subtheme comprises references to the breast abnormality as a source of momentum to motivate the uptake of health-related behaviours. One participant said:

> I think the whole biopsy, it stressed to me that I needed to get healthy. Diet changes, no pop, no diet pop, I never smoked so that wasn't a problem, but I know I should exercise. I'm not a terrible junk food addict but I was cutting some of it out too.

Overall, the approach and perspective with respect to individual perceptions of *control* illuminated the corresponding interpretations and coping

actions of this sample of women with suspected breast cancer as they navigated the peri-diagnostic phase.

Illness representations. Interviews with participants highlighted the importance of individual interpretations in the formation of beliefs about their medical condition. The qualitative data offer a complementary description of the illness representations of this sample, and provided context for the interpretation of Brief IPQ composite and domain scores.

Consequences. Although the consequences of the abnormality reflected in the Brief IPQ scores attenuated from one week post-biopsy to the follow-up assessment 11 weeks later, participants reflected upon the impact as one of significant intrusion in their lives. One participant described the uncertainty of the diagnostic waiting period as a time in which "*you spin your wheels when you don't know what's going on*". For some, this resulted in intrusive thoughts that interrupted their daily functioning. One woman described the impact: "*I went to work, did my normal things, but my thoughts were always about the biopsy*".

Concern. Few participants described only minimal levels of concern related to the breast abnormality. For example, one woman stated, "*my nature is not to over-worry. That's just wasted energy*." Others, however, detailed a more debilitating level of concern that involved ruminating about concerns for future consequences. One woman described her concerns:

> I worried about what I would have to go through if I did have cancer… I found it hard to concentrate at work and that I was thinking about it a lot. I don't think i really thought I was going to die of breast cancer or anything, but I was thinking about what I would have to deal with if I had to do treatment and if I had to lose my hair, if I had to have a mastectomy, and how i would feel to have that surgery and all that kind of thing…

Emotional consequences. Concern was closely associated with the participants' descriptions of emotional consequences of facing the threat of suspected breast cancer. This relationship was illustrated by an emphasis in the

interviews on preconceived expectations of the diagnostic process surrounding procedures, communication, and the sequence of events. For instance, greater severity was ascribed to the breast abnormality if the notification itself was interpreted as "*unusual*" and did not align with prior expectations of the health care system. Unmet expectations resulted in emotional reactions including anger, fear, shock, anxiety, stress, and sadness. One participant expressed her emotional reaction to the notification of her breast abnormality: "*My first concern was how I was notified. The hospital called before the doctor's office. I was almost at work and very surprised to get this call. I was upset and emotional… went to the washroom and cried*".

Emotional consequences were described retrospectively across the peri-diagnostic phase and responses varied according to perceptions of control across the trajectory. Women described feelings of "*shock*" and "*surprise*" to the initial notification of the breast abnormality and request for core biopsy: "*I was shocked. I never thought it was a possibility*". One woman said, "*I was told out of the blue one day*" while another described the phone call in which the biopsy was requested as a "*jolt*". Participants used descriptors such as "*nerve-wracking*" to describe the time spent waiting for test results.

Throughout the peri-diagnostic phase, some women described frustration and anger in reaction to the information they were receiving from the hospital: "*they kept changing what they were saying and that ticked me off*". Participants spoke about general "*upset*" in reaction to the necessity for further diagnostic tests, and at the communication of results: "*I was mad at my own doc because she said the pain was muscular*". A range of emotional reactions were expressed in response to the diagnosis, from fear: *"I broke out in a sweat and thought, oh my god*"; to a sense of relief: "*Everything worked out for the best. They want me every six months now because of some tissue they are keeping an eye on. I'm okay with that because so many people have cancer now, it's scary*." At the same time, some participants expressed a reluctance to surrender to the stress of this experience, citing protective motives such as "*stress can cause so many things*".

Illness identity. According to the CSM framework, appraisals of illness identity are derived from the interpretation of stimuli, *e.g.,* symptoms. Although these women appeared to be predominantly asymptomatic according to their illness identity scores on the Brief IPQ, the majority of participants discussed some level of discomfort in their breast(s); however, the interpretation of symptom severity was generally dismissed. One participant said, "*it must be small, so I worried less*" while another expressed, "*people always say if it hurts, that's a good sign*".

Personal control. Participants highlighted a variety of means to gain personal control over their experience with the health threat of a breast abnormality. Many participants acknowledged the likelihood of being diagnosed with cancer, but expressed a determination to be in control of the situation. One woman said, *"I think we are predisposed to have cancer so just take care of yourself, and if you're diagnosed then have it treated early*". Another woman, diagnosed with breast cancer and awaiting treatment, spoke about acupuncture treatments she had pursued to "*boost [her] immune system … so things are just as they were or less*" by the time of her surgery. Many discussed exercise as a mechanism for regaining control over physical and emotional health, "*If you are facing or think you are facing something, exercising makes you think you are making part of your body better*."

Causal factors. Participants further elucidated the perceived aetiological factors that had been recorded in the open-ended responses to the causal item on the Brief IPQ. Women discussed factors including family history and associated predispositions to the disease: "*there is a history of breast cancer in my family*". Moreover, there was some discussion of toxins and other external factors:

> My Mom died of cancer when she was 66 – always active, never smoked, never drank, exercised regularly, and was healthy. She was always on a diet and drank diet pop and used artificial sweeteners. Not that that's what caused her cancer, but I wonder.

Conversely, few women described their lifestyle as a protective factor against developing breast cancer. One woman elaborated:

> Nobody in my family has cancer. We are very lucky. We lived off the garden all our lives, lived in the fruit trees. I think that has something to do with it. So many of our friends are sick right now, getting treatment, or just being diagnosed. It's scary.

The majority of participants spoke about modifiable factors, specifically diet and exercise, as important to their perceived risk of breast cancer as highlighted by the threat of the breast abnormality. Women discussed "*yo-yo dieting*", "*aspartame*", "*junk food*", and were critical of their "*poor discipline*" with respect to managing regular exercise throughout the course of their lives, particular in the face of adversity. Participants highlighted the challenges of "*committing*" to exercise throughout pregnancies, childcare, and career navigation.

Coping responses. The individual interviews elaborated on the coping responses of this sample as reported in the Brief COPE inventory. Overall, the qualitative data related to coping was consistent with the quantitative responses and illuminated the extent to which these women spoke about the use of coping responses labeled as "adaptive" rather than those labeled "problematic". Accordingly, the qualitative findings elaborate on the coping responses as described in the interviews, including: active coping, planning, positive reframing, acceptance, emotional and instrumental support, and self-distraction. When participants spoke about the trajectory of the diagnostic interval, there was an emphasis on adaptive coping in general; with a particular focus on active coping responses.

Active coping. Participants elaborated on practical and concrete actions in response to their breast abnormality and associated diagnostic workup, with little to no discussion of avoidance behaviours. One woman described her approach to dealing with anticipatory stress of the diagnosis: "*meeting it head*

on is preferable to it bugging me"; while another similarly expressed, "*you just have to go on and live your own life*".

Planning. A few women spoke about engaging in planning and preparation, "*in case of the worst*". One woman spoke about putting "*plans in place*" to care for her granddaughter in the event she was diagnosed with breast cancer: "*my husband is older so I am the one that has to be there for her, so I cannot be sick*". Other responses indicative of planning that women discussed included strategies that had a common matriarchal element, in which women detailed efforts to protect their children or other family members from the impact of their diagnosis. One woman described her strategy to protect her family: "*my daughter just got married and she's on cloud nine so I decided it'd just be better to keep it to myself*".

Positive reframing. Some participants described their reaction to the notification and diagnostic workup in a positive light. For example, one woman expressed that the purpose of her biopsy was related to cost-saving measures associated with new staff in the Breast Care Centre: "*I think she must have gone over the records and thought, 'why aren't we figuring out what this is instead of spending money on all these tests'…*". Another participant expressed optimism that her malignancy may have attenuated prior to treatment: "*…it's been a long wait and I just hope nothing has changed but I'm also totally open to the fact that it's gone away too*".

Acceptance. Overall, the participants discussed their experience of the breast biopsy and peri-diagnostic phase in a pragmatic manner. Although the women generally acknowledged that this was not a preferred outcome of their regular breast screening (*e.g.*, "*if I could choose to go down this path or not, I think I would choose not*"), the interview discussions did not reveal any examples of catastrophizing or other maladaptive cognitive distortions. In fact, some women described their waiting period as a time in which they attempted to accept the situation and move on: *"I knew there was a lot of time to wait and rather than get anxious or pissed off just waiting, I've been making myself busy in the last few weeks on purpose…just to make this time go faster*". Other women

spoke about accepting their respective results and "*moving on*", as illustrated by one woman who described her post-treatment expectations: "…*getting through this and getting back to a normal life*".

Emotional and instrumental support. Overall, the participants spoke highly of their support networks and elaborated on their use of supports; including family and friends, along with clinic personnel at the Breast Care Centre. One woman expressed her reliance on family as a means of support throughout her biopsy and diagnostic waiting period: "*I am very expressive. I have to talk things out and they have to listen to me*". A few participants illustrated a lesser extent of family involvement, and elected to disclose their journey to only one chosen individual from their support network, *e.g.,* "*I didn't tell many people because I didn't want to worry anyone, except my husband*". The emotional support was generally valued by the participants and played a crucial role in coping with the emotional consequences of the peri-diagnostic phase. One woman described the emotional support she obtained from a sibling: *"if I'm in a slump I go to my sister's place 3 or 4 miles away and I'd join her for coffee*".

Instrumental support was similarly described by participants as critical to their processing of the information presented to them across the peri-diagnostic trajectory. One important source of instrumental support that was highlighted by participants was the clinic personnel at the Breast Care Centre. One woman described her decision-making process during diagnostic workup at the clinic, "*so I'm laying there. I asked if I was her Mom, what would she say? She said 'no'. So I was fine*".

Self-distraction. The majority of participants spoke about activities they engaged in to "*keep busy*" during the peri-diagnostic phase. These women had elected to enrol in an exercise behaviour change intervention throughout their journey. Accordingly, much of the discussion on self-distraction revolved around fitness and exercise. For example, one woman stated, "*fitness was a distraction, so that was good*", while another woman expressed her motivation for enrolling in the program as a way to "*be proactive, keep [her] busy and would be good for*

[her]". All participants who spoke of distraction as a coping technique expressed an interest in pursuing only activities that produced tangible results.

Discussion

The objective of this study was to explore and describe the peri-diagnostic perceptions and responses of a small group of women (*N* = 7) who elected to participate in a 6-week behaviour change exercise program following diagnostic stage core breast biopsy. In order to illuminate the beliefs that informed psychosocial distress during the peri-diagnostic phase, we employed a concurrent mixed methods design using data source triangulation to understand the formation of illness representations and the resultant coping responses. Given the unpredictable nature of the female breast cancer peri-diagnostic experience, we selected the Common Sense Model as the conceptual framework to explore the illness perceptions and coping responses elicited throughout the peri-diagnostic phase. Standardized questionnaires were completed by participants one week post-biopsy and repeated 11 weeks later to assess these constructs, and qualitative interviews were conducted 12 weeks post-biopsy to retrospectively explore the subjective experiences of this group of women faced with the health threat of a breast abnormality. The quantitative responses from this small sample suggest that the severity of illness perceptions attenuated over the 12 week study period, while the coping responses remained relatively stable. The qualitative responses revealed similar findings, however allowed for further insight into the nature of the cognitive and emotional illness representations and coping behaviours employed by this sample of women.

Illness Representations

One of the predominant features of the CSM is its dynamic framework (Diefenbach & Leventhal, 1996). As mentioned above, the findings from the standardized questionnaires were generally corroborated and elaborated upon by the findings generated from the interview data; however, the data triangulation indicated a number of themes and subthemes of import that could not be classified within the parallel processing framework of the CSM. It is

possible that this framework may be too prescriptive to study the cognitive, emotional, and behavioural responses in this context, as the uncertainty associated with the diagnostic experience and the outcome-oriented cognitive and behavioural coping styles demonstrated by these women were not adequately captured within the CSM framework. Although there is some evidence to support the existence of relationships between CSM constructs and subjective patient-reported outcomes (*e.g.,* quality of life; QOL) in various illness populations (Moss-Morris & Chalder, 2003; Rutter & Rutter, 2002; Vaughan, Morrison, & Miller, 2003), these data have been derived from cross-sectional studies. In a prospective study of head and neck cancer patients, pre-treatment illness perceptions were predictive of post-treatment depression, but not of anxiety or QOL (Llewellyn, McGurk, & Weinman, 2007), suggesting that the CSM framework may not be appropriate for predicting outcomes that are likely to change over time according to the dynamic course of the disease trajectory. Similarly, the women in our sample experienced oscillating emotions across the peri-diagnostic phase. In fact, the evidence from the present study presents us an opportunity to question the applicability of the CSM to examinations of self-regulatory processes among individuals with unpredictable or unstable courses of illness or health threats. The CSM dimensions of personal control and treatment control have been closely aligned with self-efficacy beliefs and outcome expectations, respectively, in the literature. These constructs have been thoroughly conceptualized and delineated in Bandura's (1986) Social Cognitive Theory, which may present a potential alternative to the CSM in addressing the dynamic nature of the health threats and the resultant cognitive and behavioural responses.

Coping Strategies

Coping responses have received considerably more research attention in comparison to illness perceptions. The prospective benefits of coping on distress are well documented (*e.g.,* Carver et al., 1993). Although the cognitive and emotional representations of illness reported by respondents in the present study declined over time, the coping responses remained relatively stable. It is

possible that the overarching emergent theme of *control* and the predominantly active coping style that was evident from the qualitative interviews are indicative of a more dispositional coping response pattern; one that is less sensitive to change. In their seminal cognitive model of stress and coping, Lazarus and Folkman (1984) postulate that cognitive appraisals of stressors influence individual coping responses. First, individuals assess the stressor, *e.g.,* breast abnormality, (primary appraisal), and then proceed to assess available coping resources, *e.g.,* exercise, (secondary appraisal). Coping is the process of responding to these appraisals, and in this example would involve engaging in physical exercise as a means of emotional regulation to ameliorate the interference of the breast abnormality. Subsequently, individuals conduct an evaluation of the effectiveness of the chosen coping response within the context of the stressor (reappraisal). In this model, coping is conceptualized as the implementation and evaluation of a set of available strategies according to situational factors.

One could argue that the coping strategies exhibited by the participants in this study would be classified as active and representative of the general coping style employed by the women in this sample. Although distraction techniques were discussed, participants valued outcome-oriented distractions. Other studies have examined the relationship between coping and stress among women undergoing diagnostic breast biopsy among women with benign (Benedict, Williams, & Baron, 1994) and malignant diagnoses (Stanton & Snider, 1993). In general, women who employ the pre-biopsy coping strategy of cognitive avoidance or disengagement exhibit higher levels of distress following notification of diagnosis in comparison to women who employ active coping strategies (Lebel et al., 2003). Participants in the present study reflected on their distress across the peri-diagnostic phase, however in no instance was it described as debilitative. It is important to recognize that the participants in this study volunteered to adopt and self-manage exercise whilst faced with a potentially serious health threat involving decision-making throughout diagnostic workup and treatment, where relevant. Exercise is a complex behaviour and

attempts to self-manage exercise present many challenges to otherwise healthy individuals in the general population (Brawley, Rejeski, & King, 2003), intimating an extraordinary sense of control displayed by this sample of women.

Limitations and Future Directions

This study is not without its limitations. It is important to note that the small sample size does not allow for us to draw any conclusions from the quantitative responses. The qualitative responses, however, can inform the perceptions and coping strategies of this sample. In line with conventional qualitative research tradition, generalizability outside of the sample and setting is not the intention (Maxwell, 1992). Although we are unable to generalize our findings to other women in the breast cancer peri-diagnostic phase, we can draw a number of conclusions about the women in our sample who elected to act upon the teachable moment presented to them in the form of an abnormal breast screen. Unfortunately, the qualitative interviews were retrospective in nature, so it is possible that there may be a recall bias. Future mixed methods investigations of perceptions and coping strategies in the peri-diagnostic phase would benefit from prospective concurrent quantitative and qualitative measurement of these constructs.

Illness representations are posited to direct actions and coping responses (Leventhal et al., 1997). Among patients with head and neck cancer, pre-treatment beliefs and coping strategies were stronger predictors of post-treatment depression, anxiety, and QOL than sociodemographic or clinical characteristics (Llewellyn et al., 2007), emphasizing the importance of considering individual beliefs and coping styles when designing interventions. Future efforts are warranted in determining appropriate measures of illness perceptions taking into consideration the volatile emotional responses associated with dynamic illness trajectories.

Conclusions

Out of the available responses to notification of an abnormal breast screen, the identification of a teachable moment is arguably an adaptive approach. Responding to the teachable moment with a significant health

behaviour change is remarkable, especially considering the challenges in the general population with adoption and maintenance of health behaviours such as exercise. The perceived loss of control to the health care system as discussed by the women in this study was challenged with an exceptionally regulated coping response that permitted these women to perceive an overall sense of control over their health and wellbeing throughout the peri-diagnostic journey. Although the diagnostic workup of many of the women in this sample did not result in a cancer diagnosis, the peri-diagnostic phase was characterized by uncertainty regardless of the ultimate diagnosis. There is a strong relationship between uncertainty and distress (Mishel, 1997) and it is important to consider that distress is associated with adverse treatment outcomes (Flory & Lang, 2011; Montgomery & McCrone, 2010). Exercise may present both an appealing and productive outlet for women who express interest in taking control over their peri-diagnostic journey.

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Table 1

Sociodemographic Characteristics of Participants (n = 7)

Characteristic	Mean (SD)	n	%
Age	55.43 (10.28)		
Ethnicity			
Caucasian		6	85.71
Missing		1	14.29
Marital status			
Married/common law partner		6	85.71
Single/divorced/widowed		1	14.29
Education level completed			
Secondary school		2	28.57
College or technical training		2	28.57
Bachelor's degree		1	14.29
Professional or graduate		2	28.57
Employment status			
Employed full-time		3	42.86
Employed part-time		0	0.00
Self-employed		1	14.29
Retired		3	42.86
Estimated annual household income			
$50,000 to $59,999		1	14.29
$60,000 to $79,999		1	14.29
$100,000 or higher		5	71.43

Table 2

Clinical Characteristics of Participants (N = 7)

Characteristic	n	%
Laterality of core biopsy lesions		
Left	2	28.6
Right	5	71.4
Additional procedures		
Surgical biopsy	2	28.6
Lumpectomy	1	14.3
Radiation therapy	1	14.3
Diagnosis (per lesion)		
Calcifications	1	14.3
Retroareolar lesion (stable)	1	14.3
Atypical ductal hyperplasia	1	14.3
Atypical lobular hyperplasia	1	14.3
Ductal carcinoma in situ (DCIS)	1	14.3
Proliferative breast disease without atypia	3	42.9
Hemorrhage	1	14.3
Interlobular fibrosis	1	14.3
Florid epithelial hyperplasia	1	14.3
Follow-up recommendations		
1 year follow-up mammogram	1	14.3
1 year follow-up mammogram + ultrasound	1	14.3
6 month mammogram + ultrasound	1	14.3
6 month mammogram + magnification views	1	14.3
Routine screening	1	14.3
Follow-up not specified	2	28.6

Table 3

Post-Biopsy Illness Representations Attributed to Breast Abnormality

Illness representations (*n* = 7)	*n* (%)	M (*SD*)	Range
Consequences			
Week 1		4.00 (1.09)	3.00 - 5.00
Week 11		0.71 (0.95)	0.00 - 2.00
Timeline			
Week 1		4.71 (3.25)	1.00 - 10.00
Week 11		3.14 (3.43)	0.00 - 10.00
Personal control			
Week 1		3.57 (3.15)	0.00 - 8.00
Week 11		2.71 (3.45)	0.00 - 8.00
Treatment control			
Week 1		3.86 (3.93)	0.00 - 8.00
Week 11		5.00 (4.10)	0.00 - 9.00
Illness identity			
Week 1		1.86 (2.04)	0.00 - 5.00
Week 11		0.57 (1.13)	0.00 - 3.00
Worry			
Week 1		5.14 (2.91)	1.00 - 9.00
Week 11		1.86 (1.72)	0.00 - 5.00
Coherence			
Week 1		7.29 (2.56)	2.00 - 10.00
Week 11		5.71 (3.45)	1.00 - 9.00
Emotional consequences			
Week 1		4.86 (2.27)	1.00 - 8.00
Week 11		1.57 (1.72)	0.00 - 5.00
Identified causal factors			
No cause	1.0 (7.1)		
External factors	7.0 (50.0)		
Modifiable factors	6.0 (42.8)		
Overall perception of illness			
Brief IPQ total score			
Week 1		35.29 (13.01)	17.00 - 54.00
Week 11		21.83 (6.79)	12.00 - 29.00

Note. Potential range 0 - 10; 10.00 = most threatening perception of breast abnormality

Table 4

Post-Biopsy Adaptive Coping Responses

Brief COPE Subscale	Mean	*SD*	Range	α
Active Coping				
Week 1	2.00	0.96	1.00 - 3.50	.57
Week 11	2.07	0.89	1.00 - 3.00	.70
Planning				
Week 1	2.86	1.21	1.00 - 4.00	.90
Week 11	2.14	0.94	1.00 - 3.50	.93
Positive reframing				
Week 1	2.29	0.76	1.00 - 3.50	.21
Week 11	2.43	1.13	1.00 - 4.00	.89
Acceptance				
Week 1	2.57	1.37	1.00 - 4.00	.96
Week 11	2.14	1.03	1.00 - 3.50	.93
Humour				
Week 1	1.29	0.49	1.00 - 2.00	1.00
Week 11	1.29	0.76	1.00 - 3.00	1.00
Religion				
Week 1	1.75	0.76	1.00 - 3.00	.93
Week 11	1.93	0.84	1.00 - 3.50	.95
Using emotional support				
Week 1	2.29	0.91	1.00 - 3.50	.90
Week 11	1.57	0.73	1.00 - 3.00	.84
Using instrumental support				
Week 1	2.00	0.65	1.00 - 3.00	.67
Week 11	1.50	0.87	1.00 - 3.00	.95

Note. Potential range 1 - 4; 4.00 = highest frequency of adaptive coping responses

Table 5

Post-Biopsy Problematic Coping Responses

Brief COPE Subscale	Mean	*SD*	Range	α
Self-distraction				
Week 1	2.57	1.37	1.00 - 4.00	.97
Week 11	2.21	1.29	1.00 - 4.00	.91
Denial				
Week 1	2.00	1.19	1.00 - 4.00	.77
Week 11	1.43	0.73	1.00 - 3.00	.71
Venting				
Week 1	1.29	0.49	1.00 - 2.00	.97
Week 11	1.21	0.57	1.00 - 2.50	.91
Substance use				
Week 1	1.14	0.38	1.00 - 2.00	1.00
Week 11	1.14	0.38	1.00 - 2.00	1.00
Behavioural disengagement				
Week 1	1.29	0.76	1.00 - 3.00	.75
Week 11	1.29	0.57	1.00 - 2.50	-
Self-blame				
Week 1	1.79	0.99	1.00 - 3.00	.38
Week 11	1.50	0.71	1.00 - 2.50	.76

Note. Potential range 1 - 4; 4.00 = highest frequency of problematic coping responses

Chapter Three

Taking Control: Pilot Study of Peri-Diagnostic Self-Managed Exercise Among Women With Suspected Breast Cancer

Introduction

Breast cancer is the most commonly detected neoplasm and the second leading cause of cancer-related mortality among women in Canada (Canadian Cancer Society's Advisory Committee on Cancer Statistics, 2013). Population-based efforts at reducing mortality rates associated with breast cancer were initiated in the late 1990s with nationwide organized breast screening programs (Canadian Cancer Society's Advisory Committee on Cancer Statistics, 2013; Canadian Partnership Against Cancer, 2013; Olivotto et al., 2001). Although early detection and improved biomedical treatments for breast cancer have resulted in increased survival rates, the psychosocial sequelae associated with screening for the disease cannot be ignored (Holland et al., 2010; Institute of Medicine, 2008; National Comprehensive Cancer Network, 2013).

