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Utilising a Combined Exercise and Counselling Program to Examine the Relationship Between Emotional Self-Efficacy and Physiological Improvements in Breast Cancer Survivors

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CHAPTER 2

Literature Review

Breast Cancer Psychosocial Side Effects

Often, the time following diagnosis is filled with concerns about the diagnosis itself, what treatment to undergo and potential side effects, and worries about the future and mortality (McInnes & Knobf, 2001). These worries may manifest into depression, anger, anxiety, strained relationships and a host of other psychosocial issues, but may also physically result in problems such as fatigue, body ache and sleeping difficulties (Byar, Berger, Bakken, & Cetak, 2006; Berger & Farr, 1999; Eversley, Estrin, Dibble, Wardlaw, Pedrosa, & Favila-Penney, 2005; Manuel et al., 2007). As treatment is undergone and finished, additional fears and concerns commonly arise. These may include worries about having or raising children, altered body image and sexuality and work ability (Avis, Crawford, & Manuel, 2004; Fleming & Kleinbart, 2001; Schain, d'Angelo, Dunn, Lichter, & Pierce, 1994). These stressors may continue well past the conclusion of treatment, especially as the physical side effects confirm some of these fears.

In a review of studies examining the psychosocial needs of breast cancer patients, Schmid-Büchi and colleagues found common needs related to physical and social impairments from breast cancer treatment, such as fatigue, menopausal symptoms, and altered body image, as well as emotional distress, linked to issues like depression and fear of recurrence (2008). The included studies involved women ranging from 3 to 30 months post-diagnosis, so these needs exist in both current patients and post-treatment women. A study by Ganz and colleagues undertaken with long-term survivors found areas of concern significantly impacting quality of life had shifted from what they were in the initial year (1996). More current issues now included problems with body image and weight, sexual interest and function and disrupted general activity levels. Another study examining unmet needs of survivors five to six years post-diagnosis found around two-thirds of women no longer reported moderate or high support need (Girgis, Boyes, & Hansen, 2008). However, those women who did report unmet needs usually related their issues to psychological and daily living issues.

Additionally, the physical changes resulting from treatment often exacerbate these psychological issues. The relationship between physical and psychological works in the reverse as well, with psychological issues seemingly capable of producing or heightening physical problems. McInnes and colleagues found that women who experienced greater weight gain during the first year since starting chemotherapy exhibited higher levels of distress, as assessed by the Linear Analog Self Assessment Symptom Distress Scale for Breast Cancer (2001). The amount of weight gained was also positively associated with how bothered the woman was by this increase, as measured with the FACT-B scale (item 41-"I am bothered by a change in weight"). However, overall quality of life, as measured by the FACT-B, was not significantly affected by weight gain during the first year. A more longitudinal study looking at issues of concern in long-term survivors found body image concerns often arose or increased two to three years after treatment, once women had time to deal with more immediate issues such as the initial shock of diagnosis, treatment decisions and side effects of treatment (Ganz, Coscarelli, Fred, Kahn, Polinsky, & Petersen, 1996).

As these physical changes often continue, and potentially even worsen, two to three years after treatment, more research is needed on the physical and psychosocial connection and ways to help women address these issues (Ganz et al., 1996; Girgis, Boyes, & Hansen, 2008). It is essential to recognise that once a woman has completed standard hospital-based care, her need for treatment does not end as well. Instead, a new approach must be taken that focuses on helping her psychologically recover from the debilitating impact of both cancer itself and the life-saving treatment.