Waiting for a definitive diagnosis has been cited as one of the most stressful aspects of the cancer experience (Green et al., 1998; Iwamitsu et al., 2005; Montazeri et al., 2000; Northouse, 1989; Olivotto et al., 2001). Among performance indicators for the Ontario Breast Screening Program (OBSP), the targeted diagnostic interval (*i.e.,* time lapse from abnormal mammogram result to diagnosis) is seven weeks for women aged 50 to 74 requiring core biopsy (Cancer Care Ontario, 2013). Program evaluation data from 2011 report a 64% achievement of the targeted diagnostic interval among women participating in the OBSP across the province (Cancer Care Ontario, 2013), suggesting that many women are waiting for longer than two months for a definitive diagnosis.

The emotional burden of the diagnostic waiting period is characterized by heightened levels of psychological distress; including uncertainty, anxiety, and acute stress reactions (Gurevich et al., 2004; Hislop et al., 2002; Liao, Chen, Chen, & Chen, 2008). Among women with suspected breast cancer, anxiety is the most frequently cited emotion experienced (Moyer & Salovey, 1996); reported anxiety levels increase significantly upon detection of a breast abnormality and peak at the time of biopsy (Liao et al., 2008).

The typical acute stress response to a breast cancer diagnosis is characterized by shock and denial (*i.e.,* avoidance), and is eventually manifested by anxiety, anger, and depressive symptoms (*i.e*., intrusive thoughts and hyperarousal) (Compas et al., 2006; Holland & Rowland, 1989). Moreover, it is important to recognize the physical (*e.g.,* pain, discomfort) and psychological morbidity (*e.g.,* anxiety, depressive symptoms) associated with a false positive screen or benign finding (Fentiman, 1988; Lebel et al., 2003) and the potential iatrogenic effect of breast cancer detection practices on psychological distress. The emotional consequence of these findings can be profound with potential to impact on treatment outcomes and future screening behaviours (Montgomery & McCrone, 2010).

Unfortunately, current practice (usual care) does not include adjunct treatment to ameliorate the psychological consequences of the diagnostic waiting period for breast cancer. Instead, behavioural and psychosocial treatments (*e.g*., cognitive behavioural therapy [CBT]; physical exercise) for women with breast cancer have traditionally been administered post-diagnosis, with an emphasis on active treatment and long-term survivorship (Fong et al., 2012). Indeed, organizational and structural constraints present as barriers to implementation of psychosocial support services prior to histological confirmation of a cancer diagnosis.

One attractive non-pharmacologic approach to mitigating the psychological and physical sequelae associated with breast cancer and its primary treatments is physical exercise. The benefits of behavioural interventions, such as exercise, to breast cancer patients and survivors during and after treatment are well documented (Duijts, Faber, Oldenburg, van Beurden, & Aaronson, 2011; Fong et al., 2012); including demonstrated improvements to anxiety and depression (Duijts et al., 2011), and to body composition (Fong et al., 2012). However, exercise initiation and adherence are negatively impacted by cancer diagnosis and treatment (Littman, Tang, & Rossing, 2010) and there is little understanding of the utility of exercise in the screening and pre-treatment stages of the breast cancer continuum (Courneya & Friedenreich, 2001; Courneya & Friedenreich, 2007).

Adherence to exercise interventions is challenging, and requires evidence-based principles to support and sustain behaviour change (Courneya, 2010; Meichenbaum & Turk, 1987). Moreover, the self-management of regular exercise requires self-regulation (Bandura, 2005). Successful self-regulation relies on the interaction of the following cognitive-behavioural skills: setting goals, self-monitoring and evaluation of performance, perceptions and interpretations of performance feedback, and self-efficacy beliefs (Bandura, 1986; Barone, Maddux, & Snyder, 1997; Maddux & Gosselin, 2003; Vohs & Baumeister, 2011). Perceptions of self-efficacy are central to theories of behaviour change (Bandura, 1997; Maddux, Brawley, & Boykin, 1995) because of their demonstrated influence on behavioural adoption and maintenance in the face of obstacles (Maddux & Gosselin, 2003). The theoretical underpinnings of Bandura's (1997) self-efficacy theory delineated this construct into a comprehensive framework for empirical examination within behavioural models. Self-efficacy can be fostered through the following mechanisms: performance, vicarious experience, imaginal

experience, verbal persuasion, and affective and physiological states (Bandura, 1986; Maddux & Gosselin, 2003).

The self-management of regular exercise depends not only on the confidence in one's capability to execute the targeted physical exercise (*i.e.,* task efficacy), but perhaps more importantly requires confidence in one's capability to execute the aforementioned cognitive behavioural skills (*i.e.,* self-regulatory efficacy). The emphasis of self-efficacy on individual perceptions of what *can* be accomplished in light of challenging and unpredictable circumstances makes it an appropriate construct to manipulate in this behavioural intervention encouraging exercise adoption among physically inactive women facing the health threat of a breast abnormality. Although the stress associated with breast assessment is well documented, the impact of exercise training on subjective post-biopsy distress among women with identified breast abnormalities has not yet been examined. Further, recruitment within a comprehensive breast care centre affords the unique opportunity to intervene with psychosocial or behavioural support throughout the diagnostic period, prior to a cancer diagnosis; however, the practicality of implementation requires investigation.

The purpose of this single-arm mixed methods pilot study was to examine the feasibility and acceptability of a self-managed exercise intervention in women with suspected breast cancer. Specific study objectives were to: (a) evaluate the feasibility of recruitment, retention, adherence, and data collection protocols; (b) evaluate the acceptability of the intervention and assessments from the patient perspective; (c) document the patient response to self-managed exercise as a means of coping with a health threat, *i.e.*, breast abnormality; and (d) describe the challenges and successes of implementation of this self-managed exercise intervention at a critical phase of the care trajectory for women with suspected breast cancer. A secondary objective was to assess proof of principle through the estimation of preliminary efficacy of the self-

managed exercise intervention on subjective distress (primary endpoint) and to explore the cognitive and behavioural processes of program adherence. The intervention under study is novel in terms of its emphasis on the adoption and self-management of a health-related behaviour (*i.e.*, exercise) for women undergoing diagnostic workup for breast cancer.

Method

Pilot Study

Consistent with best practice guidelines from the Medical Research Council for the systematic development and evaluation of complex interventions (Craig et al., 2008), we conducted a mixed quantitative and qualitative pilot study to assess acceptability and feasibility of the intervention, following guidelines for pilot studies elaborated upon by Thabane et al. (2010) and Leon, Davis, and Kraemer (2011). A mixed methodological approach was selected for this investigation because the complex phenomenon under study could not be understood using quantitative or qualitative methodology alone (Tashakkori & Teddlie, 2003). A convergent mixed methods design was implemented to produce a deeper understanding of the feasibility of implementation of exercise behaviour change in the peri-diagnostic period for women with suspected breast cancer.

Pilot studies are instructive and a necessary precursor to hypothesis testing in a full-scale randomized controlled trial (RCT; Bowen et al., 2009; Hertzog, 2008; Leon et al., 2011; Thabane et al., 2010). Accordingly, the emphasis of this iterative pilot study was on feasibility objectives to inform modifications required for the planning and design of a randomized efficacy trial. The feasibility outcomes will inform the refinement of recruitment, retention, measurement, and adherence strategies and protocols for interventions of self-managed exercise targeting larger samples of women in this specific context. Although treatment effects from pilot studies are often used to estimate power and sample size for future trials, this practice can be misleading due to the

inherent imprecision of estimations generated from small samples (Kraemer, Mintz, Noda, Tinklenberg, & Yesavage, 2006; Leon et al., 2011; Thabane et al., 2010). As such, the findings from this pilot study will not be used for the computation of power or sample size selection for a hypothesis-testing trial.

Sample and Participant Selection

Participants. The target sample for recruitment was 15 women presenting with a breast abnormality identified as suspicious for malignancy. The targeted sample size allowed for a 20% attrition rate (based on similar exercise intervention studies) for assessment of the pragmatics associated with recruitment, implementation, and outcome assessment (Leon et al., 2011) during the critical diagnostic and pre-treatment phase of the cancer trajectory (Courneya & Friedenreich, 2007). Although we did not meet our minimum enrolment objective of $N = 12$ (Julious, 2005), 10 women consented to participate (M age = 55.43 years ± 9.05; age range = 40 - 69 years) and 7 women completed the intervention and all scheduled assessments. The sociodemographic and clinical characteristics of this sample are described in detail in Chapter Two of this dissertation. In summary, the majority of participants were negative for malignancy following diagnostic workup. Only one participant was recommended to continue with a routine screening protocol, while all others were advised to pursue more frequent and complicated procedures for detection.

Eligibility screening. Eligibility was based on the following inclusion and exclusion criteria (see Eligibility Checklist; Appendix F). Inclusion criteria: (a) presenting with breast lesion(s) classified as low to moderate likelihood of malignancy (i.e., BI-RADS 4A, 4B, or 4C) recommended for biopsy, according to the Breast Imaging Reporting and Data System (BI-RADS; D'Orsi, Mendelson, Ikeda, & al., 2003), a standardized breast imaging risk assessment and quality assurance classification system; (b) age at biopsy ≥ 18 years; (c) able to speak, read,

and understand the English language for the completion of questionnaires and participation in the intervention, and (d) able to provide informed consent. Exclusion Criteria: (a) age at biopsy > 69 years, (b) prior breast cancer diagnosis, (c) medical contraindications that preclude participation in regular exercise, (d) exercising at a moderate intensity ≥ 150 minutes or ≥ 75 minutes at a vigorous intensity in a typical week over the past 6 months, and (e) unable to commit to facility-based intervention and assessment sessions due to the distance from home and/or place of employment to the intervention setting.

Recruitment Setting. Recruitment was conducted through the Breast Care Program of St. Joseph's Hospital in London, Ontario. The Norton and Lucille Wolf Breast Care Centre is the core of St. Joseph's Breast Care Program. Patients from the region of southwestern Ontario referred to the program are seen at this highly specialized centre. The Breast Care Centre (BCC) is part of a large partnership initiative to implement patient-centred clinical care coordinated from diagnostic workup through treatment and post-operative follow-up. The interdisciplinary breast care team was designed to support collaboration among providers including clinical assessment teams for diagnostic services, surgical care, and supportive needs, with an emphasis on research and education.

Intervention Setting. The CaRE program (Control and Recharge with Exercise) is a 6-week collaborative, self-managed exercise intervention involving weekly supervised and home-based sessions. The facility-based supervised exercise sessions and assessments were completed at the Exercise and Health Psychology Laboratory (EHPL; www.ehpl.uwo.ca; Suite 408, Arthur & Sonia Labatt Health Sciences Building, The University of Western Ontario). This 1,800 square foot facility consists of space and equipment for the facility-based portion of the self-managed exercise intervention and data collection (Prapavessis, Hall, & Carron, 2006). Exercise supervision was provided by a Kinesiology doctoral student with specialized training for exercise program delivery (American College of Sports Medicine) and expertise in tailoring to persons with cancer (Wellspring CancerSmart™ Exercise).

Measures

Screening measures*.* In addition to screening by the nurse navigator for medical contraindications, the physical ability and safety to participate in exercise was assessed using the Physical Activity Readiness Questionnaire+ (PAR-Q+; Warburton, Jamnik, Bredin, Gledhill, & Collaboration, 2011)*.* The PAR-Q+ contains items assessing medical history and chronic conditions for the purposes of pre-screening individuals prior to exercise participation. Any positive responses to items on this form require clearance from a physician.

Routine exercise behaviour at baseline was screened using the Godin Leisure Time Exercise Questionnaire (LTEQ; G. Godin & Shephard, 1997), in which participants were asked to recall the number of times spent per week over the past 6 months engaging in mild, moderate, and vigorous exercise in their leisure time. This two-item self-report questionnaire is a reliable and valid measure of mild, moderate, and vigorous exercise behaviour in adults (Godin & Shephard, 1985) and was used to screen out patients engaged in routine leisure-time exercise.

Clinical and sociodemographic characteristics. Basic diagnostic workup, disease and treatment information were obtained through chart review and demographic information was collected using a self-report questionnaire at baseline. Participant characteristics have been previously described in Study One and depicted in Tables 1 and 2 of Chapter Two of this dissertation.

Intervention feasibility*.* Feasibility criteria were established *a priori* using relevant outcomes for pilot studies (Bowen et al., 2009; Craig et al., 2008; Leon et al., 2011; Thabane et al., 2010), based on similar behavioural intervention studies and clinic workflow at the Breast Care Centre. Feasibility criteria were defined as: (a) recruitment: accrual rate >40% of all eligible patients with core biopsies, (b) retention: 6-week facility-based intervention sessions and 1-month follow-up assessment completed by ≥75% of consented patients, and (c) adherence: ≥80% of

intervention completed (5 of 6 sessions). Adherence was measured by attendance to the facility-based sessions and documentation of progress and program modifications systematically tracked by the interventionist at each session (see Appendix D). Estimates for recruitment, retention, and adherence were based on similarly self-managed exercise interventions employing cognitive behavioural techniques for adherence (*e.g.,* Cadmus et al., 2009; Cramp & Brawley, 2009; Hoffman et al., 2012).

Qualitative interviews. Feasibility of recruitment was further informed through in-depth individual interviews with members of the clinical team at the recruitment site. The goal of the interviews was to establish the context and culture of the Breast Care Centre with respect to current beliefs and practice of distress screening and management, and to explore perceptions of supportive care resources from a health services perspective. Subsequently, clinic personnel were asked questions specific to the CaRE program (*e.g*., feasibility of recruitment), and perceptions of exercise as a coping resource for women undergoing diagnostic workup. See Appendix E for the semi-structured interview guide for clinic personnel.

Intervention receipt and enactment. Exercise behaviour change and self-efficacy were assessed at each time point as a measure of the participant receipt and implementation of the cognitive and behavioural strategies and skills delivered in the intervention. Measures were completed at each timepoint (see Appendix F for assessment timeline). These quantitative outcomes were augmented through in-depth individual interviews with program participants to highlight the patient experience of the adherence process.

Exercise behaviour change. The feasibility of exercise behaviour change associated with the CaRE intervention was assessed through measures of self-reported walking and exercise behaviour using the International Physical Activity Questionnaire - Short Form (IPAQ-SF; Craig, Marshall, Sjostrom, et al., 2003). The IPAQ-SF is a widely used

measure of exercise behaviour, and assesses the frequency and duration of walking, along with moderate and vigorous physical activity. Respondents are explicitly instructed to exclude walking activity from their reported engagement in moderate activity on the IPAQ-SF. The brief inventory has acceptable psychometric properties with high reliability estimates (0.66 to 0.88) and support for concurrent and criterion validity.

Exercise self-efficacy. Self-efficacy scales were developed purposively for this study, following measurement guidelines put forth by Bandura (2006) and in accordance with specific recommendations for the assessment of exercise self-efficacy (McAuley & Mihalko, 1998). The domains of self-efficacy assessed corresponded to the task (*i.e.,* the enactment of moderate and vigorous cardiovascular and strength training exercises) and self-regulatory strategies and skills encouraged within the intervention for the purposes of adhering to a self-managed exercise program; including self-efficacy of exercise, self-monitoring, goal-setting, and coping with barriers. Each domain was measured with a scale assessing confidence in the respective task or self-regulatory strategy from 0 (“cannot do at all”) to 100% (“certainly can do”).

***Qualitative interviews*.** The processes of program adherence were further elucidated through in-depth individual interviews conducted at the 1-month follow-up visit. Semi-structured interviews explored the role of social cognitive variables *i.e*., outcome expectations, perceived self-efficacy, motivational factors, and behavioural repertoire (Bandura, 1977; Bandura, 1986) in the context of the patient experience of adoption and adherence to exercise throughout the peri-diagnostic phase for suspected breast cancer. Issues that interfered with program receipt and enactment were also explored. See Appendix A for a copy of the semi-structured patient interview guide.

Program acceptability. Individual reactions to the intervention and the subjective experience of the CaRE program were assessed through the in-depth individual interviews following program completion.

The focus of the interview questions related to acceptability was program satisfaction and practicality, while exploring barriers and enablers to participation and intentions to maintain program goals. In addition, perceived burden and acceptability associated with collection of outcome measures (*e.g*., relevance, satisfaction, timing) were examined in the semi-structured interviews. Although this brief exercise intervention was not intended to confer substantial changes to body composition, a description of anthropometric parameters and the acceptability of objective assessments was of interest. In particular, we hoped to ascertain the value of this objective feedback from the perspective of the study participants to inform its utility in future peri-diagnostic exercise interventions. Accordingly, parameters of body composition (*i.e.,* body fat; fat free mass; bone mineral composition; visceral fat) were measured objectively by a trained technician using dual-energy x-ray absorptiometry (iDXA) at baseline (Week 1) and one week post-intervention (Week 7).

Primary endpoint. The primary endpoint for this intervention was subjective distress specific to the breast abnormality. Self-reported subjective distress was assessed using the Impact of Event Scale-Revised (Horowitz, 1979; Weiss & Marmar, 1996), administered at baseline, midpoint, post-intervention and 1-month follow-up.

The IES-R is a 22-item inventory that has been deemed reliable and valid in the measurement of subjective distress in response to a traumatic event. Consistent with the tripartite model of post-traumatic stress disorder (PTSD) as indicated in the DSM-IV (American Psychiatric Association, 1994), respondents are asked to report the extent of distress experienced by the symptoms of avoidance, intrusive thoughts, and hyperarousal. The internal consistency coefficient alphas reported for each of these subscales are 0.89, 0.84, and 0.82, respectively (Weiss & Marmar, 1996).

Items are rated on a 5-point scale with distress scores ranging from 0 (“not at all”) to 4 (“extremely”). The original IES has been used extensively to study the stress response in cancer (Gurevich, Devins, & Rodin, 2002), and applications of the IES-R include the assessment of traumatic stress related to cancer risk (Watson et al., 1996), diagnosis (Sahler et al., 2005), anticipatory distress prior to treatment (Schnur et al., 2008), post-treatment survivorship (Mehnert & Koch, 2007; Stanton, 2005), and advanced disease (Chambers, Foley, Galt, Ferguson, & Clutton, 2012). This inventory was selected to measure distress in this study because of its specificity with respect to the measurement of the distress experience.

Design

A phase II randomized pilot trial was initiated in January 2012 following full-board ethical approval from the Health Sciences Research Ethics Board of the host institution (#17796) and the Clinical Research Impact Committee of the recruitment site (R-12-252). After 10 months of recruitment for the pilot trial, only 5 patients had consented to participate in the intervention (see Figure 1 for study participant flow diagram). The pilot trial was not feasible in meeting enrolment targets, *i.e.*, the number of eligible patients identified each week was lower than expected based on the number of core breast biopsies conducted (approximately 20 - 30 per week). Therefore, the randomized pilot trial was terminated.

To facilitate recruitment efforts, eligibility criteria were made less stringent according to feedback from the nurse navigators conducting primary screening. Final decisions regarding modifications to the inclusion and exclusion criteria, along with study protocol and feasibility outcomes, resulted from review of participant data and accrual by our interdisciplinary team comprising researchers from the University of Western Ontario and clinicians from the departments of Diagnostic Imaging and Surgery at St. Joseph’s Health Care. See Figure 2 for a flow diagram of the feasibility study reflecting the revised protocol and

eligibility criteria. Patient-reported reasons for declining participation in the study are outlined in Table 1.

After obtaining full-board institutional ethics approval (#100047) for study revisions, a single-arm concurrent mixed methods feasibility study was launched in February 2013 employing the modified inclusion and exclusion criteria and study protocol. Outcomes were assessed at baseline, midpoint, post-intervention, and at a 1-month follow-up visit. Feasibility of recruitment and implementation was further informed by a qualitative interview study of clinic personnel at the recruitment site initiated in October 2013 (IRB delegated approval 104356; R-13-442).

Procedures

Recruitment. Potential candidates were screened and identified by nurse navigators at the Breast Care Centre at St. Joseph's Health Care on the day of diagnostic stage core biopsy to investigate a potential diagnosis of breast cancer. Patients were screened for primary eligibility using a checklist of inclusion and exclusion criteria (Appendix G). The Nurse Navigator briefly described the study to potential candidates during a standard consult regarding breast assessment and treatment options. Eligible and interested patients were referred to the Research Coordinator (RC), who provided patients with an overview of the study and conducted secondary eligibility screening using screening measures.

Enrolment*.* The first facility-based session was scheduled at the EHPL within 1 week of core biopsy for all interested patients meeting eligibility criteria. At the first study visit, the RC conducted the informed consent process and introduced the study participant to her exercise specialist (*i.e.,* study interventionist). Following an orientation to the exercise facility and the CaRE intervention, participants engaged in the first session of the supervised exercise program.

Assessments*.* Body composition was assessed by a trained technician using a DXA scan in the EHPL at the first facility-based study visit (baseline) and at one week post-intervention (Week 7). First, the

participant's weight and height were assessed with a Health O Meter Scale (Pelstar®). In preparation for the DXA scan, participants were instructed in advance to wear loose, comfortable attire, avoiding garments containing metal. Participants were positioned on a padded table and instructed to remain still while the imaging device completed the scan. Refer to Appendix H for the data collection log used by the technician to record the body composition assessment data. The technician presented participants with a summary of their changes to body composition at the 1-month follow-up visit (Week 11). Participants were provided with a verbal explanation, along with a comprehensive handout and a Body Composition Infographic Report as an overview of their body composition assessments (see Appendix I for a report template; developed for this study).

Participants were provided with an envelope containing a packet of patient reported outcome measures (PROMs; see CaRE PROMs, Appendix J) to complete at home within 3 days of their first session and were asked to return the questionnaire package the following week. Participants were asked to complete the questionnaire package at home again at midpoint (*i.e.,* Week 4). Post-intervention (*i.e.,* Week 7) PROMs were completed at the EHPL during the final session of the CaRE program. Finally, the study measures were administered at the EHPL during the 1-month follow-up study visit prior to the in-depth individual interview. See Appendix E for a timeline of assessments.

CaRE Intervention. The theoretical rationale for intervention effects was grounded in the posited processes outlined in Bandura's (1986) Social Cognitive Theory.

Exercise protocol. The exercise program consisted of a 6-week personalized facility and home-based exercise program, developed and implemented based on individual preferences and predicted maximal heart rate (220 – age; Wasserman, Hansen, Sue, Stringer, & Whipp, 2005). Exercise intensity was measured using target heart rate zones derived

from maximal heart rate and calculated heart rate reserve (HRmax – HRresting; Karvonen, Kentala, & Mustala, 1957). Home-based sessions were introduced at the first study visit as a self-managed component of the exercise protocol. Exercise prescriptions were reviewed weekly with the interventionist and adjusted according to participant feedback, and to align with the participant-set goals.

In general, the exercise protocol comprised a cardiovascular warm-up, cardiovascular training, muscular conditioning, and flexibility training. A typical warm-up activity involved walking at a slow pace on the treadmill for 5 to 10 minutes followed by walking at the weekly prescribed duration and intensity for the cardiovascular training component. Prescribed exercise duration commenced at 30 minutes for Weeks 1-2 and then systematically increased by 5 minutes each week until participants were able to exercise for 45 minutes per exercise bout during weeks 5-6. Prescribed exercise intensity ranged from 60% (weeks 1-3) to 85% (weeks 4-6) of heart rate reserve. To facilitate the monitoring of exercise intensity during facility- and home-based exercise sessions, participants were provided with a Polar RS 400 heart rate monitor for the duration of the study period. Participants proceeded to cool down by walking at a gradually slower pace to decrease their heart rate before proceeding with the strength training exercises.

Muscular strength training exercises targeted the muscle groups in the upper body, lower body, core, and back. Strength conditioning was conducted with a resistance band that was used at the facility and home-based sessions. Finally, flexibility training involved total-body stretches to improve balance and flexibility. All exercises (including stretches) were detailed in a booklet that was developed for the CaRE program to facilitate recall for home-based use. The exercise guide was provided to all participants as part of an exercise toolkit, along with a resistance band, heart rate monitor, and journal for goal setting and self-monitoring.

***Cognitive and behavioural self-management*.** In addition to following the exercise protocol, participants received evidence-based behavioural self-management principles to promote retention (Carroll, 1997) and compliance with the study and assessment protocols throughout the intervention and follow-up period (Meichenbaum & Turk, 1987). Patient empowerment was encouraged through the adoption of a collaborative care approach to all aspects of the self-managed exercise intervention (Bodenheimer, Lorig, Holman, & Grumbach, 2002). An emphasis was placed on Bandura's (1986) cognitive and behavioural recommendations for the fostering of self-efficacy to encourage adherence to the intervention. Preparation techniques were undertaken by the research staff with each patient, including a comprehensive explanation of the study procedures accompanied by a thorough informed consent process. To encourage retention, practical strategies were adopted to optimize user-friendliness, including accommodating individual schedules and programmatic needs, the use of reminders through frequent participant contact and monitoring, and accessible parking at no charge. Additionally, flexibility of programming, provision of feedback, and private supervision were offered by the study interventionist (SD); a certified exercise specialist with knowledge and specialized training in behaviour change principles.

The tenets of Social Cognitive Theory (Bandura, 1986) were systematically integrated into each session and the exercise toolkit to facilitate adoption and adherence to the CaRE intervention. In addition to physical exercise training, all participants were encouraged to engage in self-monitoring by recording daily exercise behaviour into an Exercise Journal, and to set weekly exercise goals. Refer to Table 2 for an overview of the theoretically derived intervention components implemented to foster self-efficacy for behavioural self-management.

Intervention fidelity. Strategies to enhance treatment fidelity were guided by published recommendations from the Behaviour Change

Consortium of the National Institutes of Health (Bellg et al., 2004). Strategies included the following: (a) selection of a skilled exercise and behaviour change specialist for program supervision and delivery, (b) standardized training and direct observation of interventionist, (c) consistency of interventionist for session delivery to ensure continuity of care, (d) constant communication between interventionist and investigator, (e) regular and frequent monitoring of dose through self-reported exercise self-monitoring and objective heart rate data, (f) regular monitoring of behavioural techniques (*i.e.,* homework), (g) systematic documentation of exercise dose and any modifications or deviations from the treatment protocol, (h) exit interviews to assess provider skills and participant progress, (i) assessment of processes of behavioural change through questionnaires and participant interviews, and (j) monitoring of attendance and delivery of reminders where relevant.

Data Analysis

Quantitative data. The targeted sample size of this pilot study was not powered to detect minimal clinically important difference on the primary endpoint of subjective distress. As such, the focus of the data analysis and reporting is on the feasibility outcomes and descriptive information. Descriptive statistics of the demographic and clinical characteristics of patients were summarized using means and standard deviations, or frequency and percentages, as appropriate. Scores were tabulated for each of the domains of the measures of intervention receipt and enactment (*i.e.,* exercise behaviour and self-efficacy) and descriptive statistics (*M,* SD) were calculated for each assessment timepoint.

The IES-R ratings were used to compute an overall mean score of subjective distress, and composite scores for each of the three IES-R subscales: avoidance, intrusion, and hyperarousal. The IES-R scores were summarized using descriptive statistics (*M,* SD). To inform proof of principle of this intervention, the pattern of change to subjective distress was examined longitudinally from baseline to the 1-month follow-up

assessment. Mean change with 95% confidence intervals (CI) were calculated for scores of the overall IES-R and each of its subscales. It should be noted, however, that estimation of treatment effects need be interpreted with caution due to the inherent imprecision associated with estimations derived from studies with small samples (Leon et al., 2011; Thabane et al., 2010). Descriptive statistics (*M,* SD) and mean change with 95% CI were also calculated for the body composition parameters assessed using iDXA. All quantitative data analyses were conducted using the IBM SPSS Statistics 21.0 statistical software package.

Qualitative data. A qualitative approach was employed to further explore the feasibility and acceptability of this intervention and its preliminary efficacy. The manifest content of semi-structured interviews conducted with patients who completed the intervention and members of the clinical team at the recruitment site were audio-recorded and transcribed verbatim. Transcripts were analyzed using conventional content analysis techniques as outlined by Hsieh and Shannon (2005) and further described by Elo and Kyngas (2007). Categories were first defined using a deductive conceptual framework that was developed using the semi-structured interview guides and research questions for each of the samples. Interview transcripts were read repeatedly and preliminary coding schemes were outlined for the patient and clinic personnel transcripts, respectively, using the deductive frameworks. Following this process, categories and concepts were modified and refined according to inductively identified emergent themes.

To enhance the reliability and validity of the analysis and research findings, steps were taken to address trustworthiness and credibility of the data (Graneheim & Lundman, 2004). Peer auditing procedures (Lincoln & Guba, 1985) were applied whereby another experienced qualitative researcher (BE) reviewed the two sets of transcripts and tentative coding schemes. Following a process of reflection and further discussion, codes were sorted into categories and concepts for patients

and for the clinical team and higher order emergent themes, subthemes, and illustrative quotes from the inductive analysis of the patient data were authenticated. All discrepancies were reconciled through discussion. Qualitative content analysis was facilitated by the NVivo 9 data management software (QSR Ltd., 2010).

Results

The results are summarized and reported based on Consolidated Standards of Reporting Trials (CONSORT) guidelines for non-pharmacologic treatment interventions (Boutron et al., 2008) modified for use with pilot and feasibility studies (Thabane et al., 2010).

At baseline, the age range of women who participated in the intervention was 40 to 69 years, with a mean age of 55.4 years (*SD* = 10.28). Participant sociodemographic and clinical characteristics were described in Study One (*N* = 7) and depicted in Tables 1 and 2, respectively, in Chapter Two of this dissertation. Self-reported exercise behaviour at baseline is depicted in Table 3. At baseline, participants declared themselves physically inactive and were not meeting Canadian guidelines of 150 weekly minutes of moderate or 75 weekly minutes of vigorous exercise (Canadian Society for Exercise Physiology; CSEP).

Feasibility

Patient enrolment. The flow of participants through the study is depicted in a flow diagram (see Figure 2) modified for use with pilot or feasibility studies (Thabane et al., 2010). There was a one month pause in recruitment (May to June, 2012) owing to a departmental move at the recruitment site. Screening and recruitment for the initial pilot study (January 30, 2012 - April 27, 2012; June 15, 2012 - October 11, 2012) were not systematically tracked and documented. An eligibility checklist at the recruitment site was implemented as part of the modified study protocol (February 19, 2013 - September 4, 2013), however documentation of recruitment efforts was not consistent. Potential explanations for this inconsistency were elicited in the individual

interviews with clinic personnel and are described with the qualitative responses.

Recruitment. The ratio of patients assessed for eligibility using the screening checklist to consenting patients was 15.7 % (~1 referral per month), not meeting our criterion of 40% to indicate feasibility of recruitment. In-depth interviews with clinic personnel at the recruitment site highlighted key barriers to recruitment surrounding time constraints, patient distress levels, and workflow considerations.

Qualitative responses. Feasibility of recruitment from a health services perspective was informed by a conventional content analysis of in-depth individual interviews with clinic personnel (*N* = 5) at the Breast Care Centre. The focus of the interviews was first to establish the culture of distress management in the clinic environment, and then to explore feasibility issues specific to recruitment for the CaRE study.

Distress management. The overarching theme that emerged from this analysis surrounded the discrepancy between perceived importance of psychosocial support and the organizational needs required for the successful implementation of psychosocial services within the clinic workflow at the Breast Care Centre. Although the clinic personnel who participated in the interviews (*N* = 5) described a need for improved psychosocial support for patients during diagnostic workup; time constraints, clinic workflow, personnel, and physical space emerged as significant barriers to the implementation of distress screening and management in the Breast Care Centre.

From an organizational perspective, the majority of personnel acknowledged "*good support from our leaders*" in efforts to provide psychosocial care to patients, and that distress management "*fits with the philosophy of the hospital*". Participants acknowledged the extent to which individual experiences and perceptions dictate the psychological distress associated with the diagnostic journey: "*Cancer is a huge scary word and most people have heard many horror stories, so there is lots of space for fear to exist there*". Moreover, the clinic staff described the uncertainty associated with the

diagnostic process as a source of significant distress for patients and their families that required clinical attention:

> Ongoing monitoring is important going through the pre-diagnostic as well as post-diagnostic continuum. Before people know what they're facing, this can be one of the most difficult or distressful times as that is when the imagination is free to roam. They are able to imagine and to worry about the worst case scenarios, which may or may not be what they will actually be facing. So some of that unknown that exists prior to diagnosis is I think one of the most important reasons to be screening for and making appropriate referrals for stress.

Unfortunately, the interviews illuminated a common shared belief among clinic personnel that "*supportive care always gets put on the back burner*". Systematic screening for distress was highlighted as a prominent barrier to distress management. Participants discussed the need for a screening tool to assess patient distress levels, "*so we don't miss distress signals*". Furthermore, standards of care for distress screening and management were highlighted as essential components of patient care and staff education. The current model of care for screening and management of psychosocial distress in the Breast Care Centre was largely described as "*inconsistent*". Ultimately, attention to psychosocial needs of patients varied according to personnel, whose "*personal values*" would dictate "*whether they will explore that area of care*". Recommendations to address these organizational barriers included the implementation of systematic screening for distress, education and training in psychosocial care for all clinic staff, and dedicated physical space for psychosocial consults and referrals. Providers conveyed a sense of pride related to the institutional holistic approach to patient care. Nevertheless, clinic personnel expressed concern for patients at risk of "*slipping between the cracks*"; specifically those patients undergoing a higher complexity of diagnostic workup and/or procedures generally considered as "*benign*" to clinicians (*e.g.,* nipple discharge), yet perceived by the interviewed care providers as contributing to heightened levels of stress.

Care providers in the clinic described community resources and family physicians as facilitators for distress management, in addition to internal

resources including spiritual care providers and social workers within St. Joseph's Hospital. The collaborative structure of the Breast Care Centre was further described as a facilitator for improved distress management; particularly as a function of increased awareness of the personnel roles within surgical, diagnostic imaging, and supportive care services, respectively. Participants described this organizational integration as "*comforting*" and "*convenient"* for patients, and also as a means of facilitating patient flow, "*so they don't get caught between services*".

Feasibility of recruitment. Clinic personnel at the Breast Care Centre were vital to patient recruitment efforts for this study, from the identification of eligible patients to the introduction of the study to potential participants. Overall, the clinic staff agreed that exercise is an important component in breast cancer prevention, and of psychological and physical health and wellness in general for patients undergoing diagnostic workup. The participants expressed concern, however, with the extent of healthcare provider knowledge and resources available to adequately advise patients during clinic appointments about exercise programming needs. The content analysis of the qualitative interviews revealed three predominant categories (organizational, contextual, and individual factors) informing the health services perspective of study recruitment in this setting. Categories and concepts illuminating the health services perspective of patient recruitment for this study are depicted in Table 4 along with representative quotes.

At the organizational level, the concepts related to time constraints, workload, and coordination of care emerged as critical to recruitment for this study at the Breast Care Centre. Clinic personnel described the time available for patient consults as "*limited*" and additionally that the nurse navigators are "*stretched*" to see patients as they transition between care providers at clinic appointments. Hence, time constraints often precluded the study discussion and introduction to otherwise eligible patients. Other aspects of the organizational environment that impeded recruitment efforts included inconsistencies with personnel and clinic workflow; including interferences with

record-keeping (*e.g.,* eligibility checklists) and the workload associated with recruiting for multiple research studies.

Contextual factors such as the distance of the study site to the patient's home address and other demographic and personal factors as perceived by the clinic personnel further impacted the dissemination of study information to potential participants. Although staff encouraged patients identified as "*routine exercisers*" to continue exercising, there was a general reluctance to encourage patients to adopt exercise as a new behaviour during the peri-diagnostic period. Indeed, this belief was highlighted as an important barrier to recruitment in this setting, particularly because patients engaging in routine exercise were ineligible for study participation.

Individual factors including the knowledge, attitudes, and beliefs of the healthcare providers in the clinic were highlighted as impacting upon study recruitment. Provider attitudes and beliefs about patient eligibility (*e.g.,* accessibility and resources) and characteristics (*e.g.,* patient distress and support networks) were discussed in the interviews as influential in the decision to introduce the study to patients at their clinic visits. From the interviews, it was apparent that the providers formed perceptions with respect to the extent to which patients would be receptive to employing exercise as a coping mechanism during the peri-diagnostic phase. This perceived level of receptivity played an important role in the decision to disseminate study information to potential participants. Providers emphasized the prioritization of patient medical care at clinic visits; of which the cancer diagnostic and treatment needs were of primary concern. Patient burden was further described as influential in the recruitment process. Providers detailed efforts to protect patients from being "*overwhelmed*" with additional information and decision-making associated with the awareness and opportunity for study participation.

The nurse navigators were key facilitators to study recruitment, and expressed interest in the study and in exercise for patient outcomes including general and breast health, coping, community involvement, and support. Nursing staff perceived patient distress, location, family responsibilities, and

scheduling as the primary reasons patients identified to decline information about this study. Clinic personnel offered recommendations to overcome barriers to study recruitment, including establishing community connections; encouragement from physicians at clinic visits, and approaching "*well breast patients*", *i.e.,* women six months post-treatment facing fewer decision-making and treatment demands.

Patient retention*.* All consenting patients who completed the Week 1 assessments remained in the study and completed all assessments, including the 1-month follow-up session. This 100% retention rate exceeded our feasibility criterion of 75%. Three patients withdrew from the study after completing informed consent and did not complete Week 1 assessments.

Adherence. Adherence to the facility-based exercise sessions based on attendance was 100% (6 of 6 sessions) among participants who completed the Week 1 assessments. Adherence to home-based sessions and behavioural self-management strategies was estimated through documentation by the interventionist and data extracted from the heart rate monitors. According to these data, participants engaged in approximately 50% of their prescribed home-based sessions and homework, not meeting the targeted adherence rate of 80%.

Intervention receipt and enactment. The extent to which participants reported the execution and corresponding self-efficacy in their practice of the cognitive and behavioural strategies delivered in the intervention was described using scores on the IPAQ-SF and self-efficacy scales.

Exercise behaviour change. Descriptive statistics (*M, SD*) are presented in Table 5 for each assessment of moderate, vigorous, and walking activity measured by the IPAQ-SF over the study period. In general, the frequency and duration of moderate, vigorous, and walking behaviour increased over the course of the CaRE program and was consistent at the follow-up assessment.

Exercise self-efficacy. The mean scores for self-efficacy reported for exercise and the self-regulatory strategies of self-monitoring, goal-setting, and coping with barriers declined across the assessment timepoints. Means and standard deviations are displayed in Table 6, along with internal reliability Cronbach's alphas for each of the self-efficacy domains assessed.

Qualitative responses. We acquired a deeper understanding of the process of adherence through the qualitative in-depth exit interviews conducted at the follow-up visit. The qualitative responses offer a somewhat divergent perspective from the quantitative description of the variables assessed and produce a more complete understanding of the cognitive and behavioural processes of program adherence in this setting. In contrast to the weakened self-efficacy perceptions illustrated by declines to mean scores of self-efficacy scales reported over time, the majority of participants spoke about an increased confidence in their ability to execute the exercises in the CaRE protocol, and additionally in their confidence to self-manage exercise in the face of obstacles. The transcripts were deductively analyzed using the social cognitive variables explored within the semi-structured interviews. Participants elaborated on the social cognitive constructs of efficacy expectations, and the non-efficacy constructs of behavioural repertoire, motivational factors, and outcome expectations to elucidate the process of exercise adherence in this setting. An overview of the categories, concepts, and evidentiary quotes is depicted in Table 7.

Efficacy expectations. The interviews illustrated a strengthened sense of exercise self-efficacy among participants following participation in the CaRE program. The increased efficacy perceptions were generally attributed to improved individual awareness and knowledge acquired over the course of the study period with respect to exercise and energy expenditure. Participants expressed a perceived improvement in their ability to engage in a longer duration of activity, at a stronger intensity, and with greater frequency. Moreover, participants spoke about increased

confidence to maintain the self-managed exercise program. For example, one woman stated, *"I'm feeling confident about maintaining my exercise routine".* Participants discussed a number of strategies they had acquired throughout the intervention as their individual repertoire of behavioural self-management strategies to increase their confidence for "*committing to exercise*".