Self-efficacy. Long-term side effects of cancer treatment, such as decrease in functional ability, difficulties with beginning new relationships or expressing oneself in existing ones, and feelings of lack of control, may also translate into decreased self-efficacy (Ganz, Coscarelli, Fred, Kahn, Polinsky, & Petersen, 1996; Han et al., 2005). The concept of self-efficacy has been defined by Bandura as "judgements of how well one can execute courses of action required to deal with perspective situations" (1982). Higher self-efficacy translates into a greater sense of control over

one's situation and actions, whether this control actually exists or is merely perceived. Studies have found individuals in the general population with greater self-efficacy are more likely to set difficult goals and expend the effort needed to overcome obstacles and achieve them (DeVellis & DeVellis, 2000). Han et al. state that as women struggle to address the overwhelming range of physical and psychological changes arising after a breast cancer diagnosis, their emotional self-efficacy, or personal belief in their own ability to face and handle "emotionally challenging situations," is certain to be challenged (2005, p. 320). Figure 1 presents a clearer outline of the concept of self-efficacy, different types, and what is suggested to correlate with emotional self-efficacy, the specific type explored in the current study.

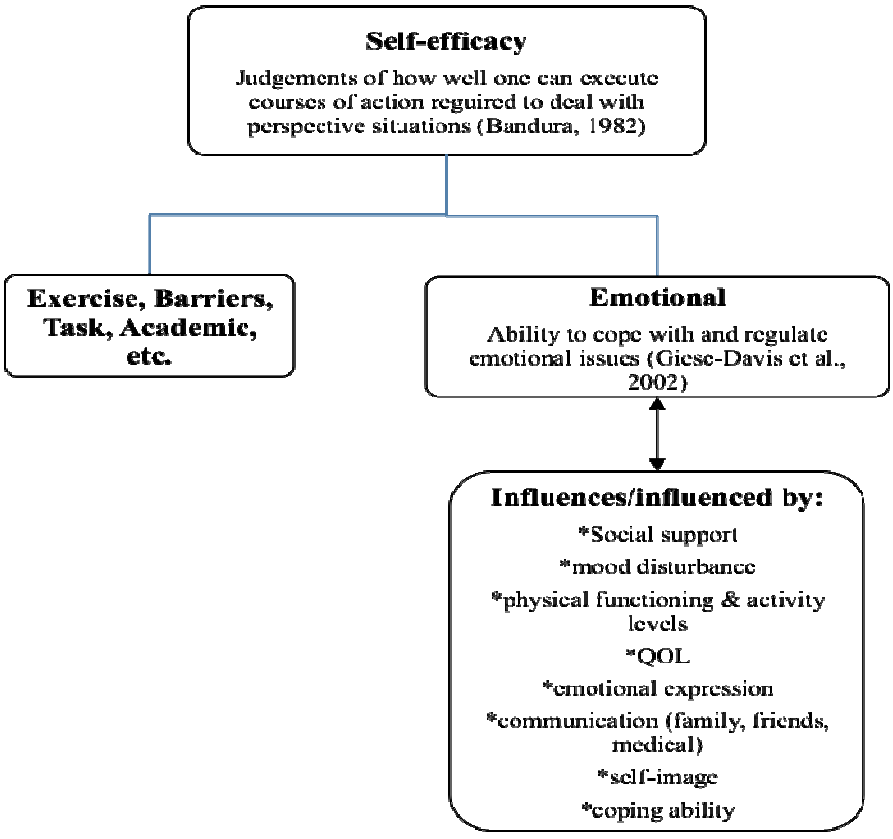

Figure 1. Self-efficacy summary chart

Emotional self-efficacy is a relatively new concept, related to a woman's coping and emotion regulation abilities. Positive correlations have been demonstrated between self-efficacy and psychological factors such as mood and perceived quality of life (Cunningham, Lockwood, & Cunningham, 1991), as well as physical functioning

and activity levels (Morris and Ingham, 1988; Mosher et al., 2008; Rogers et al., 2005; Valois et al., 2008). Other psychological issues arising from breast cancer diagnosis and treatment may contribute to decreased emotional self-efficacy. In a world where appearance is so highly scrutinised, physical changes seen with breast cancer often lead to a more negative outlook on body image and general psychological distress (Demark-Wahnefried et al., 2002; Fleming & Kleinbart, 2001; Han et al., 2005; Helms, O'Hea, & Corso, 2008). Deformity or loss of one or both breasts may negatively affect not only a woman's physical functioning but also her psychosocial well-being. As the breast has a societal connotation of femininity and sexuality, any alteration or loss may impact areas like confidence, identity, and esteem (Helms et al., 2008; Khan, Sehgal, Mitra, Agarwal, Lal, & Malik, 2000). This may affect a woman's social relationships, one of the key issues suggested to impact emotional self-efficacy (Giese-Davis et al., 2002).

Another common physical change women with breast cancer experience is a gain in fat mass without equivalent gains in lean body mass. Breast cancer patients in the 1987 Psychological Aspects of Breast Cancer Study Group exhibited self-depreciation, inadequate body image, and weight gain (Pinto et al., 2003). Additionally, weight gain has been linked to development of other comorbidities, such as diabetes and cardiorespiratory disease, as well as heightened disease progression and poorer outcome (Giese-Davis & Spiegel, 2003; Weihs, Enright, Simmens & Reiss, 2000). Awareness of these risks, coupled with physical changes, has been shown to negatively impact self-esteem and quality of life and increase feelings of distress (Helms et al., 2008), and is also likely to impact emotional self-efficacy as it relates to issues of confronting death and dying (Giese-Davis et al., 2002). Studies have suggested that part of this weight gain may be associated with psychological variables, such as coping style (Kumar et al., 1997). One way of avoiding emotions may be turning to food rather than people. Levine and colleagues concluded that, regardless of treatment regime, there seemed to be a link between a woman's weight gain and a decrease in emotional self-efficacy, or ability to express her emotions (1991).

When emotional self-efficacy was examined in the doctor-patient relationship, it was found that a better ability to communicate with physicians helped improve overall quality of life (Engel, Kerr, Schlesinger-Raab, Eckel, Sauer, & Holzer, 2003). Women who viewed these relationships as negative tended to have greater problems coping (Alder and Bitzer, 2003) and lower emotional self-efficacy (Han et al., 2005). Higher emotional self-efficacy has been suggested to correlate with a more proactive approach to seeking information, and therefore feeling greater satisfaction with medical interactions (Han et al., 2005). Bulsara and colleagues found women who experienced more positive interactions with their healthcare team felt more empowered and better able to manage their illness (2008). The doctor-patient relationship, and its potential relation to a woman's self-efficacy, has been explored in conjunction with social support. Han and colleagues found women who viewed themselves as receiving adequate social support were less likely to have a negative view of medical interactions (2005). Additionally, Collie and colleagues suggested that women who experience unsupportive interactions with friends and family may feel unable to voice concerns to health professionals (2005). This decreased emotional self-efficacy could negatively impact the woman's recovery and overall well-being, as she becomes unable to express any fears or worries about her health. Lower emotional self-efficacy has also been linked to increased mood disturbance, with emotional suppression correlating with higher levels of depression and anxiety in both advanced-stage breast cancer patients (Classen, Koopman, Angell, & Spiegel, 1996) and those recently diagnosed (Watson et al., 1991). Emotional inhibition is known to heighten the cardiorespiratory system's sympathetic, or stress, response (Gross & Levenson, 1997), and long-term suppression has been suggested to relate to the progression of cancer (Gross, 1989; Jensen, 1987).

Every individual's experience of breast cancer diagnosis and treatment is different, as are the resulting side effects of cancer and method of addressing them. As a result, the degree to which each woman's emotional self-efficacy is impacted is certain to vary, making it necessary to recognise a patient's particular stressors and develop an approach that can be tailored to each woman (Manuel et al., 2007). This becomes especially important as findings suggest suppression, repression or

dysregulation of emotional expression may be linked to an increase in incidence and progression of cancer (Giese-Davis et al., 2002; Gross, 1989; Jensen, 1987).