Behavioural repertoire. Participants described the self-regulatory strategies delivered in the CaRE program as facilitators to maintaining a regular exercise program. "*I have a toolkit now*"; one woman expressed with regards to her perceived ability to commit to regular exercise despite obstacles such as inclement weather and a busy schedule*.* Participants discussed the awareness obtained through feedback provided by the interventionist and the heart rate monitor as integral to their successful self-regulation of exercise. Strategies that were emphasized by the majority of participants as essential components of their behavioural repertoire surrounded self-monitoring (*e.g.*, tracking and monitoring progress), setting goals (*e.g.,* recording short and long-term goals with action plans), social support (*e.g.,* family, friends, interventionist), prompts (*e.g.,* cues to action) and incentives (*e.g.,* intrinsic and extrinsic rewards associated with exercising).

Motivational factors. All participants expressed a desire to be active, however admitted to having struggled with previous efforts to maintain an active lifestyle. Participants discussed short and long term benefits of exercise that served as motivation for their participation in the CaRE program. The majority of participants identified benefits to psychological and physical health as their primary motivation for exercising. Participants also underscored the incentive of exercise as a source of control; particularly in light of the health threat associated with the peri-diagnostic phase. Few women spoke about weight loss and body image concerns as motivators for program participation.

Outcome expectations. Participants estimated that a commitment to regular exercise would produce a variety of outcomes of value. The

majority of participants described exercise as an effective means of mood regulation, weight management, and stress management via distraction and "*taking control*". Participants placed particular emphasis on the discussion of exercise outcomes for the improvement of health, wellness, and aging.

Acceptability

Qualitative patient interview data were subjected to deductive content analysis to inform the acceptability of the intervention. Overall, participants deemed the CaRE intervention acceptable. Participants discussed components of the exercise program as "*enjoyable*" and there were few barriers to participation among those who completed the study. One woman described her experience of enrolment: "*When the nurse asked if I was interested I thought sure – it would be proactive, keep me busy and would be good for me*". There was some mention of minor problems associated with parking early in the program, followed by the assertion that these issues were swiftly resolved. Ultimately, the overall impression of the facility and its access was described as favourable. One woman mentioned that she was initially "*turned off*" by the name of the program, CaRE (Control and Recharge with Exercise), because she interpreted that "*the CA is for cancer… I had a reaction to that".*

In general, participants expressed sentiments of satisfaction and enjoyment with the intervention. Specifically, the women described being highly satisfied with the knowledge and support from the interventionist, "*She was very encouraging - and correcting me when my stances weren't right or my elbows were out or, you know, getting the most out of the exercise*". Many participants required modifications to the strength training exercises to accommodate injuries or other health concerns and valued the tailoring provided by the interventionist:

> She was very good. The first few weeks we had to modify a few of the exercises because of my stroke but then the strength in my arm increased that much that I came back to her the one week and I said "I don't need the weights anymore, we're gonna do it with the bands",

> so we ended up putting the weights away and did the bands - it's amazing.

The knowledge gained from the interventionist about exercise and self-management strategies was valued by participants and they appreciated the extent of information gained over the course of the program: *"This is the first formal education I've had in doing proper exercises… the tips were most helpful; [Interventionist] was excellent".*

With respect to recommendations for program barriers and enablers, one woman expressed an interest in using the facility for additional sessions throughout the week, and another suggested that a group exercise environment had the potential to offer support in the peri-diagnostic phase. Otherwise, participants agreed that attending the EHPL for facility-based sessions one time per week was manageable and some even asserted that they enjoyed this aspect: "*Coming in once a week wasn't a problem… I liked being in the routine and sometimes I even walk here and back*".

An additional feasibility objective of this study was to determine the appropriate and relevant outcome measures to quantify the psychological response to the breast cancer diagnostic workup. Participants appreciated the objective feedback provided by the heart rate monitor and by the body composition scan (iDXA) and its associated output. The women spoke favourably about the tangible results pre- and post-intervention from the iDXA reports: "*I'd like to see the benefits and there they were, in black and white*". Descriptive statistics (*M, SD*), along with mean change and 95% CI are presented in Table 8 for the body composition parameters assessed via iDXA scans at baseline and post-intervention (Week 7). Body composition parameters were relatively stable with some improvements to fat mass and bone mineral composition from baseline to post-intervention.

Although participants did not attribute any time or emotional burden to the completion of outcome measures, some raised questions

regarding the relevance of the outcomes post-diagnosis; particularly those outcomes related to distress. For example, one woman stated, "*When my biopsy was benign the questions weren't really relating to me. It was fine at the start but once I knew my diagnosis the survey didn't pertain.*" Moreover, a few participants were concerned that their responses to PROMs were "*wrong*" or "*not what [we] were looking for*".

Primary endpoint

Descriptive statistics (*M, SD*) and internal reliability Cronbach's alphas are presented in Table 9 for each assessment of subjective distress measured by the IES-R. Patterns of change in subjective distress were examined longitudinally with mean change and 95% confidence intervals (CI; see Table 10). Overall, distress scores on the IES-R declined from baseline to the intervention midpoint assessment (Week 4), and were generally stable at each subsequent assessment point. The pattern of change to subjective distress over time is depicted in Figure 3.

Qualitative emergent theme

A deductive content analysis of the patient interviews was conducted to generate further evidence to support or refute the proof of principle of the CaRE intervention. All patients indicated that participating in the CaRE program had been helpful for stress management experienced throughout the diagnostic workup period: **"***If you are facing or think you're facing something like that, doing the exercises makes part of your brain think, 'well, I'm doing good for my body' so I may get better*". It became apparent through the content analysis that this sample of women demonstrated common characteristics that warranted further exploration. Subsequently, an inductive content analysis was conducted using the manifest and latent content of the patient interviews to contextualize the findings from this pilot study and facilitate their interpretation and discussion. This interpretive approach revealed an emergent overarching theme (Irons in the Fire) that illuminated characteristics of this particular sample that may have

contributed to their unique subjective experience of exercise behaviour change throughout the peri-diagnostic phase.

Irons in the fire. It was apparent from the patient interviews that the participants adopted an adaptive and active coping response to the health threat of a breast abnormality. The interviews revealed, however, that all of the women in this sample lived with at least one additional health concern that required significant adaptation or management in their daily lives. The comorbidities mentioned by participants comprised a range of health concerns from acute and chronic joint pain to hemiparesis and autoimmune disease. The manner in which participants described their comorbidities intimated a high degree of resilience among these women; health management was integrated into their lives and did not appear to inhibit their daily activities. One woman spoke about keeping busy in the face of stress, in order to avoid "*thinking 'poor me'. There's no time to dwell on yourself if you're busy doing things*". Furthermore, the women discussed their enjoyment of being active and "*tackling things head on*". Every participant described a measure of health management in her life that necessitated some degree of self-advocacy. One woman expressed frustration with her family physician for not respecting her wishes to have a colonoscopy until she is "*old enough*" by saying, "*You can bet every CEO in Toronto has one every year*". Another woman described the extent of vigilance she engaged in throughout her biopsy procedure:

> I was watching her and said, "So you didn't try to avoid a scar by closing it up?". She said, "Yes I did". I said, "No you didn't; you just put cream on the bandaid and the cream ended up right in the hole". She didn't put it together at all and my scar is the size of the hole and I knew she was wrong.

Moreover, it was apparent that these women had developed a behavioural repertoire for self-managing their health and had translated some of these strategies (*e.g.*, pacing, adaptation) to their new exercise routines. To illustrate, one woman described her use of pacing to sustain her walking activity:

> I have a bad knee but I can walk, just not too fast. I need to do that. My body is sabotaging me. I am really wanting to be active and I like going for a 10 kilometre walk with a friend, not quickly, but it's very enjoyable.

The extent to which these women were activated in their health management was remarkable. In particular, although the screening measures indicated that participants were not meeting the recommended guidelines for physical activity, these women made concerted efforts to be active in their daily lives despite concurrent health concerns. Participants seemed to distinguish between energy expended in an active lifestyle and that from structured exercise conducted at a fitness facility — to the extent that any exercise conducted outside of a structured program "*doesn't count*". In fact, many of these women led an active lifestyle. One woman spoke about her efforts to be active in the workplace: "*I've been doing the stairs, not elevators, for two years now*". The majority of participants spoke about engaging in housework and yardwork as activities that were "*hard" and "really make me sweat",* however did not classify these activities as a form of exercise or fitness. One participant described her exercise habits as "*undisciplined*"; based on prior attempts at exercise self-regulation at a fitness facility:

> I could have used it every day but I didn't, even though I know exercising is so good for you. The only exercise that I love is walking. I've always walked and I bike and curled and I golf. I quit curling last year because we go away too much. I like to swim – I can't swim, but I dog paddle or breast stroke around.

In describing her efforts to become "*disciplined*" about regular exercise, the same woman discussed the role of this pilot study in facilitating her self-managed exercise:

> I liked that routine. I was committed to you girls, so it would never cross my mind not to do it, so I fit it in… I would just make sure that I always did it. I liked the commitment.

Indeed, participants appeared to enjoy exercising; however they did not consider the activities they were engaging in prior to the CaRE program (*e.g*., golfing, swimming, household activities) as exercise: "*I don't go to the gym, but I love speed-walking."* In sum, the emergent theme resultant from this inductive analysis contextualizes the findings

and underscores the resilience demonstrated by the women who participated in this pilot study.

Discussion

We conducted an iterative pilot study using mixed methods to assess the feasibility and acceptability of a self-managed exercise behaviour change intervention intended to mitigate distress among women with suspected breast cancer during the peri-diagnostic phase — a time period characterized by uncertainty with extant research into interventions for distress management. Aside from the challenges with recruitment, our results support the feasibility of implementing the intervention in this setting with the homogeneous sample of women who consented to participate in the study. Self-reported exercise behaviour increased and subjective distress scores systematically decreased in this small sample (N = 7) from pre- to post-intervention. Moreover, in-depth individual interviews with study participants revealed that exercising during the peri-diagnostic phase was an effective coping resource for these women. The qualitative findings suggest that future research into behavioural interventions for women undergoing breast cancer diagnostic workup is warranted.

Originally, we initiated a randomized pilot trial to test the intervention effects on distress (primary endpoint) and the hypothesized mediating variables (task and self-regulatory self-efficacy). The feasibility of recruitment was highlighted as a barrier to patient accrual and we amended our study methodology and inclusion criteria to address this issue and emphasize feasibility of implementation as our primary study objective. In addition, we adapted a concurrent mixed methods design by including qualitative patient interviews for the ascertainment of intervention acceptability and elaboration of the patient-reported outcomes assessed using quantitative methods. Despite the amended inclusion criteria, we continued to face challenges with patient enrolment that necessitated early study termination. A subsequent qualitative study

was conducted to explore feasibility of self-managed exercise in the peri-diagnostic phase from a health services perspective using in-depth individual interviews with clinic personnel at the recruitment site. Taken together, the quantitative and qualitative findings highlight the complexity of the subjective experience of distress among women with suspected breast cancer throughout the peri-diagnostic phase from the perspective of patients and health care providers. Moreover, we gained a deeper understanding of the role of self-managed exercise in managing distress among women who elect to conquer health behavioural change in the face of significant concurrent stressors. The results for each study objective are summarized and discussed below, along with study limitations and considerations for future research into self-managed exercise interventions in the breast cancer peri-diagnostic phase.

Feasibility Objectives

Recruitment. Undoubtedly, the greatest challenge we faced with respect to study implementation was the recruitment of eligible patients, with an average of one patient recruited each month over the study period. Indeed, the targeted timeframe is one characterized by uncertainty and elevated levels of distress, with the added potential burden of decision-making associated with diagnostic workup for breast cancer. The health services perspective of the recruitment process for this study underscored the vital role of healthcare providers as the gatekeepers of knowledge in relation to study information and access. This concept of gatekeeping was captured in the qualitative interviews with clinic personnel and was predominantly reflected by provider perceptions of patient physical and psychological capabilities, resources, support networks, and level of receptivity to exercising as a mechanism for distress management in the peri-diagnostic phase. This selective process of disseminating the opportunity to participate in our pilot intervention study is reflective of broader structural factors that influence recruitment to cancer clinical trials (Howerton et al., 2007; Sateren et al.,

2002; Swanson & Bailar, 2002). Although this purposeful sampling method was unintentionally implemented, it provided us with the opportunity to illuminate the effects of the intervention on an 'ideal' population — a homogeneous group of women amongst whom this intervention should, theoretically, be effective.

Retention. The qualitative data suggest that the women who participated in the study were highly motivated to adopt exercise behaviour in the face of a health threat. Three participants withdrew from the study within days of consent, but the remaining 7 participants attended 100% of the scheduled facility-based intervention sessions and completed all assessments. The qualitative interviews and field notes documented by the interventionist illustrated that this sample was highly motivated to adopt and maintain a self-managed exercise regime and dedicated to study participation.

Adherence. Overall, participants adhered to the study protocol and self-managed exercise intervention. Adherence to exercise dose (*i.e.,* frequency, duration, and intensity of exercise) can be assessed with a variety of subjective and objective methods. Although we had hoped to ascertain an objective measure of home-based exercise dose using data from the heart rate monitors, technological issues led to inconsistencies with recording the heart rate data and usage of the monitoring device. Based on facility-based attendance records (objective) and documentation from the interventionist (subjective), participants demonstrated an acceptable level of adherence to the intervention which exceeded our criterion for feasibility.

Exercise behaviour change. The qualitative and quantitative methods provided complementary findings that demonstrated increased exercise behaviour reported by the participants. Improvements were documented by the interventionist throughout the program and participants remarked upon their abilities to engage in an increased dose

of exercise with a decreased need for modifications and programmatic tailoring.

Exercise self-efficacy. The processes underlying adherence to the intervention were elucidated through in-depth individual interviews with the study participants. The qualitative responses revealed that the behavioural repertoire with which these women self-regulated their exercise programs developed over the course of the study period, and was aligned with the theoretical underpinnings of our behaviour change intervention. Furthermore, their efficacy beliefs for performing these self-regulatory strategies (*i.e.,* self-regulatory efficacy) and their perceived physical capabilities of executing the exercises (*i.e.,* task efficacy) were strengthened by the intervention. Participants valued the outcomes they anticipated from exercising, which were predominantly motivated by the desire to achieve and maintain physical and psychological health and wellness.

Divergence. The quantitative responses to the self-efficacy scales are inconsistent with the qualitative findings; providing a different perspective of the adherence process that reflected decreases to self-efficacy across the intervention assessments. In principle, divergent findings in mixed methods studies can be explained by weaknesses in methodological or theoretical assumptions and present the opportunity for new theoretical insights (Tashakkori & Teddlie, 2003). Indeed, the trajectory of self-efficacy beliefs evident in the quantitative data may be misleading due to the inherent variability in responses with small sample sizes that would not be noticeable with an adequately powered sample. Moreover, the divergence between these data allows us to reflect on the content validity of the self-efficacy scales used in this study. Given the insight into the unique characteristics of the respondents from the qualitative emergent theme, *Irons in the Fire*, it is possible that this sample of women are resilient to the typical barriers that prevent individuals from self-regulating a routine exercise program. In light of the

comorbid health challenges self-managed by these women, one could speculate that an ancillary health threat may not test their resolve. Furthermore, it is possible that quantitative measurement of self-efficacy in the peri-diagnostic phase may require a higher level of specificity reflective of the diagnostic workup and treatment-related decision making associated with this time period. This is consistent with guidelines for self-efficacy theory (Bandura, 1977; Bandura, 1986) and the measurement of exercise self-efficacy put forth by McAuley and Mihalko (1998) that underscore the importance of behavioural, contextual, and situational specificity when assessing the construct of self-efficacy. To illustrate, rather than posing questions with the assumption that the obstacles of self-regulation in this setting will involve scheduling, planning, and barriers that influence the general population; items that reflect stressors specific to the peri-diagnostic phase may be more relevant (*e.g.*, "I am confident I can exercise when I have an MRI scheduled the next day").

Data collection. Participants expressed enthusiasm about the opportunity to obtain objective results pertaining to their body composition from the iDXA scans conducted pre- and post-intervention. Although the women did not report feeling burdened by completing the outcome assessments, some did question the appropriateness of the measures and the relevance with respect to timing of administration. The qualitative and quantitative methods generally served to provide complementary results; however, the methods revealed divergent findings with regards to the self-efficacy perceptions in this sample. Without detailed accounts of the subjective experience of the peri-diagnostic journey through the qualitative interviews, it would have been impossible to gain an understanding of the theoretical processes of adherence in this study. Indeed, feedback from participants about the appropriateness of the outcome measures suggest that the examination of change to the patient-reported outcomes across the peri-diagnostic trajectory may be

misleading; underscoring the complexity and dynamic nature of this timeframe. For example, at Week 7, women may be experiencing distress about impending biopsy results, waiting for a surgical consult, or making treatment decisions related to a benign breast condition. At the same timepoint, other women may be experiencing little to no distress after being informed of the results of diagnostic workup or having completed treatment consults and generally feeling prepared. One possible remedy for this confound of measurement within the diagnostic interval may be to tailor the instructions for each scale to the diagnostic journey of the respondent.

Acceptability

Overall, the participants were satisfied with the intervention, and it was deemed acceptable according to our deductive content analysis of the qualitative exit interviews. Although minimal changes were achieved to body composition parameters over the brief intervention, the iDXA feedback was important to this sample. One potential explanation as to why participants appreciated the objective feedback to this extent is illustrated by the qualitative themes which revealed that these women desired to obtain concrete outcomes from any activity in which they were engaged. We received some helpful feedback for modification and refinement of the intervention programming and delivery and have incorporated these comments into our recommendations for future research into breast cancer peri-diagnostic exercise interventions.

Proof of Principle

Subjective distress. Our examination of subjective distress using the IES-R revealed a systematic decrease in distress scores across the study period. As previously mentioned, these data are intended for descriptive purposes only, as the small size of the sample precludes the calculation of inferential statistics. Furthermore, it is important that we interpret these descriptive data with caution as any causal inferences would be misleading. It is possible that the decrease in distress scores is

related to the exercise intervention. An alternative explanation is that distress decreased over the diagnostic interval because the uncertainty was alleviated as results from diagnostic workup became available. Other studies have demonstrated post-biopsy decreases to anxiety (Liao et al., 2008) and further declines to distress upon notification of results including malignancies and false positive findings (Lampic, Thurfjell, Bergh, & Sjoden, 2001). The adaptive coping profile of this particular sample of woman offers yet another alternative explanation for the attenuated distress over the 11 week assessment period. Is it possible that the coping behaviours exhibited by these women can explain their attenuated distress? The qualitative data suggest that exercising was perceived as an effective means of coping with the distress of the peri-diagnostic phase in this sample. Further research is required to test the hypothesis that distress in the peri-diagnostic phase is impacted by exercise, and if the anticipated change to distress is mediated by the theoretical construct of self-efficacy. A full-scale randomized controlled trial would best elucidate the effectiveness of the intervention on distress and allow for the assessment of self-efficacy in the mediational relationship between the intervention and distress as the primary endpoint.

Limitations

It is important to acknowledge that there were limitations to this pilot study beyond the aforementioned challenges with recruitment. Perhaps the most striking limitation is the small sample size. In addition, the feasibility results we have generated do not necessarily generalize beyond our inclusion and exclusion criteria (Leon et al., 2011). Furthermore, in the tradition of qualitative research design, the qualitative strand of this mixed method study is not intended to be representative of women who were not interviewed as a part of this project (Maxwell, 1992). Consequently, the contribution of our findings is restrictive as it

only represents the experiences of this unique sample in the settings of the recruitment site and research facility.

Peri-Diagnostic Intervention Considerations and Recommendations

The mixed methods findings from this pilot study have provided us with comprehensive insight into the challenges associated with the implementation of a self-managed exercise intervention for women with suspected breast cancer in the peri-diagnostic phase. Taken together, the strengths and weaknesses of this study present us with the unique opportunity to inform future research into interventions in this specific setting. First and foremost, our findings suggest that it is possible for women with suspected breast cancer to adopt and adhere to self-managed exercise during the peri-diagnostic phase. Our sample demonstrated a level of resilience that may not be typical of women undergoing diagnostic workup for breast abnormalities. In this particular sample, however, exercise was described as a desirable coping resource when presented with a significant stressor.

Our small sample size precludes us from drawing inferential conclusions based on the outcome measures in this study. However, the feedback from participants with regards to the PROMs and the complementary qualitative findings offer some direction for future study design and assessment timelines. The divergence of our self-efficacy findings suggest that there may be a component of this theoretical construct that was not captured through our quantitative assessment that could potentially be improved upon with items that assess exercise task and self-regulatory efficacy with greater contextual specificity reflective of the peri-diagnostic phase. The process of item generation and refinement should ideally be informed by the target population, *i.e*., women undergoing breast diagnostic work-up, in order to enhance the content validity of this measure.

Translating this intervention into clinical practice will present an entirely new set of challenges, as reflected in our difficulties with

recruitment. Our qualitative interviews with clinic personnel highlighted a number of institutional barriers to implementation that would require support from a structural level (*e.g.,* resources, training, space). In order to address this research question in the clinical setting of a comprehensive breast centre, the structural barriers cannot be ignored. The experienced and anticipated difficulties in implementation of a randomized controlled trial of exercise for distress management in the Breast Care Centre lend itself well to an Integrated Knowledge Translation approach (Lomas, 1993). The collaborative and participatory orientation of this research methodology engages stakeholders (*e.g.,* decision-makers, patients, clinicians) throughout the entire research process, from the inception of the research questions to study implementation, data collection, interpretation, and dissemination activities (Cargo & Mercer, 2008; Tetroe, 2007). The partnership between researchers and stakeholders enhances the likelihood of uptake and relevance to the end users (*i.e.,* the Breast Care Centre; Tetroe, 2007) and may be a promising avenue to further explore the potential for exercise interventions throughout the peri-diagnostic phase for women with suspected breast cancer.