Self-efficacy and psychosocial therapies. As emotional self-efficacy is a psychosocial construct, utilising some form of psychological therapy may be effective in improving it. A recent meta-analysis by Zimmerman and colleagues examined 56 studies exploring the effectiveness of various psychosocial interventions in breast cancer patients (2007). Groups involved in the studies were both homogeneous (breast cancer patients only) and a mixture of breast and other cancer patients, with a variety of intervention methods utilised: psychoeducation, relaxation, cognitive-behavioural and supportive. In regards to treatment administration, some interventions were led by one or more health professionals (psychologist, social worker, nurse), while others were led by peer breast cancer survivors. Those interventions found to be most effective were heterogeneous in relation to cancer type ($p<0.001$), psychoeducational ($p<0.05$), led by a health professional, specifically a psychologist rather than nurses ($p<0.001$), individual instead of group interventions ($p<0.001$), involving women with early stage over advanced stage disease ($p<0.001$) and done right after diagnosis or surgery rather than during treatment ($p<0.01$) or months to years post-diagnosis ($p<0.001$). The researchers also looked at the overall effect size of psychological interventions and concluded that, as previous meta-analyses have also found, they are beneficial for reducing emotional distress in adult patients.

A review study examining the effect of psychosocial interventions on breast cancer survival found mixed results after examining six studies conducted between 1989 and 2001 (Falagas et al., 2007). Varying types of interventions were used, but only two of the six studies found those in the intervention group lived significantly longer than those in the control. One of these studies involved patients with metastatic breast cancer and used weekly group therapy sessions, while the other one enlisted Stage I patients receiving health psychology classes. Additionally, this systematic review concluded social support, minimising, denial, and marriage were all associated with better cancer prognosis, while depression and emotional constraint were linked to decreased survival. Though no direct reference was made to general

therapy impact on emotional self-efficacy, factors such as social support and emotional constraint are linked to this concept. A finding that these matters are associated with cancer prognosis highlights the need for further study in this area, expanding the research to directly include self-efficacy.

Another literature review summarised the impact of interventions on other key parameters related to emotional self-efficacy, such as coping or control skills and social relationships (Newell, Sanson-Fisher, & Savolainen, 2002). Overall, they have found group therapy appears beneficial for improving coping or control skills, and approaches like cognitive behavioural therapy, communication skills training, and relaxation training warrant further study. In relation to improving social relationships, both structured and unstructured counselling may provide long-term benefits.

An examination of individual studies reveals both group therapy and counselling approaches have been utilised with breast cancer patients, examining emotional self-efficacy or measuring factors thought to influence it. Such recent studies are summarised in the table below (Table 1).

Table 1

Self-Efficacy Psychosocial Interventions

Study	Participants	Treatment	Outcomes	Notes
Classen et al., 2001	n=125 Metastatic bc women (64 in intervention, 61 in control group)	*3-15 women in 1 year SET led by 2 therapists *compared to self-directed educational control group	*therapy sign. ↓ traumatic stress symptoms *↓ TMD for patients not in last year of life	*no measure of ESE
Classen et al., 2007	n=353 primary bc women	*groups of up to 10 in 12-wk SET, 1x/wk, led by 2 therapists *compared to educational control group (publically-accessible info from ACS)	*no sign. group diff. in TMD or self-efficacy *after SET, most highly distressed had greatest improvement in anxiety & depression	
Fukui et al., 2000	n=46 Japanese primary bc women	*6-10 women led by psychiatrist & clinical psychologist, 1x/wk for 6wks *compared to wait-list control	*Sign. ↓ in TMD in therapy group *↑ in fighting spirit (coping ability)	*no measure of ESE *cultural differences b/t Asian & Western societies limit generalisiblity
Giese-Davis et al., 2002	n=see above	*3-15 women in 1 year SET led by 2 therapists *compared to self-directed educational control group	*therapy sign. ↓ repression of negative affect, ↑ restraint *only 65 patients with ESE data→therapy group unchanged, control ↓	*need to assess ESE in non-metastatic bc patients
Lieberman et al., 2003	n=32 bc women of predominately rural/medium-size towns	*16-wk online weekly group discussion led by trained therapist *coping data compared to those who dropped out after 1+ meeting	*↓ depression levels and pain reaction, ↑ parts of PGI *drop-outs more fatalistic, less capable of coping w/ anxiety, fewer perceived positive social changes	*no measure of ESE
Giese-Davis et al., 2006	n= bc women (43 newly diagnosed, 39 av. 52.2 months post-diagnosis)	*new patient paired w/ post-diagnosis peer counsellor, 1-4x/wk for 3-6 months	*new patients ↓ trauma symptoms, ↑ cancer SE, desire for info, emotional well-being *cousellors ↑ emotional repression, dissatisfaction w/ med interactions *no sign. change in ESE	*emotional expression & active coping main topics discussed, linked to ESE