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Figure 1

Flow Diagram of Initial Study Protocol and Eligibility Criteria

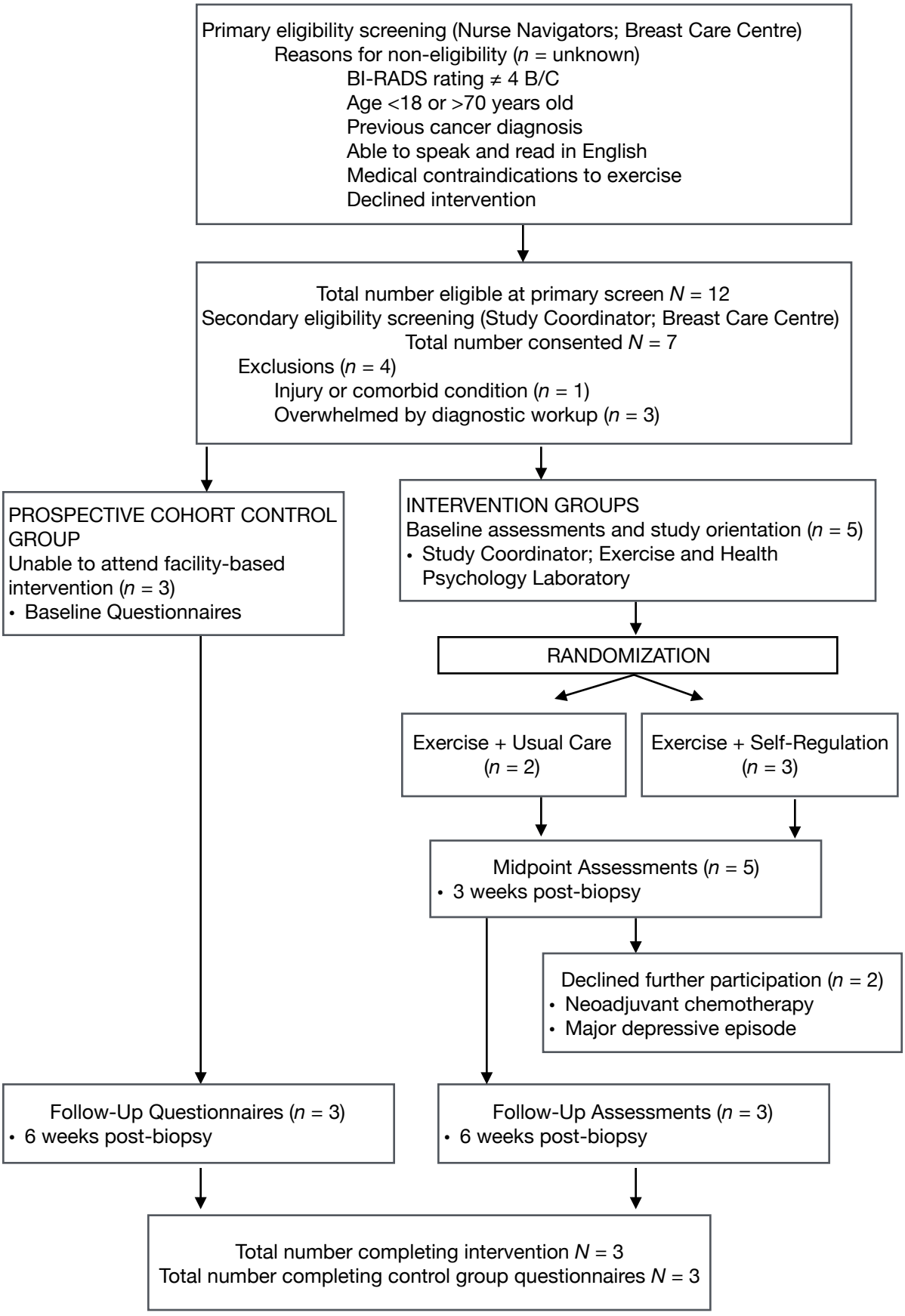

Figure 2

Flow of Participants Through the Feasibility Study

(Adjusted Protocol and Inclusion Criteria)

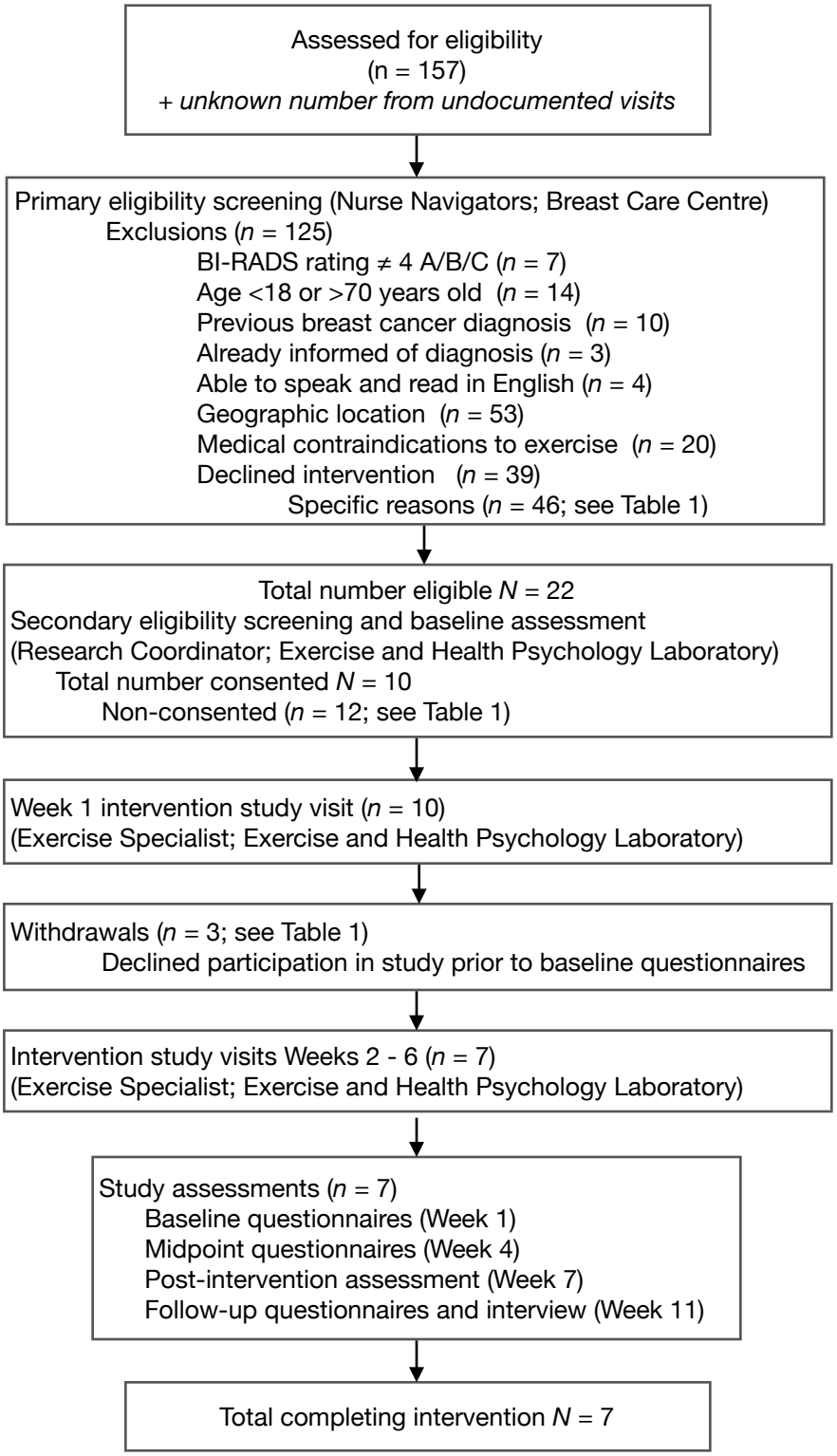

Table 1
Reported Reasons for Declining Participation in the Feasibility Study

Reasons for declining participation	n	%
Primary eligibility screening		
Not interested in exercise intervention	13	33.3
Overwhelmed with diagnostic phase	3	7.7
Caregiver responsibilities	4	10.3
Comorbid conditions or injury	4	10.3
Time commitment	15	38.5
Exercises on routine basis	7	17.9
Secondary eligibility screening		
Time commitment	4	18.2
Exercising at moderate intensity > 150 mins/wk	2	9.1
Already informed of diagnosis	6	27.3
Overwhelmed with Dx Process	4	18.2
Medical contraindications to exercise	1	4.5
Unreachable by phone	1	4.5
Prior to Week 1 assessments (post-consent)		
Distress necessitated referral	1	10
Informed of benign diagnosis	1	10
Time commitment	1	10

Table 2

Theoretical Underpinnings of CaRE Intervention

Source of self-efficacy	Mode of induction	Program component(s)
Performance	Awareness Feedback Self-monitoring Goal setting	Heart rate monitor Intensity Scale Exercise Journal Exercise Goals
Vicarious learning	Model and demonstration Skill acquisition Support	Interventionist Exercise Guide
Verbal persuasion	Encouragement Suggestion Instruction Support	Interventionist Exercise Guide
Physiological arousal	Awareness Feedback Cognitive reframing	Interventionist Heart rate monitor
Affective arousal	Awareness Feedback Cognitive reframing	Interventionist

Table 3

Exercise Behaviour at Baseline (N = 7)

Typical Leisure Time Exercise (LTE)	*M* (SD)	*n*	%
Weekly LTE > 30 minutes			
Strenuous exercise sessions	0.14 (0.38)		
Moderate exercise sessions	0.71 (1.25)		
Mild exercise sessions	2.00 (2.45)		
Frequency of exercise to “work up a sweat”			
Often		1	14.29
Sometimes		1	14.29
Never/rarely		5	71.43

Table 4

Qualitative Health Services Perspective and Representative Quotes

Category and concept	Representative Quote
Organizational factors	
Time constraints	As nurses in the diagnostic imaging side, we are always limited by appointment time for mammos, ultrasounds, etcetera. When we see a patient, we don't know what level of anxiety or stress they are at until they are in our office.
Coordination of care	There are barriers in terms of staff too, like trying to coordinate it with the other caregivers that are needing to do their part and their work too.
Workload	Sometimes we had other studies to recruit for. It's a lot of work.
Contextual factors	
Geography	Location was a big barrier - where they lived in relation to where the study was taking place. People come here from one or two hours away.
Comorbidities	Another issue is health issues, physical limitations, although I believe personally that you can write up programs for those people – you just have to tailor the program like they do for osteoporosis or whatever.
Individual factors	
Level of receptivity	I don't think it's for everyone… there are a few people who would grasp onto something more concrete like that.
Prioritization	At the time of their surgical or DI [Diagnostic Imaging] appointment, the priority is to get the woman looked after, and get her cancer looked after.
Patient burden	How do we get that information across to the patient who is experiencing distress already, and trying to learn about their diagnosis and treatment plans, without giving them information overload. People under distress don't process information the same way.
Recommendations	If you really want long-lasting effects, it makes more sense to me to start the programs at the end of treatment, when they become a well breast-patient. Patients would then have the time to comprehend the program and be in the right frame of reference.

Table 5

Weekly Physical Activity Over Time (N = 7)

	Mean	SD	Range
Vigorous activity (days)			
Week 1	1.00	1.41	0.00 - 3.00
Week 4	2.57	1.13	1.00 - 4.00
Week 7	2.71	1.60	0.00 - 4.00
Week 11	3.29	2.29	0.00 - 7.00
Vigorous activity (minutes)			
Week 1	12.14	18.22	0.00 - 45.00
Week 4	64.64	38.22	37.50 - 120.00
Week 7	72.14	77.02	0.00 - 240.00
Week 11	47.14	21.96	0.00 - 120.00
Moderate activity (days)			
Week 1	1.00	1.15	0.00 - 3.00
Week 4	2.29	1.38	0.00 - 4.00
Week 7	2.14	1.57	0.00 - 5.00
Week 11	2.71	3.09	0.00 - 7.00
Moderate activity (minutes)			
Week 1	17.86	25.14	0.00 - 60.00
Week 4	13.57	17.01	0.00 - 35.00
Week 7	27.86	21.57	0.00 - 70.00
Week 11	38.57	44.88	0.00 - 120.00
Walking activity (days)			
Week 1	3.71	2.21	0.00 - 7.00
Week 4	3.29	2.21	1.00 - 7.00
Week 7	2.86	2.73	0.00 - 7.00
Week 11	2.37	2.37	1.00 - 7.00
Walking activity (minutes)			
Week 1	60.00	80.98	0.00 - 240.00
Week 4	47.14	12.86	30.00 - 60.00
Week 7	35.71	21.49	0.00 - 60.00
Week 11	37.14	25.14	0.00 - 60.00

Table 6

Exercise and Self-Regulatory Self-Efficacy Over Time (N = 7)

	Mean	SD	Range	α
Exercise				
Week 1	70.83	22.66	40-100	0.97
Week 4	79.40	14.57	61-96	0.93
Week 7	71.14	23.90	36-100	0.95
Week 11	64.78	30.55	24-100	0.96
Self-monitoring				
Week 1	88.57	12.90	70-100	0.95
Week 4	82.50	19.51	50-100	0.95
Week 7	74.29	30.34	20-100	0.99
Week 11	54.05	25.52	23-100	0.90
Goal setting				
Week 1	70.23	20.21	45-100	0.85
Week 4	64.74	15.82	45-100	0.85
Week 7	64.39	18.28	82-100	0.87
Week 11	53.44	23.87	29-98	0.93
Coping with barriers				
Week 1	62.48	11.76	42-76	0.75
Week 4	60.23	18.35	34-87	0.95
Week 7	62.66	18.56	35-90	0.96
Week 11	59.21	25.10	16-88	0.96

Note. Potential range 0 - 100; 100.00 = strongest efficacy beliefs

Table 7

Representative Quotes for the Patient Perspective of the Adherence Process

Category and concept	Representative Quotes
Efficacy expectations	I think I can do a whole lot more cardio than I thought I could because I used to think 'Oh, that's enough' but I really see that I'm not going to turn into a puddle if I work a little harder.
Exercise dose	
Exercise self-regulation	I like speedwalking but I avoid it in the Fall because of the weather. [Interventionist] said to look for an alternative if the weather is bad, or take an umbrella, or walk at the mall. I may even get a treadmill in our basement for the Winter.
Behavioural repertoire	
Self-monitoring	My doctor tells me to pace myself because of the stroke but I want to push myself now… I'm not worried. I know when I'm done.
Awareness	
Journaling	I used the journal and noted the changes.. 2 or 3 times a week, but eventually daily. It was a great thing.
Setting goals	I'd sit down and say 'ok' and write my goals for the week. I started with after dinner every night, and now weekends, and in the mornings. When I was on holidays, I still went every morning… It was kind of nice that i set those goals for myself.
Prompts	Prepping with the gym bag by the door and knowing when to do it – those things helped me fit it in.
Rewards	My reward is just seeing the difference and enjoying the alone time.
Social support	My husband is very supportive. His exercise comes first so I could learn from him.
Exercise outcome expectations	
Stress management	When I know there's something I haven't control over, or I'm stressed with, I do find exercise good because you just think your way through it and the endorphins help.
Health management	The [comorbidity] put me back quite a bit…I kept having flare-ups but walking helped. I really enjoyed walking.
Affect regulation	My mood is better after the walk than if I've had a lazy day at home.
Motivational factors	I'm finding the older I'm getting I want to be fit to be healthy and that I think is a big motivator. There are so many people my age that are ill – it's enough info to know better. I just want to feel good about myself and stay healthy and fit so i can enjoy my later years with my kids and my grandchildren.

Table 8

Body Composition at Baseline and Post-Intervention (N = 7)

	Week 1	Week 7		
	Mean (*SD*)	Mean (*SD*)	*M* Change	95% CI
Height (cm)	159.96 (8.82)	-	-	-
Weight (kg)	64.10 (11.02)	63.61 (10.03)	0.49	[-0.89, 1.86]
Body mass	63.84 (10.66)	63.17 (9.78)	0.67	[-0.68, 2.03]
Total body fat (kg)	37.49 (12.40)	35.17 (6.75)	2.31	[-3.38, 8.01]
Android fat (kg)	35.49 (7.13)	36.84 (11.14)	-1.36	[-5.43, 2.72]
Fat mass (kg)	23.16 (8.05)	22.66 (7.42)	0.50	[-0.25, 1.24]
Lean mass (kg)	38.56 (3.86)	38.41 (3.68)	0.15	[-0.57, 0.88]
Fat free mass (kg)	40.65 (4.17)	40.51 (4.01)	0.14	[-0.62, 0.89]
Visceral fat mass (kg)	0.63 (0.51)	0.62 (0.49)	0.01	[-0.03, 0.06]
Bone mineral composition				
Bone mineral density (g/cm	1.04 (0.12)	1.05 (0.12)	-0.003	[-0.001, 0.004]

Table 9

Subjective Distress Over Time (N = 7)

	Mean	SD	Range	α
Intrusion				
Week 1	1.14	0.75	0.25 - 2.13	.85
Week 4	0.41	0.51	0.00 - 1.13	.80
Week 7	0.45	0.70	0.00 - 1.75	.94
Week 11	0.40	0.54	0.00 - 1.56	.89
Avoidance				
Week 1	1.71	1.04	0.38 - 3.63	.90
Week 4	0.63	0.60	0.00 - 1.63	.88
Week 7	0.91	1.29	0.00 - 3.50	.98
Week 11	0.82	1.13	0.00 - 3.13	.96
Hyperarousal				
Week 1	1.07	0.80	0.00 - 2.50	.80
Week 4	0.33	0.44	0.00 - 1.00	.60
Week 7	0.17	0.32	0.00 - 0.83	.59
Week 11	0.21	0.43	0.00 - 1.17	.89
Impact of Event				
Week 1	1.33	0.81	0.23 - 2.77	.95
Week 4	0.48	0.51	0.00 - 1.29	.90
Week 7	0.54	0.80	0.00 - 2.14	.97
Week 11	0.50	0.72	0.00 - 2.02	.97

Note. Potential range 0 - 4; 4.00 = most severe stress response to breast abnormality

Table 10

Subjective Distress Mean Change Over Time (N = 7)

	Mean Change	95% CI
Intrusion		
Week 1 to Week 11	-0.74	[-1.36, -0.12]
Avoidance		
Week 1 to Week 11	-0.89	[-1.54, -0.24]
Hyperarousal		
Week 1 to Week 11	-0.86	[-1.36, -0.36]
Impact of Event		
Week 1 to Week 11	-0.83	[-1.33, -0.33]

Figure 3. Subjective Distress Over Time

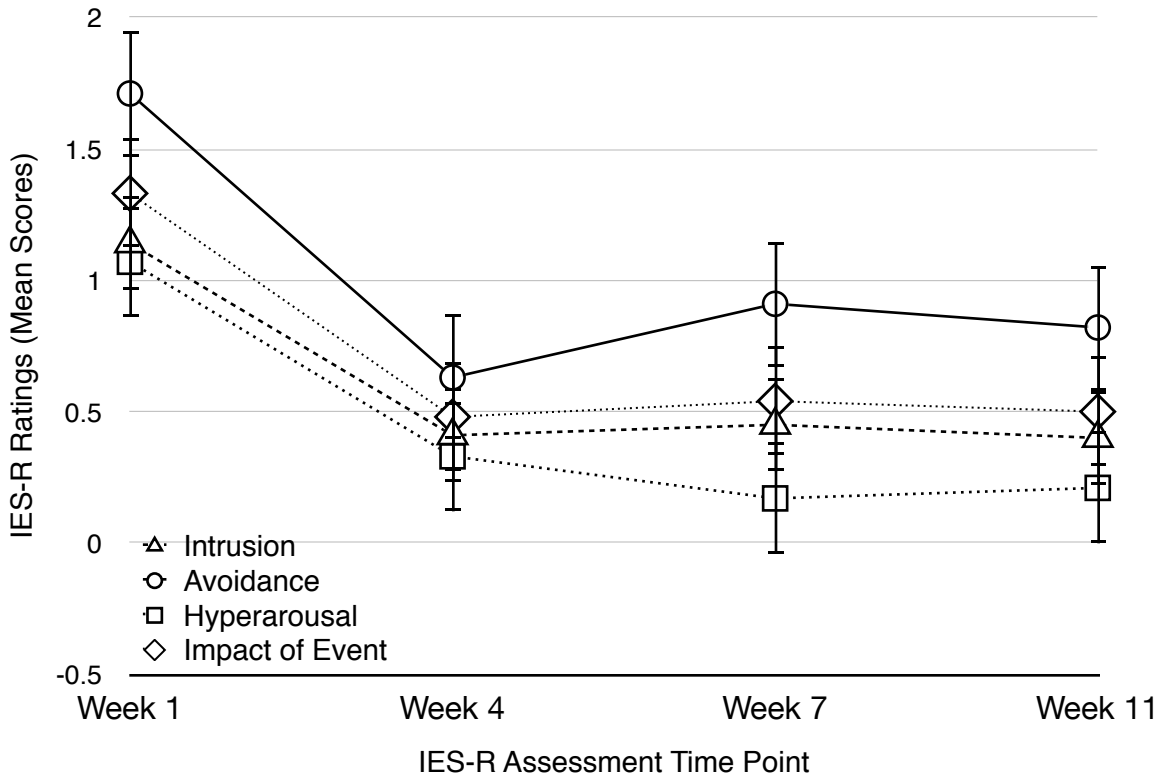

Figure 3. Mean subjective distress scores from beginning of intervention to 1-month post-intervention assessment. Error bars represent standard errors. Week 1 = Week 1 of intervention; Week 4 = Intervention midpoint; Week 7 = Post-intervention; Week 11 = 1-month post-intervention follow-up.

Chapter 4
General Discussion

Significance of the Problem

Breast cancer is the most commonly detected neoplasm and the second leading cause of cancer-related mortality among women in Canada (Canadian Cancer Society's Advisory Committee on Cancer Statistics, 2013). In addition to advanced biomedical treatments, population-based screening programs and diagnostic services have accounted for declines to breast cancer mortality in Canada over the past 30 years (CCS, 2013). Despite the emphasis on early detection to control cancer burden, population-based screening efforts remain contentious due to the risks of overdetection and overtreatment (Independent UK Panel on Breast Cancer Screening, 2012; Welch & Passow, 2014), and the associated psychological distress among women with false positive findings (Gotzsche & Jorgensen, 2013). Among women with a suspicious breast lesion, the peri-diagnostic phase is undoubtedly accompanied by some degree of uncertainty, which has been linked with negative emotional consequences (Lebel, Jakubovits, et al., 2003; Stanton & Snider, 1993). Although the majority of women undergoing diagnostic workup will receive a benign diagnosis, the threat of malignancy can induce elevated levels of distress (Andrykowski et al., 2002). Moreover, it has been speculated that this potential psychosocial morbidity can impact on treatment outcomes and future screening behaviours regardless of the diagnosis (Flory & Lang, 2011).

Perceptions of Peri-Diagnostic Distress

The extant evidence of psychosocial distress among women in the breast cancer peri-diagnostic phase is plagued with conceptual and methodological inconsistencies, and lacks theoretical foundation; impeding the development of sustainable evidence-based interventions. There has been a dearth of intervention studies targeting distress across the diagnostic trajectory (Montgomery & McCrone, 2010), however our understanding of this

multidimensional construct and its role in the peri-diagnostic phase is yet to be elucidated. Moreover, our understanding of diagnostic distress is focused on studies conducted when open surgical techniques for biopsies were the standard of care (*e.g.,* Fentiman, 1988). Although there has been a prolonged adoption rate, clinical recommendations for breast biopsy procedures advocate less invasive techniques associated with fewer risks (Agency for Healthcare Research and Quality, 2009). Despite the variations in procedural risks and complications, individual beliefs about the diagnostic workup are unpredictable and not always informed by factual information (Diefenbach & Leventhal, 1996). To address the important role of perceptions in behavioural self-management (Diefenbach, 2008), we used concurrent mixed methods to explore the illness representations ascribed to the peri-diagnostic phase and the associated coping responses among women with suspected breast cancer. Our sample comprised seven women who elected to adopt a complex health behaviour change while faced with a significant stressor. An inductive content analysis of the qualitative interviews conducted with these women allows us to characterize this sample as resilient and highly motivated. A salient theme that emerged from the qualitative data collected for this dissertation indicated that “taking control” was of particular import to these women. They approached the notification of their breast abnormality as a teachable moment to instigate the adoption and regulation of routine exercise. The qualitative interviews highlighted the extent of concurrent health stressors endured by every participant in our sample, and emphasized their activation in managing their health and wellbeing despite these comorbities. It was evident from the qualitative analysis that these women engaged in active cognitive and behavioural coping strategies to appraise and respond to the stressors presented to them throughout the peri-diagnostic phase.

Active Coping with Self-Managed Exercise

Regular physical activity has been highlighted as an important preventive strategy for cancer control (American Institute for Cancer Research, 2010). The

psychosocial and physiological benefits of exercise as a behavioural intervention to peri-operative breast cancer survivors are well documented (Duijts, Faber, Oldenburg, van Beurden, & Aaronson, 2011), however, our understanding of exercise adoption and adherence in the screening and pre-treatment stages of the breast cancer continuum is limited (Courneya & Friedenreich, 2007). Adherence to regular exercise requires self-regulation (Bandura, 2005), and the practice and implementation of evidence-based cognitive and behavioural strategies to support and sustain behaviour change (Courneya, 2010; Meichenbaum & Turk, 1987).

To our knowledge, the impact of exercise training on subjective peri-diagnostic distress among women with suspicious breast lesions has not yet been examined. We elected to explore the practicality and process of a self-managed exercise intervention for women undergoing diagnostic workup at a comprehensive breast care centre. Given the novelty of the methodological and theoretical approach employed in the CaRE intervention, a pilot study was deemed necessary to inform feasibility and optimization prior to hypothesis testing in a full-scale RCT (Craig et al., 2008; Leon, Davis, & Kraemer, 2011; Thabane et al., 2010). We employed mixed methods to provide the opportunity for greater diversity of perspectives, and because the constructs under study could not be understood using quantitative or qualitative methodology alone (Tashakkori & Teddlie, 2003). This combined approach of pilot study and mixed methodology provided a deeper understanding of the feasibility of implementation of exercise behaviour change in the peri-diagnostic period for women with suspected breast cancer.

Feasibility of Peri-Diagnostic Exercise Behaviour Change

The greatest challenge facing the feasibility of this dissertation research was undoubtedly encountered in the recruitment process. Our first attempt at a randomized phase II trial of the intervention was not a fruitful endeavour. Despite modifications to inclusion criteria to broaden our pool of eligible patients, low accrual rates necessitated early termination of the non-randomized pilot study.

We gained insight into the health services perspective of the barriers to recruitment through in-depth individual interviews with clinic personnel. These qualitative interviews underscored the discrepancy at the institutional level between the value placed on supportive care services and the resources required for their successful implementation. Patient accrual was restricted by institutional factors at the clinic site, predominantly related to time constraints and limited resources. The nurse navigators played a crucial role in screening patients for eligibility and disseminating the study information to eligible patients. An inductive content analysis revealed that individual factors such as perceived patient burden initiated a gatekeeping process whereby a purposeful sampling method was unintentionally implemented, but allowed us the opportunity to illuminate the feasibility and impact of the intervention on a highly motivated and resilient sample.

The small sample size precludes us from drawing inferential conclusions from the quantitative data; however, we were able to gain insight into the feasibility of administration of the patient-reported outcome measures, and of the iDXA scan for the assessment of body composition parameters. In general, the intervention and its related assessments were feasible to implement and deemed acceptable by the participants. Participants were adherent to the intervention protocol and completed all assessments. The exercise dose reported by participants increased from pre- to post-intervention, along with the behavioural repertoire for self-managing regular exercise. We can infer from the qualitative data that these changes are likely sustainable in light of the strong sense of personal control exemplified by these women. The qualitative interviews allowed us to further elucidate the adherence process, and offered support for the integration of Bandura's (1986) Social Cognitive Theory as the theoretical underpinning for the exercise behaviour change intervention.

Methodological Implications

The breast cancer peri-diagnostic phase comprises a number of distinct milestones, including but not limited to: abnormal mammogram; notification of

biopsy; biopsy procedure and/or other diagnostic workup; notification of results; diagnosis, and treatment decision-making (Cancer Care Ontario, 2013). The extant evidence informing our current understanding of distress among women with suspicious breast abnormalities has been derived from studies assessing distress at any one, or a combination of, these timepoints. Thus, our understanding of peri-diagnostic distress may be isolated to certain milestones along this trajectory, but we cannot discern a distress trajectory given the current state of the science.

This dissertation offers important methodological contributions to the literature. We developed and implemented a novel exercise behaviour change intervention that successfully integrated its theoretical underpinnings into the delivery with minimal materials that did not require resource intensive efforts at psychoeducation. The mixed methodological approach allowed us to elucidate the processes of the intervention and its impact. Our qualitative data revealed that participants were satisfied with the intervention and described notable accomplishments in their adoption and adherence to exercise. These data were corroborated by the documentation of the interventionist and attendance records. Furthermore, participants described the impact of the intervention as powerful for their psychological and physical wellbeing.

Measurement. The divergence of our qualitative and quantitative self-efficacy findings highlighted important measurement issues related to content validity. In order to discern the unique challenges of regulating routine exercise in the peri-diagnostic phase, the quantitative measurement of self-efficacy may require contextual specificity reflective of the diagnostic workup and treatment-related decision making associated with this time period.

The concern of content validity also extends to the measurement of psychological distress. The breast cancer peri-diagnostic phase is unpredictable, and it is impossible to pre-determine individual trajectories. In our research, we used a situation-specific measure of distress, the Impact of Event Scale-Revised (Weiss & Marmar, 1996), to isolate the distress specific to the breast abnormality. We acknowledge that there are limitations to this approach.

In particular, the specificity with which we measured distress (*i.e.,* notification of the breast abnormality) was not appropriate for all assessment timepoints as each participant had a unique trajectory. Situation-specific assessments are challenging to administer in a time-dependent context.

The measurement of distress as a multidimensional construct presents additional challenges. In research conducted in the peri-diagnostic phase, distress has traditionally been operationalized as a unidimensional construct, predominantly manifested as anxiety or depression (Montgomery & McCrone, 2010). The multifactorial nature of distress presents significant challenges for quantitative assessment. In order to measure longitudinal peri-diagnostic distress, the stressor would need to be tailored to each individual trajectory. This is not a practical approach to plotting changes to subjective distress over time. In order to ascertain the clinically meaningful outcomes associated with the peri-diagnostic phase, we need to better understand the interference and psychological morbidity associated with the individual and collective milestones of the trajectory. Systematic examination of the predictive value of the variables that comprise the multifactorial construct is warranted. Prospective qualitative interviews at each of the milestones would be a valuable future contribution through the exploration of meanings women with suspected breast cancer ascribe to their journey as they navigate the peri-diagnostic phase.

Theoretical Implications

For this dissertation research, we relied on theoretical frameworks to systematically elucidate the feelings and experiences using deductive and inductive qualitative content analysis. We explored illness perceptions and coping responses in the peri-diagnostic phase using the common sense model of illness (Diefenbach & Leventhal, 1996) and a revised approach to Lazarus and Folkman's (1984) cognitive conceptualization of stress and coping (Carver, Scheier, & Weintraub, 1989). The exercise behaviour change intervention was guided by the tenets of Bandura's (1986) Social Cognitive Theory. Together, these theories illuminated the experiences and feelings of these women and the

impact of exercise in their peri-diagnostic journey. None of these theories alone captured the interplay of individual and contextual factors that influenced the formation of their perceptions and actions. In this sample of highly motivated and resilient women, few of the dimensions of the Common Sense Model were salient to their interpretation of the peri-diagnostic experience and formation of coping responses. In fact, the only constructs that were elaborated upon in the qualitative interviews were associated with emotional consequences and control: *i.e.,* worry, consequences, personal control.

In their revised conceptualization of coping and stress, Carver et al. (1989) acknowledge the potential for overlap when categorizing coping responses as problem-focused *versus* emotion-focused or adaptive *versus* problematic. Our data certainly corroborate the challenges with this distinction. To illustrate, many participants described exercise as an appealing "distraction" from the stress of the peri-diagnostic period, however they collectively exhibited an extraordinarily active coping repertoire that exemplified a desire for goal-oriented actions. Exercise was an appropriate addition because the outcomes were deemed "concrete" and "tangible".

Conclusions

Self-managed exercise has the potential to alleviate the stress of the peri-diagnostic phase among women with suspected breast cancer. This mixed methods pilot study demonstrated that a tailored and supervised self-managed behaviour change exercise intervention exhibited positive impacts upon highly motivated and resilient women. We have illuminated unique characteristics of our homogenous sample, and several barriers related to implementation. Recruitment challenges highlight a need for participatory research efforts to overcome the structural and organizational barriers to patient accrual, while informing implementation for a more sustainable intervention in this setting. Further research is warranted to ascertain clinically meaningful outcomes in the breast cancer peri-diagnostic phase; to test the mediational influence of the

social cognitive variables on behaviour change, and to identify other subgroups that may benefit from peri-diagnostic exercise interventions.

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Appendix A

Semi-Structured Interview Guide - Participants

Qualitative Interview Guide: CaRE Patient Interviews

The following discussion topics and prompts are meant to serve only as a guide, and the course of inquiry/exploration will adapt according to the meaning and comfort level of the participant. The emerging themes from the ongoing analysis will further inform the open dialogue as we explore the following topics.

1. Describe the experience and feelings you encountered after being informed of your breast abnormality.
- Perceptions: previous experiences with breast cancer, expectations, coherence, causal inferences, controllability
- Distress over time: waiting, diagnosis, next steps
- Nature of distress: anticipatory, uncertainty, fear, sadness

2. Describe your strategies for coping with the distress you experienced (where relevant) while waiting for test results.
- Coping strategies
- Support network
- Exercise and being involved in the CaRE Trial
    - Expectations about exercise
    - Confidence in committing to exercise
    - Feelings about capabilities
    - Understanding of personal motivation to exercise
    - Preferences for exercise within/outside of the CaRE trial?

3. What are some important elements for you to engage in exercise on your own and manage this into your everyday life?
- Specific strategies employed (e.g., self-monitoring, goal-setting, rewards, prompts)
- Which strategies do you use?
    - Helpful? Burdensome?

4. To what extent do you believe you will use exercise to cope with other stressors going forward?
- Other health threats
- Daily challenges
- Work/life stress
    - Expectations of exercise for stress management
    - Other purposes of exercise during stressful times
    - Other ways you expect you will cope with stress
        - Directly engaging in coping (e.g., activation)
        - Indirectly (e.g., distraction)
        - Avoidance

5. Describe thoughts, actions, environmental factors that you perceive will enable your exercising goals when faced with a health threat and those factors that will prevent you from exercising.
    - Access to facilities, support
    - Anxiety (too anxious or facilitative anxiety)
    - Enjoyment (or lack thereof)
    - Motivation (short-term and long-term motivators)
    - Confidence and sense of control

6. Based on your journey, think about what it takes to self-manage and commit to regular exercise and what (if anything) could have made it easier for you at the Breast Care Centre. After receiving news of your breast abnormality, is there a 'toolkit' that could have worked for you?
    - Need for tailoring/personalized approach
    - Individual or group setting
    - Home-based vs. Center-based
        - Thoughts about attending exercise sessions at the hospital?
        - Wellness in the context of an "illness environment"?
    - Computer-based (comfort level with Internet, computer accessibility)
    - Supplementary materials: video, pamphlets
        - Distance? Need for interactive touch to understand exercises?

Appendix B

Qualitative Categorization Matrix

Categorization Matrix

EF	Experiences and feelings
EFP	Experiences and feelings - Perceptions *Perceptions*: previous experiences with breast cancer, expectations, coherence, causal inferences, controllability
EFT	Experiences and feelings - Time *Distress over time*: waiting, diagnosis, next steps
EFD	Experiences and feelings - Distress *Nature of distress*: anticipatory, uncertainty, fear, sadness
CS	Coping strategies
CSS	Coping strategies – Support network
CSE	Coping strategies – Exercise and being involved in the CaRE Study
CSEE	Expectations about exercise
CSEC	Confidence in committing to exercise
CSEF	Feelings about capabilities
CSEM	Understanding of personal motivation to exercise
CSEP	Exercise preferences — within/outside of the CaRE trial
SM	Self-management
SMS	Specific strategies employed (e.g., self-monitoring, goal-setting, rewards, prompts)
CSEF	Exercise as a coping strategy in the future
CSEH	Other health threats
CSED	Daily challenges
CSEW	Work/life stress
EEB	Exercise enablers/barriers
EEBA	Access to facilities, support
EEBAx	Anxiety (too anxious or facilitative anxiety)
EEBE	Enjoyment (or lack thereof)
EEBM	Motivation (short-term and long-term motivators)
EEBC	Confidence and sense of control
BCP	Breast Centre Programming
BCPP	Personalization: Need for tailoring/personalized approach
BCPN	Numbers: Individual or group setting
BCPE	Environment: Home-based or centre-based
BCPM	Materials: Supplementary materials; toolkit

Appendix C

Notices of Ethical Approval

Research Western

Use of Human Participants - Ethics Approval Notice

Principal Investigator: Prof. Harry Prapavessis
Review Number: 17796
Review Level: Full Board
Approved Local Adult Participants: 75
Approved Local Minor Participants: 0
Protocol Title: Effectiveness of Physical Exercise and Psychological Skills Training in Managing Anxiety and Depression Following Diagnostic Stage Core Breast Biopsy
Department & Institution: Kinesiology,University of Western Ontario
Sponsor:
Ethics Approval Date: June 03, 2011 **Expiry Date:** March 31, 2012

Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
UWO Protocol		
Letter of Information & Consent	(Including instruments noted in section 8.1)	2011/04/12

This is to notify you that the University of Western Ontario Health Sciences Research Ethics Board (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced study on the approval date noted above. The membership of this HSREB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request form.

Member of the HSREB that are named as investigators in research studies, or declare a conflict of interest, do not participate in discussions related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The UWO HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

[redacted]
Signature

Ethics Officer to Contact for Further Information

Janice Sutherland (jsutherl@uwo.ca)	Grace Kelly (grace.kelly@uwo.ca)	Shantel Walcott (swalcot@uwo.ca)

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Western

Use of Human Participants - Ethics Approval Notice

Research Ethics

Re-issue
Jan 23/13.

[redacted]

Principal Investigator: Prof. Harry Prapavessis
File Number:100047
Review Level: Delegated
Approved Local Adult Participants:75
Approved Local Minor Participants:0
Protocol Title: Effectiveness of Physical Exercise and Psychological Skills Training in Managing Anxiety and Depression Following Diagnostic Stage Core Breast Biopsy
Department & Institution: Health Sciences\Kinesiology,Western University
Sponsor:
Ethics Approval Date: January 21, 2013 **Expiry Date:**June 30, 2013
Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Revised Study End Date	Extended to June 1 2013	

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request Form.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

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Signature

Ethics Officer to Contact for Further Information

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Use of Human Participants - Ethics Approval Notice

Principal Investigator: Prof. Harry Prapavessis
File Number:100047
Review Level: Delegated
Approved Local Adult Participants:30
Approved Local Minor Participants:0
Protocol Title: Phase 2 Pilot Study of CaRE (Control and Recharge with Exercise): Managing Distress After Your Breast Biopsy
Department & Institution: Health Sciences\Kinesiology,Western University
Sponsor:
Ethics Approval Date: February 11, 2013 **Expiry Date:**September 30, 2013
Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Revised Western University Protocol	Revised study title, study objectives, methodology, study design, sample size, study analysis procedures and study instruments	
Other	Brief Illness Perceptions Questionnaire (Brief IPQ),International Physical Activity Questionnaire (IPAQ), Breast Care Status, Impact of Event Scale-Revised and Brief COPE These	
Letter of Information & Consent		2013/01/31
Change in Study Personnel	S. deJesus and A. Fong have been added to the study team.	
Revised Study End Date	Increased to Sept. 30 2013.	
Other	The number of local participants has changed to 30.	

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request Form.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

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Use of Human Participants - Ethics Approval Notice

Principal Investigator: Prof. Harry Prapavessis
File Number:100047
Review Level: Delegated
Approved Local Adult Participants:30
Approved Local Minor Participants:0
Protocol Title: Phase 2 Pilot Study of CaRE (Control and Recharge with Exercise): Managing Distress After Your Breast Biopsy
Department & Institution: Health Sciences\Kinesiology,Western University
Sponsor:
Ethics Approval Date: June 24, 2013 **Expiry Date:**September 30, 2013
Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Revised Western University Protocol	Revised objectives, methods and confidentiality procedures	
Revised Letter of Information & Consent		2013/06/20
Instruments	Qualitative Interview Guide	

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request Form.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

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Use of Human Participants - Initial Ethics Approval Notice

Principal Investigator: Prof. Harry Prapavessis
File Number:104356
Review Level: Delegated
Protocol Title: Distress During Diagnostic Workup for Women with Suspected Breast Cancer: A Health Services Perspective
Department & Institution: Health Sciences\Kinesiology,Western University
Sponsor:
Ethics Approval Date: October 11, 2013 **Expiry Date:**November 30, 2013
Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Instruments	Interview Guide for Qualitative Description	2013/09/10
Western University Protocol		2013/09/10
Recruitment Items	Email Recruitment Script - Revised	2013/10/01
Letter of Information	Letter of Information revised (telephone interviews): v2	2013/10/01
Letter of Information & Consent	Letter of Information & Consent for face-to-face interviews	2013/10/01
Other	telephone script (prior to interview guide)	2013/10/01

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request Form.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

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Use of Human Participants - Revision Ethics Approval Notice

Principal Investigator: Prof. Harry Prapavessis
File Number:104356
Review Level: Delegated
Protocol Title: Distress During Diagnostic Workup for Women with Suspected Breast Cancer: A Health Services Perspective
Department & Institution: Health Sciences\Kinesiology,Western University
Sponsor:
Ethics Approval Date: November 08, 2013 **Expiry Date:**December 31, 2013
Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Revised Study End Date		

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request Form.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.

[redacted]
Signature

Ethics Officer to Contact for Further Information

Erika Basile (ebasile@uwo.ca)	Grace Kelly (grace.kelly@uwo.ca)	Vikki Tran (vikki.tran@uwo.ca)

This is an official document. Please retain the original in your files.

Appendix D

Interventionist Documentation

ID _____ Research Associate: _____

Week 1	**HR Zone:**	**Intensity Zone:**
Exercise frequency, intensity, duration:		
Strengths:		
Challenges:		
Modifications recommended:		
Notes:		
Week 2	**HR Zone:**	**Intensity Zone:**
Exercise frequency, intensity, duration:		
Strengths:		
Challenges:		
Modifications recommended:		
Notes:		
Week 3	**HR Zone:**	**Intensity Zone:**
Exercise frequency, intensity, duration:		
Strengths:		

ID _____ Research Associate: _____

Challenges:		
Modifications recommended:		
Notes:		
Week 4	**HR Zone:**	**Intensity Zone:**
Exercise frequency, intensity, duration:		
Strengths:		
Challenges:		
Modifications recommended:		
Notes:		
Week 5	**HR Zone:**	**Intensity Zone:**
Exercise frequency, intensity, duration:		
Strengths:		
Challenges:		
Modifications recommended:		
Notes:		

ID _____ Research Associate: _____

Week 6	**HR Zone:**	**Intensity Zone:**
Number of sessions (minutes):		
Strengths:		
Challenges:		
Modifications recommended:		
Notes: **SCHEDULE FOLLOW-UP APPOINTMENT - 1 WEEK LATER**		
Week 7 - Follow-up assessment at EHPL: (DXA scan, T3 Survey, return heart rate monitor)		
Week 11 (1 month later): 1-month Follow-up: Survey Packet; DXA results; opportunity for exercise recommendations.		

Exercise intensity target zone: (% intensity x HRR) + RHR

<u>General Guidelines:</u>
Week 1: 50 - 55% of HRR
Week 2: 55 - 60% of HRR
Week 3: 60 - 65% of HRR
Week 4: 65 - 70% of HRR
Week 5: 65 - 75% of HRR
Week 6: 65 - 75% of HRR

Heart Rate Maximum (220 - AGE) = _____

Heart Rate Reserve ($HR_{max} – HR_{resting}$) = _____

Appendix E

Semi-Structured Interview Guide - Clinic Personnel

Breast Care Centre Clinic Staff: Semi-Structured Interview Guide

I. Introduction

Thank you for agreeing to talk with me, and for your participation in this project. I anticipate the interview will last about 20 to 30 minutes, and appreciate any information you can provide. This interview is important, as it will serve to augment our understanding of the need for and barriers to the implementation of distress screening and management for women with suspected breast cancer.

Your answers are completely confidential and will be coded and recorded without names. Although your responses will only be reported as part of a group, it is helpful for accuracy to record your responses. Is it okay if I tape record this interview?

I understand that you are a _____ {occupation} at St. Joseph's Health Care in London, Ontario. Please consider this your particular area of expertise and consider the culture of St. Joe's and your role when answering the interview questions.

II. Interview Questions

The National Comprehensive Cancer Network (NCCN) defines distress in cancer as a "multifactorial unpleasant emotional experience of a psychological (cognitive, behavioral, emotional), social, and/or spiritual nature that may interfere with the ability to cope effectively with cancer, its physical symptoms and its treatment. Distress extends along a continuum, ranging from common normal feelings of vulnerability, sadness, and fears to problems that can become disabling, such as depression, anxiety, panic, social isolation, and existential and spiritual crisis."

Pan-Canadian guidelines for screening and treatment of distress apply to all stages of the cancer continuum and highlight the diagnostic waiting period as a time of heightened risk for distress. However, we do not have a clear understanding of relevant and appropriate distress management prior to a cancer diagnosis. Standards of care for distress management include monitoring and treatment of distress as part of routine clinical practice. It is recommended that each practice setting should have

agreed protocols for distress management that include expectations or standards for referral, including processes for referral to psychosocial specialists.

1. a) Do you agree with this recommendation?

   Yes.....*(Ask b.)*

   No.....*(Ask c.)*

   a) Explain why you feel this is important?
   (Clarification: In what ways can distress screening and management benefit patient care?)

   b) Explain why you do not agree?

2. Can you think about some of the things currently in place at SJHC and within your particular role at the Breast Care Centre (if applicable) that would **enable** screening and management of distress during diagnostic workup and prior to diagnosis and/or treatment?

   (*Probes: structural, economic, patient, culture*)

3. Can you think about some of the things currently at SJHC and within your role at the Breast Care Centre (if applicable) that would be **barriers** to screening and management of distress for patients prior to diagnosis and/or treatment?

   (*Probes: structural, economic, patient, culture*)

If yes….
Could you suggest some possible approaches or solutions that may help to overcome these barriers?

4. Do you have any concerns about the recommendation of screening and management of distress in the current workflow at the Breast Care Centre?

If yes…are there solutions that you might suggest to adequately address these concerns?

Probe: role of family physician and community programs

5. Evidence-based guidelines for distress management include treatment by primary team if the resources are available or referral if necessary. Modes of intervention or treatment may be pharmacologic or psychotherapeutic in nature. In some instances, behavioural interventions that have the potential to be self-managed, such as exercise, are recommended for implementation. Exercise has numerous well-documented physical and emotional health benefits for people of all ages and recent emphasis has been placed on the benefits to individuals at all stages of the cancer continuum.

   a) Do you think that clinicians at the Breast Care Centre are generally in support of women engaging in exercise during diagnostic workup and, if relevant, prior to treatment for benign or malignant breast disease?

   b) Yes….why?

   c) No…..why not?

6. Can you think about some of the things currently in place at SJHC and within your particular role at the Breast Care Centre (if applicable) that would **enable** the uptake or adherence to regular exercise during diagnostic workup and prior to diagnosis and/or treatment?

   (*Probes: structural, economic, patient, culture; Bust a Move program*)

7. Can you think about some of the things currently at SJHC and within your role at the Breast Care Centre (if applicable) that would be

barriers to encouraging patients to exercise prior to diagnosis and/or treatment?

(*Probes: structural, economic, patient, culture*)

If yes….
Could you suggest some possible approaches or solutions that may help to overcome these barriers?

8. Do you have any concerns about the recommendation of exercise in the current workflow at the Breast Care Centre?

(Probes: workflow; education; information)

If yes…are there solutions that you might suggest to adequately address these concerns?

(Probes: patient education; materials/toolkits; role of outside specialists/ community resources or programming)

III. Closing Comments

Thank you for sharing your perspectives and your expertise with me today. Do you have any additional comments you would like to add?

If not…

Thank you for taking time out of your important work to participate in this study.

Appendix F

Timeline of Assessments

CaRE Pilot Study: Timeline of Assessments

MEASUREMENT OUTCOMES		Baseline (T0)	Week 1	INTERVENTION SESSIONS 1-3	Midpoint (Week 4)	INTERVENTION SESSIONS 4-6	Post-Intervention (Week 7)	POST-INTERVENTION	1 Month Follow-Up (Week 11)
FEASIBILITY	• Recruitment • Enrolment • Retention • Adherence	• Recruitment rates • % Eligible consented	<u>Weekly</u> • Retention rates • Treatment logs (Interventionist)				• Program adherence		• Retention rates • Interviews
ACCEPTABILITY	• Intervention acceptability								Interviews
PRIMARY	• Subjective distress		Impact of Event Scale-Revised (IES-R)		IES-R		IES-R		IES-R
SECONDARY	• Body composition	Dual energy absorptiometry scan (iDXA)					iDXA		
	Exercise volume		International Physical Activity Questionnaire (IPAQ)		IPAQ		IPAQ		IPAQ
	Coping responses		Brief COPE Inventory		Brief COPE		Brief COPE		• Brief COPE • Interviews
	Illness representations		Brief Illness Perceptions Questionnaire (IPQ)		Brief IPQ		Brief IPQ		• Brief IPQ • Interviews
SOCIAL COGNITIVE VARIABLES (SCT)	• Self-efficacy • Outcome expectations • Behavioural repertoire		Purpose-built SCT scales		SCT Scales		SCT Scales		• SCT Scales • Interviews

Appendix G

CaRE Eligibility Checklist - Breast Care Centre

Primary Eligibility Screening (Breast Care Centre)

Eligibility Screening Checklist	
	BI-RADS 4 A/B/C
	Completed core biopsy within past week
	Age 18 - 69
	No previous diagnosis of breast cancer
	Able to speak and read in English
	Live close to London (able to commit to 1 session per week at private fitness facility in London for next 6 weeks)
	Medically able to participate in exercise

Is the patient **interested in learning more** about the CaRE trial?

____**Yes**

____**No**

Is the patient willing to receive a **phone call** from Amy Kossert (Research Coordinator) to discuss the research study?

____**Yes**

____**No**

First name: _____

Phone number: _____

Note:

Appendix H

CaRE Baseline Data Collection Log

ID:_____

CaRE Pilot Trial – Baseline Assessment

Date: _____

Date of Birth (mm/dd/yyyy): _____/_____/_____ Age: _____

Height (cm): _____ Weight (kg): _____

BODY COMPOSITION:

Mass (kg):	Fat mass (kg):	Visceral Fat (g/cm^3):
Lean mass (kg):	Total Body Fat (%):	Bone Mineral Content (kg):
Fat free mass (kg):	Region Android Fat (%):	

HEART RATE:

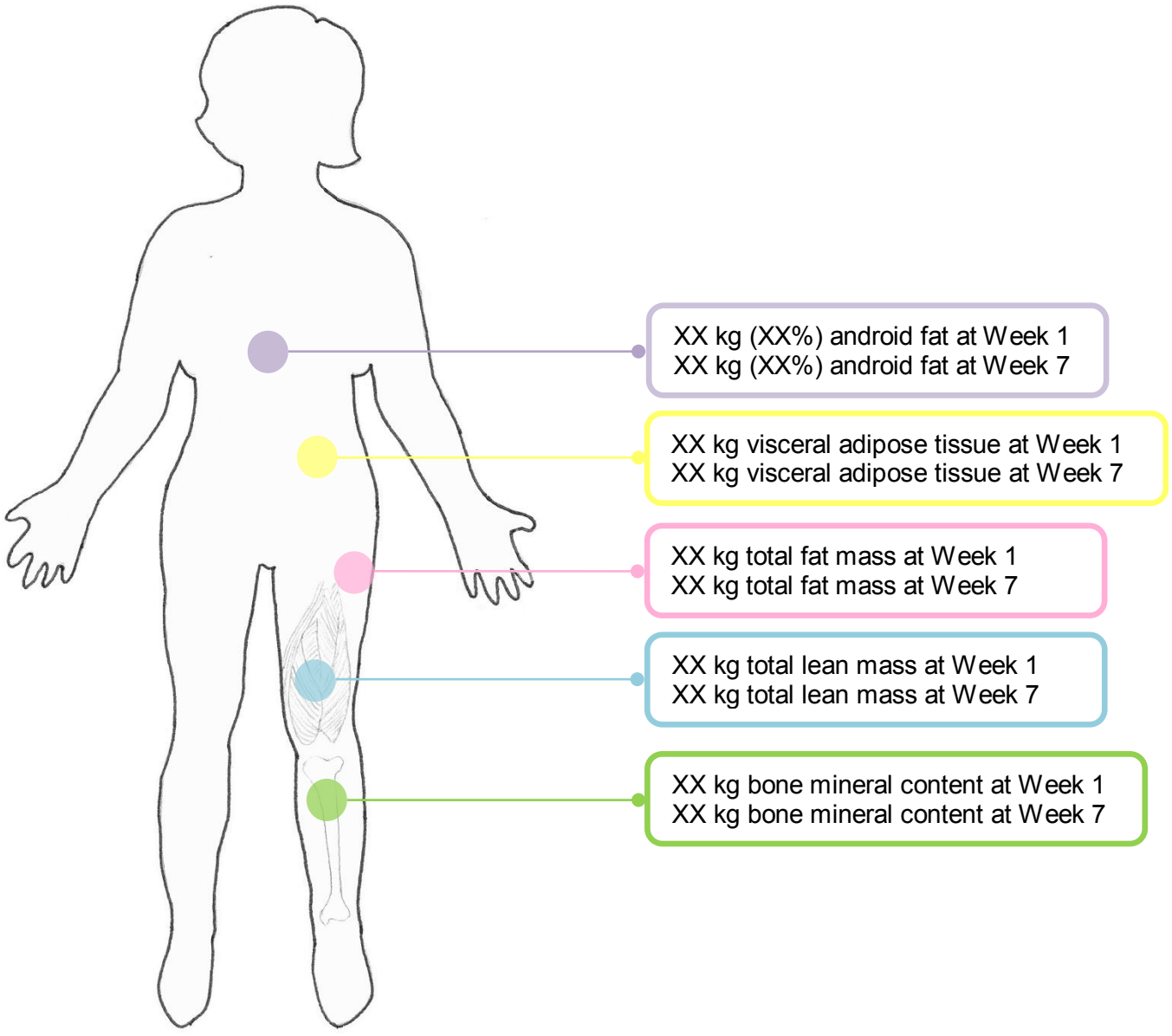
Resting Heart Rate:	
Heart Rate Monitor Serial Number (watch):	
Serial Number (band):	

Appendix I

Body Composition Infographic

Control and Recharge with Exercise: CaRE Pilot Trial

Thank you for your effort and participation in the CaRE Trial! Here is an opportunity to learn more about the changes in your body composition over the six-week exercise program. Feel free to contact Amy or Stefanie with any questions or concerns. We wish you the very best and thank you for your dedication.



Contact Information

Phone: [redacted]

E-mail: Amy Kossert: [redacted] Stefanie De Jesus: [redacted]

CaRE Pilot Trial: Quick Facts on Body Composition

- **Android fat** is found in the trunk and upper body (around your waist). Fat distribution to this area of the body is associated with increased risk of diabetes and heart disease. The lower the percentage of android fat, the healthier the individual. Continue doing the plank exercises or engage in other core exercises to decrease fat in this region.

- **Visceral adipose tissue** is found deep within the abdominal cavity, where it pads the spaces between our abdominal organs. Visceral fat is associated with increased health risks, and the best way to fight it is through a healthy diet and regular exercise.

- **Fat mass** is the number of grams of fat in the body. Fat mass can be decreased with cardiovascular exercise. Canadians are recommended to engage in at least 150 minutes of activity per week. Continue your program of brisk walking and/or cycling to maintain or decrease your fat mass. Gradually increase the amount you exercise or the intensity of your exercise sessions to burn more fat.

- **Fat free mass** is the weight of your body without measuring your fat (includes muscle, bone, organs, water).

- **Lean muscle mass** is the weight of your muscle tissue. This is healthy weight that increases with exercise. Continue your strength training by using your resistance band or lifting weights to build muscle mass.

- **Bone Mineral Content** (BMC) measures the weight of your bones. You want your bones to weigh as much as possible. Increase your bone weight through exercise and proper nutrition.

Contact Information
Phone: [redacted]
E-mail: Amy [redacted] Stefanie: [redacted]

Appendix J

CaRE Survey Packet (Sample) — Time 1

ID #

Date: _____

Phase 2 Pilot Study of CaRE (Control and Recharge with Exercise):

Managing Distress After Your Breast Biopsy

BASELINE SURVEY PACKET

Please answer the questions in this survey as honestly and accurately as possible. There are no right or wrong answers. Please read the instructions carefully and complete questions on both sides of each page.

If you have any questions, please feel free to contact **Amy Kossert** at any time.

Voicemail: [redacted] *or* Mobile: [redacted]

E-mail: [redacted]

Your answers are important.

Thank you for participating.

ID #

Section 1. General Information

Please answer the following questions to the best of your ability. Be as truthful as possible.

1. What is your age? _____

2. What is your ethnicity? (Please circle all options that apply):

Caucasian	Asian/Asian Canadian
African/African Canadian	Aboriginal Peoples of Canada
Hispanic/Hispanic Canadian	Other: _____

3. What is your marital status?

   ____ Married/common law partner

   ____ Single/divorced/separated/widowed

4. What is the highest level of schooling that you have achieved?

   ____ Graduate or Professional degree

   ____ Bachelor's degree

   ____ College or technical training

   ____ Secondary school diploma

   ____ Some secondary school

5. What is your current employment status?

____ Employed full time	____ Stay at home mother
____ Employed part time	____ Student
____ Unemployed	____ Retired
____ Self-employed	

ID #

6. What is your best estimate of your total household income, before taxes and deductions, in the past 12 months?

   ____ Less than $50,000

   ____ $50,000 to less than $60,000

   ____ $60,000 to less than $80,000

   ____ $80,000 to less than $100,000

   ____ $100,000 or more

   ____ I prefer not to answer

Section 2.

Below is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each difficulty has been for you **during the past 7 days with respect to your breast abnormality**. How much were you distressed or bothered by these difficulties?

		Not at all	A little bit	Moderately	Quite a bit	Extremely
1	Any reminder brought back feelings about it.					
2	I had trouble staying asleep.					
3	Other things kept making me think about it.					
4	I felt irritable and angry.					
5	I avoided letting myself get upset when I thought about it or was reminded of it.					

ID #

		Not at all	A little bit	Moderately	Quite a bit	Extremely
6	I thought about it when I didn't mean to.					
7	I felt as if it hadn't happened or wasn't real.					
8	I stayed away from reminders about it.					
9	Pictures about it popped into my mind.					
10	I was jumpy and easily startled.					
11	I tried not to think about it.					
12	I was aware that I still had a lot of feelings about it, but I didn't deal with them.					
13	My feelings about it were kind of numb.					
14	I found myself acting or feeling like I was back at that time.					
15	I had trouble falling asleep.					
16	I had waves of strong feelings about it.					
17	I tried to remove it from my memory.					

ID #

		Not at all	A little bit	Moderately	Quite a bit	Extremely
18	I had trouble concentrating.					
19	Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart.					
20	I had dreams about it.					
21	I felt watchful and on guard.					
22	I tried not to talk about it.					

ID #

Section 3.

These items deal with ways you've been coping with the stress in your life **related to your breast abnormality**. There are many ways to try to deal with problems. These items ask what you've been doing to cope with this one. Obviously, different people deal with things in different ways, but I'm interested in how you've tried to deal with it. Each item says something about a particular way of coping. I want to know to what extent you've been doing what the item says. How much or how frequently. Don't answer on the basis of whether it seems to be working or not - just whether or not you're doing it. Circle the most accurate response. Try to rate each item separately in your mind from the others. Make your answers as true FOR YOU as you can.

		I haven't been doing this at all	I have been doing this a little bit	I've been doing this a medium amount	I've been doing this a lot
1	I've been turning to work or other activities to take my mind off things.	1	2	3	4
2	I've been concentrating my efforts on doing something about the situation I'm in.	1	2	3	4
3	I've been saying to myself "this isn't real".	1	2	3	4
4	I've been using alcohol or other drugs to make myself feel better.	1	2	3	4

ID #

		I haven't been doing this at all	I have been doing this a little bit	I've been doing this a medium amount	I've been doing this a lot
5	I've been getting emotional support from others.	1	2	3	4
6	I've been giving up trying to deal with it.	1	2	3	4
7	I've been taking action to try to make the situation better.	1	2	3	4
8	I've been refusing to believe that it has happened.	1	2	3	4
9	I've been saying things to let my unpleasant feelings escape.	1	2	3	4
10	I've been getting help and advice from other people.	1	2	3	4
11	I've been using alcohol or other drugs to help me get through it.	1	2	3	4
12	I've been trying to see it in a different light, to make it seem more positive.	1	2	3	4
13	I've been criticizing myself.	1	2	3	4

ID #

		I haven't been doing this at all	I have been doing this a little bit	I've been doing this a medium amount	I've been doing this a lot
14	I've been trying to come up with a strategy about what to do.	1	2	3	4
15	I've been getting comfort and understanding from someone.	1	2	3	4
16	I've been giving up the attempt to cope.	1	2	3	4
17	I've been looking for something good in what is happening.	1	2	3	4
18	I've been making jokes about it.	1	2	3	4
19	I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.	1	2	3	4
20	I've been accepting the reality of the fact that it has happened.	1	2	3	4
21	I've been expressing my negative feelings.	1	2	3	4

ID #

		I haven't been doing this at all	I have been doing this a little bit	I've been doing this a medium amount	I've been doing this a lot
22	I've been trying to find comfort in my religion or spiritual beliefs.	1	2	3	4
23	I've been trying to get advice or help from other people about what to do.	1	2	3	4
24	I've been learning to live with it.	1	2	3	4
25	I've been thinking hard about what steps to take.	1	2	3	4
26	I've been blaming myself for things that happened.	1	2	3	4
27	I've been praying or meditating.	1	2	3	4
28	I've been making fun of the situation.	1	2	3	4

Section 4.

For the following questions, please circle the number that best corresponds to **your views about your breast abnormality**:

1. How much does your breast abnormality affect your life?										
0	1	2	3	4	5	6	7	8	9	10
No affect at all										Severely affects my life

ID #

2. How long do you think your breast abnormality will continue?										
0	1	2	3	4	5	6	7	8	9	10
A very short time										Forever

3. How much control do you feel you have over your breast abnormality?										
0	1	2	3	4	5	6	7	8	9	10
Absolutely no control										Extreme amount of control

4. How much do you think your treatment can help your breast abnormality?										
0	1	2	3	4	5	6	7	8	9	10
Not at all										Extremely helpful

5. How much do you think you experience symptoms from your breast abnormality?										
0	1	2	3	4	5	6	7	8	9	10
No symptoms at all										Many severe symptoms

6. How concerned are you with your breast abnormality?										
0	1	2	3	4	5	6	7	8	9	10
Not at all concerned										Extremely concerned

ID #

7. How well do you feel you understand your breast abnormality?										
0	1	2	3	4	5	6	7	8	9	10
Don't understand at all										Understand very clearly

8. How much does your breast abnormality affect you emotionally? (e.g., does it make you angry, scared, upset or depressed?)										
0	1	2	3	4	5	6	7	8	9	10
Not at all affected emotionally										Extremely affected emotionally

Please list in rank-order the three most important factors that you believed caused <u>your breast abnormality</u>:

The most important causes for me:

1. _____

2. _____

3. _____

Section 5.

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **<u>last 7 days</u>**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise, or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you

breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like running, heavy lifting, digging, aerobics, or fast bicycling?

   _____ **days per week**

   ☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____ **hours per day**

   _____ **minutes per day**

   ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

   _____ **days per week**

   ☐ No moderate physical activities → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

   _____ **hours per day**

   _____ **minutes per day**

ID #

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

Section 6.

There are specific strategies that people use to manage a regular exercise routine. Of the techniques listed below, please indicate the ones with which you are familiar by marking an X in the last column.

	Technique	X
1	Imagining yourself exercising	
2	Keeping track of your exercise sessions	
3	Punishing yourself for not exercising	
4	Using cues to action to prompt yourself to exercise	
5	Associating with exercisers	
6	Setting exercise goals	

ID #

	Technique	X
7	Rewarding yourself or using incentives	
8	Buying new workout gear	
9	Joining a gym	
10	Understanding your motivation to exercise	
11	Overcoming obstacles that interfere with your exercise goals	

Please list below up to 5 additional techniques that you believe people may use to manage regular exercise.

Technique 1. _____

Technique 2. _____

Technique 3. _____

Technique 4. _____

Technique 5. _____

If you did not list any additional techniques, please skip ahead to Section 7.

ID #

A. In the table below, please rate your degree of confidence to perform the techniques you listed above by recording a number from 0 to 100 using the scale given below:

0	10	20	30	40	50	60	70	80	90	100
Cannot do at all					Moderately can do					Highly certain can do

B. In the table below, please rate each technique listed according to how effective you think it is in helping people to manage regular exercise by recording a number from 1 to 9 using the scale below:

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

Please rate each technique you listed above in terms of your confidence to perform it and how effective you think it is in helping to manage regular exercise.

Technique	Confidence (0 - 100%)	Effectiveness (1 - 9)
Technique # 1		
Technique # 2		
Technique # 3		
Technique # 4		
Technique # 5		

ID #

Section 7.

Please rate how certain you are that you can exercise at the levels described below.

At a **moderate intensity**, you are working hard enough to raise your heart rate and break a sweat. One way to tell if you're working at a moderate intensity is if you can still talk but you can't sing the words to a song.

Examples of MODERATE exercise include brisk walking/jogging, swimming, and cycling.

Rate your degree of confidence by recording a number from 0 to 100 using the scale given below:

0	10	20	30	40	50	60	70	80	90	100
Cannot do at all					Moderately can do				Highly certain can do	

I am confident that I can complete…	**Confidence (0 - 100%)**
15 minutes of exercise at a **moderate** intensity **3 times** per week	
20 minutes of exercise at a **moderate** intensity **3 times** per week	
25 minutes of exercise at a **moderate** intensity **3 times** per week	
30 minutes of exercise at a **moderate** intensity **3 times** per week	
35 minutes of exercise at a **moderate** intensity **3 times** per week	
40 minutes of exercise at a **moderate** intensity **3 times** per week	

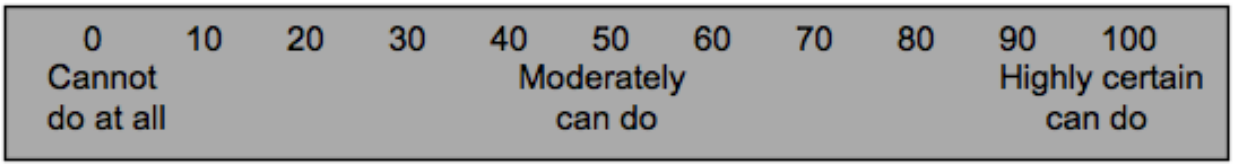
ID #

I am confident that I can complete…	Confidence (0 - 100%)
Moderate intensity upper body strength training exercises (e.g., arms, shoulders, chest) **2 times** per week	
Moderate intensity lower body strength training exercises (e.g., legs) **2 times** per week	
Moderate intensity core strength training exercises (e.g., abdominals; back) **2 times** per week	

At a **vigorous intensity**, you are breathing hard and fast, and your heart rate has gone up quite a bit. If you are working at this level, you won't be able to say more than a few words without pausing for a breath.

Examples of VIGOROUS exercise include running, spinning class, and swimming laps moderately fast to fast.

Rate your degree of confidence by recording a number from 0 to 100 using the scale given below:



I am confident that I can complete…	Confidence (0 - 100%)
15 minutes of exercise at a **vigorous** intensity **3 times** per week	
20 minutes of exercise at a **vigorous** intensity **3 times** per week	
25 minutes of exercise at a **vigorous** intensity **3 times** per week	
30 minutes of exercise at a **vigorous** intensity **3 times** per week	

ID #

35 minutes of exercise at a **vigorous** intensity **3 times** per week	
40 minutes of exercise at a **vigorous** intensity **3 times** per week	
Vigorous intensity upper body strength training exercises (e.g., arms, shoulders, chest) **2 times** per week	
Vigorous intensity lower body strength training exercises (e.g., legs) **2 times** per week	
Vigorous intensity core strength training exercises (e.g., abdominals; back) **2 times** per week	

Section 8.

A number of strategies can be applied to help you stick with an exercise routine. Please rate how certain you are that you can get yourself to perform these strategies as described below.

Rate your degree of confidence by recording a number from 0 to 100 using the scale given below:

0	10	20	30	40	50	60	70	80	90	100
Cannot do at all					Moderately can do					Highly certain can do

I am confident that I can…	**Confidence (0 - 100%)**
Record the total amount of time I spend exercising each day	
Record the type of exercise(s) I engage in	
Record the intensity of exercise(s) I engage in	
Keep track of my exercise sessions even if I forget to do it right after the exercise session	
Set specific exercise goals including how, when, and where I plan on exercising	

ID #

I am confident that I can…	Confidence (0 - 100%)
Set exercise goals that can be evaluated	
Set exercise goals that I can achieve	
Set exercise goals that are realistic	
Use a timeframe when setting my exercise goals	
Record the number of exercise sessions that I plan on doing each week	
Record the intensity that I plan on exercising at during each session	
Record the length of time I will spend exercising during each session	
Record the type of exercise that I will engage in for each exercise session	
Post my exercise goals in a public place	
Set exercise goals even when I don't feel up to exercising	
Identify short term benefits of exercising	
Identify long term benefits of exercising	
Record short term benefits of exercising	
Record long term benefits of exercising	
Identify things in life that I find rewarding (i.e., incentives)	
Reward myself after meeting my exercise goals	
Identify reminders of my exercise goals (people, places, objects)	
Use these reminders as 'cues to action' to prompt me to exercise	

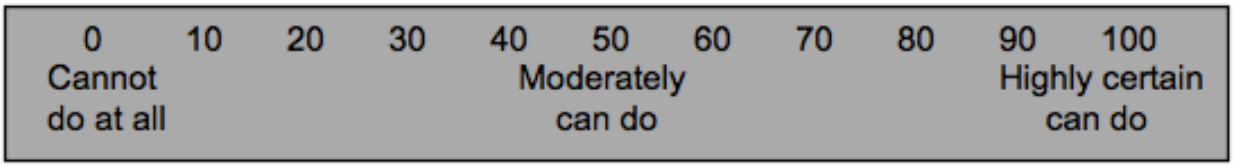
ID #

I am confident that I can…	Confidence (0 - 100%)
Identify when I experience a setback from my exercise routine	
Review my exercise goals when I experience a setback	
Enlist support from someone I trust when I experience a setback	
Get back on track to prevent setbacks from interfering with my exercise goals	

Section 9.

A number of situations are described below that can make it hard to stick to an exercise routine. Please rate how certain you are that you can get yourself to meet your exercise goals if you were presented with one of the obstacles listed below.

Rate your degree of confidence by recording a number from 0 to 100 using the scale given below:



I am confident that I can exercise…	Confidence (0 - 100%)
When I am feeling tired	
When I did not get enough sleep the night before	
When I am feeling under pressure from work	

ID #

I am confident that I can exercise…	Confidence (0 - 100%)
During bad weather	
When I am sore from the last time I exercised	
When I am feeling sad	
When I am feeling stressed	
During or after experiencing personal problems	
When I feel physical discomfort when I exercise	
After a vacation	
When I have too much work to do at home	
When visitors are present	
When there are other interesting things to do	
If I don't reach my exercise goals	
Without support from my family or friends	
During a vacation	
When I am feeling sick (cold-like symptoms)	
When I have other time commitments	
After experiencing family problems	
After recovering from an illness that caused me to stop exercising	
When I do not have someone to exercise with	
When my schedule is hectic	
When I am not motivated to exercise	
When I feel that my goals are not being achieved by exercising	

ID #

I am confident that I can exercise…	**Confidence (0 - 100%)**
When my exercise program is not enjoyable	
When it feels as though I have too much on my plate	
When I feel I just cannot commit to exercising	

ID #

Section 10.

There are strategies that help people manage a regular exercise routine. Please rate each of the following actions according to **how effective you think it is** in helping people to exercise on a regular basis.

1. Imagining yourself exercising

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

2. Keeping track of your exercise sessions

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

3. Punishing yourself for not exercising

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

4. Using cues to action to prompt you to exercise

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

5. Associating with exercisers

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

ID #

6. Setting exercise goals

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

7. Rewarding yourself or using incentives

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

8. Buying new workout gear

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

9. Understanding your motivation to exercise

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

10. Joining a gym

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

11. Overcoming obstacles that interfere with your exercise goals

1	2	3	4	5	6	7	8	9
Not at all effective		Somewhat effective		Moderately effective		Very effective		Extremely effective

ID #

Section 11.

Please update us on your current status at the Breast Care Centre by circling the appropriate response to each of the following statements.

I have had a breast biopsy.	YES	NO
I am waiting for test results.	YES	NO
I been told the results of my biopsy.	YES	NO
I will not pursue/require treatment.	YES	NO
I am waiting for my treatment options.	YES	NO
I am waiting for treatment.	YES	NO

You have reached the end of the survey.
Thank you for taking the time to complete these questions.

Appendix K

Curriculum Vitae

Amy Kossert, PhD Candidate

Educational History

2008 – 2014	Doctorate in Kinesiology (Behavioural Medicine) University of Western Ontario London, ON, Canada *Doctoral thesis project.* Mixed methods pilot study of peri-diagnostic exercise behaviour change among women with suspected breast cancer (in progress).
2006 – 2008	Master of Human Kinetics (Exercise Psychology) University of Windsor Windsor, ON, Canada *Master's thesis project*. The nature and valence of appearance-related exercise imagery.
2001 – 2006	Bachelor of Arts Honours (Psychology with Thesis) University of Windsor Windsor, ON, Canada *Undergraduate honours thesis project*. Effects of anxiety on eating behaviour in binge eaters and non-binge eaters.

Academic Awards and Honours

Doctoral Awards

Social Sciences and Humanities Research Council of Canada (SSHRC): Joseph-Armand Bombardier Canada Graduate Scholarship $105,000
Scholar of the Canadian Institutes of Health Research (CIHR) Strategic Training Program in Cancer Research and Technology Transfer (CaRTT)
Ontario Graduate Scholarship $15,000 (offered and declined)
2012 Kinesiology Graduate Conference Travel Award $660.76
2012 Faculty of Health Sciences Graduate Conference Travel Award $441.75
2010 Faculty of Health Sciences Graduate Conference Travel Award $500
2009 Kinesiology Graduate Conference Travel Award $407.58
2009 Faculty of Health Sciences Graduate Conference Travel Award $600
Ontario Graduate Scholarship $15,000
Western Graduate Research Scholarship (Department of Kinesiology) $8,000/year
Dean's Entrance Scholarship, University of Western Ontario $5,000

Master's Awards

SSHRC Master's Canada Graduate Scholarship $17,500
Ontario Graduate Scholarship $15,000 (offered and declined)
President's Excellence Scholarship $3,000
Ontario Graduate Scholarship $15,000
Outstanding Graduate Student Research Award, University of Windsor $250
Graduate Student Alumni Award, University of Windsor $100

Postgraduate Tuition Scholarship, University of Windsor
Association for Psychological Science Travel Award $200 (USD)

Undergraduate Awards
Canadian Psychological Association: Certificate of Academic Excellence (2005)
In-Course Tuition Scholarship, University of Windsor $375.00
Dean's List, University of Windsor (2003-2006)
President's Roll, University of Windsor (2001-2002; 2003-2005)
Eli Lilly Canada: Moving Lives Forward Scholarship $3,000 (2003)

Grant Support

Cramp, A., Burke, S., & **Kossert, A**. (2012-2013). *Fitness for Two: A Postnatal Exercise eHealth Intervention*. Research Development & Services Western University - Internal Competitions #SG12-04. Amount awarded: $8,092.00.

Cramp, A., **Kossert, A.**, deJesus, S., Turnbull MacDonald, G. (2012-2013). *Cancer Care Talks: Engaging the Community in Cancer-Related Symptom Self-Management*. Canadian Institutes of Health Research (CIHR) Dissemination Events - Priority Announcement: Cancer Research #KDE284498. Amount awarded: $24,354.00

Research Experience

Research Associate — Department of Psychosocial Oncology and Palliative Care
Ontario Cancer Institute, University Health Network.
(May 2012 - present)

Physical Activity Consultant: CHALLENGE Trial (Colon Health and Life-Long Exercise Change; NCIC CTG CO.21). Collaborated with post-treatment colon cancer survivors to deliver behavioural support, exercise training, motivation for trial adherence. (2009-2011)

Publications List

Published Refereed Papers

Munroe-Chandler, K. J., **Kossert, A.** L., & Lougheed, T. (2012). Pumping iron: The social advantages of weight training. *Journal of Applied Biobehavioral Research, 17*(3), 157-175.

Kossert, A. L., & Munroe-Chandler, K. J. (2007). Exercise imagery: A systematic review of the empirical literature. *Journal of Imagery Research in Sport and Physical Activity, 2*(1), Art 2.

Jarry, J. L., & **Kossert, A**. L. (2007). Self-esteem threat combined with exposure to thin media images leads to body image compensatory self-enhancement. *Body Image: An International Journal of Research, 4,* 39-50.

Published Abstracts

De Jesus, S., **Kossert, A.**, & Prapavessis, H. (2014, April). Prospective Descriptive Pilot Study of Body Composition in Women With Suspected Breast Cancer Enrolled in Six Weeks of

Prehabilitation for Distress Management. *Annals of Behavioral Medicine*.

De Jesus, S., Cramp, A.G., **Kossert, A**., Lockwood, D., Cornish, S., & Page, S. (2013, October). Evaluation of Cancer Care Talks: Community Cancer Self-management Education. *Psycho-Oncology*.

Kossert, A., Howell, D., Bottorff, J., Friedman, A.J., Jones, J., Catton, P., Fleshner, N., Krzyzanowska, M., Elser, C., Fleshner, N., McGowan, P., & Burkes, R. (2013, March). Characterization of Symptom and Disease Self-Management in Canadian Cancer Care: Illness Representations of Sentinel Disease Sites. *Annals of Behavioral Medicine*.

Kossert, A., Lebel, K., & Cramp, A. G. (2012). Tweetment in 140 Characters or Less? A Content Analysis of Cystic Fibrosis Social Networks on Twitter. *Final Program and Rapid Communications Poster Abstracts*.

Kossert, A., Cramp, A., Prapavessis, H., & Brackstone, M. (2011). An examination of the feasibility and efficacy of exercise in attenuating symptoms of anxiety and depression among breast cancer surgical candidates. *Psycho-Oncology, 20*(S2), 168.

Cull, S., Figueredo, R., **Kossert, A**., & Koropatnik, J. (2010). Diet and voluntary aerobic exercise affects peripheral monocyte and resident macrophage function and activity in female C57BL/6 mice. *International Journal of Behavioral Medicine, 17*(S1), 140.

Kossert, A. L., & Munroe-Chandler, K. J. (2009). Appearance imagery promotes exercise intention among sedentary females: A qualitative examination of the nature and valence of exercise imagery. *Annals of Behavioral Medicine, 37*(S1), 171.

Kossert, A. L., & Munroe-Chandler, K. J. (2008). The two-component model of self-presentation: Examination of a weightlifting stereotype. *Journal of Sport & Exercise Psychology, 31*, S177.

Kossert, A. L., Loughead, T. M., & Munroe-Chandler, K. J. (2007). Promoting physical activity in the natural environment through prompted stairway use. *Journal of Sport & Exercise Psychology, 29*, S176.

Refereed Contributions

De Jesus, S., **Kossert, A.**, & Prapavessis, H. (2014, April). *Prospective Descriptive Pilot Study of Body Composition in Women With Suspected Breast Cancer Enrolled in Six Weeks of Prehabilitation for Distress Management*. Poster presented at the annual meeting for the Society of Behavioral Medicine, Philadelphia, PA.

De Jesus, S., Cramp, A.G., **Kossert, A**., Lockwood, D., Cornish, S., & Page, S. (2013). *Evaluation of Cancer Care Talks: Community Cancer Self-management Education*. Paper presented at the 15th World Congress of Psycho-Oncology and Psychosocial Academy, Rotterdam, The Netherlands.

Howell, D., **Kossert, A.**, Jones, J., Friedman, A., Mayo, S., Mohammed, S., & Bottorff, J. (2013, October). *Tailoring the disease self-management model for cancer: A mixed methods evaluation*. Paper presented at the 25th annual Conference of the Canadian Association of Nurses in Oncology, Vancouver, BC.

Gray, S., Cramp, A.G., Burke, S., & **Kossert, A**. (2013, October). *Move More Mommy: A postnatal physical activity eHealth pilot intervention.* Paper presented at the Canadian Society for Psychomotor Learning and Sport Psychology, Kelowna, BC.

Kossert, A., Howell, D., Bottorff, J., Friedman, A.J., Jones, J., Catton, P., Fleshner, N., Krzyzanowska, M., Elser, C., Fleshner, N., McGowan, P., & Burkes, R. (2013, April). *Characterization of Symptom and Disease Self-Management in Canadian Cancer Care: Illness Representations of Sentinel Disease Sites*. Poster presented at the annual meeting of the Society for Behavioral Medicine, San Francisco, CA.

Kossert, A., Lebel, K., & Cramp, A. G. (2012, March). *Tweetment in 140 Characters or Less? A Content Analysis of Cystic Fibrosis Social Networks on Twitter*. Poster presented at the annual meeting of the Society for Behavioral Medicine, New Orleans, LA.

Kossert, A., Cramp, A., Prapavessis, H., & Brackstone, M. (2011, October). *An examination of the feasibility and efficacy of exercise in attenuating symptoms of anxiety and depression among breast cancer surgical candidates*. Poster presented at the 14h World Congress of the International Psycho-Oncology Society, Antalya, Turkey.

Cull, S., Figueredo, R., **Kossert, A**., & Koropatnik, J. (2010, August). *Diet and voluntary aerobic exercise affects peripheral monocyte and resident macrophage function and activity in female C57BL/6 mice*. Poster presented at the 11th International Congress of Behavioral Medicine, Washington, DC.

Kossert, A. L., & Munroe-Chandler, K. J. (2009, June). *Appearance imagery formation among female exercisers and non-exercisers: A qualitative examination*. Poster presented at the annual meeting of the International Society for Behavioral Nutrition and Physical Activity, Lisbon, Portugal.

Kossert, A. L., & Munroe-Chandler, K. J. (2009, April). *Appearance imagery promotes exercise intention among sedentary females: A qualitative examination of the nature and valence of exercise imagery*. Poster presented at the annual meeting of the Society for Behavioral Medicine, Montreal, QC.

Kossert, A. L., & Munroe-Chandler, K. J. (2008, November). *It makes me work harder: How negative appearance imagery facilitates exercise behaviour*. Poster presented at the annual meeting of the Canadian Society for Psychomotor Learning and Sport Psychology, Canmore, AB.

Kossert, A. L., & Munroe-Chandler, K. J. (2008, June). *The two-component model of self-presentation: Examination of a weightlifting stereotype*. Paper presented at the annual meeting of the North American Society for the Psychology of Sport and Physical Activity, Niagara Falls, ON.

Kossert, A. L., & Munroe-Chandler, K. J. (2007, November). *Weightlifting bias: Impression formation based on weightlifting habits*. Paper presented at the annual meeting of the Canadian Society for Psychomotor Learning and Sport Psychology, Windsor, ON.

Kossert, A. L., Loughead, T. M., & Munroe-Chandler, K. J. (2007, June). *Promoting physical activity in the natural environment through prompted stairway use*. Poster session presented at the annual meeting of the North American Society for the Psychology of Sport and Physical Activity, San Diego, CA.

Bola, S., Jarry, J. L., & **Kossert, A.L**. (2006, June). *Effects of thin media images on binge eating, affect, and body dissatisfaction.* Poster session presented at the annual meeting of the Canadian Psychological Association, Calgary, AB.

Kossert, A. L., Ip. K., & Jarry, J. L. (2006, June). *Body image satisfaction in a sample of sub-clinical binge eaters: Self-esteem as a protective factor*. Poster session presented at the annual meeting of the International Academy of Eating Disorders, Barcelona, Spain.

Kossert, A. L., & Jarry, J. L. (2006, May). *Internalization of athletic ideal: Effects on eating behaviour*. Poster session presented at the annual meeting of the Association for Psychological Science, New York.

Kossert, A. L., Jarry, J. L., & Bola, S. (2005, June). *Effects of anxiety on eating behaviour in binge eaters and non-binge eaters.* Poster session presented at the 66th Annual Conference of the Canadian Psychological Association, Montreal, QC.

Bola, S., **Kossert, A**. L., & Jarry, J. L. (2005, April). *Obsessive-compulsive symptom presentation in restrained eaters.* Paper presented at the annual meeting of the International Academy for Eating Disorders, Montreal, QC.

Bola, S., Jarry, J. L., & **Kossert, A.L**. (2005, April). *The interaction between dieting and checking compulsions interfere with improvement in eating pathology over time*. Paper presented at the annual meeting of the International Academy for Eating Disorders, Montreal, QC.