Abbreviations: bc, breast cancer; sign., significant; TMD, Total Mood Disturbance; ESE, emotional self-efficacy; PGI, Posttraumatic Growth Inventory; SET, supportive-expressive therapy; ACS, American Cancer Society; av., average; SE, self-efficacy

Based on findings from recent psychosocial interventions, further research is warranted on the impact of such treatments on emotional self-efficacy. Most studies did not directly assess emotional self-efficacy, and the two that did emphasised the need for additional exploration of this parameter (Giese-Davis et al., 2002; Giese-Davis et al., 2006). The outcomes commonly assessed, such as mood disturbance and distress symptoms, were typically shown to benefit from therapy and have commonly been suggested to correlate with emotional self-efficacy (Classen at al., 2001). Directly measuring this parameter will help clarify whether psychosocial therapy can help women improve their self-efficacy levels. Also, more research is needed on women with primary rather than metastatic breast cancer, especially those who are further post-diagnosis or post-treatment, due to the potential differences in psychosocial issues faced and response to therapy. Most studies have utilised a form

of group therapy to address affect regulation. However, as each woman differs in her methods of coping and regulating emotions, a program using a one-on-one counselling approach is justified. As peer counsellors struggle with their own lingering cancer-related psychosocial issues, potentially decreasing their ability to provide adequate guidance on how to cope with such problems, such counselling may be most affective when delivered by a professional counsellor.

Self-efficacy and physical activity. With the potential negative impact of decreased self-efficacy on quality of life and, ultimately, survivorship, it is essential to examine ways of increasing one's self-efficacy. One potential method may be through physical activity interventions. A survey conducted using West Australian breast cancer survivors found that only 31% of survivors were obtaining the recommended amount of physical activity post-treatment (Milne et al, 2007). Those that were meeting guidelines, however, reported a significantly higher quality of life ($p<0.001$, assessed using the FACT-B) than those not obtaining recommended levels of activity. Also, regardless of activity levels, those women with healthy BMI values (<25.0) scored significantly higher on the FACT-B quality of life assessment ($p=0.058$) than those classified as obese (BMI$\geq$30). Pinto and colleagues conducted a one-year study tracking exercise participation of early stage breast cancer patients, and its subsequent impact on mood, quality of life and correlated symptoms (2002). Like Milne, they found most women were getting below the recommended amount of physical activity, with 35% of the participants not meeting guidelines at any of the five assessments over the year. Those few who did meet guidelines, however, exhibited a significantly higher degree of physical functioning, but no significant difference in mood or cancer symptoms.

Physical activity has been examined in relation to both general self-efficacy and self-efficacy subtypes, such as exercise self-efficacy, task self-efficacy, and emotional self-efficacy. Exercise self-efficacy relates to one's confidence in planning and carrying out physical activity. Studies with young adults have found that this form of self-efficacy appears to have a greater relation to physical activity uptake and maintenance than other psychosocial determinants, such as social support and outcome expectations (Dzewaltowski, Noble, & Shaw, 1990; Rovniak, Anderson,

Winett, & Stephens, 2002). A study with healthy female undergraduate students found those with higher general self-efficacy felt more energised during exercise and more refreshed and positively engaged following activity bouts than peers exhibiting low self-efficacy scores (Bozoian, Rejeski, & McAuley, 1994). Enjoyment and perceiving benefits of exercise is essential for long-term adherence, which has important implications for the current study as physical activity uptake has been positively associated with survival in breast cancer patients (Holmes et al., 2005).

A mail survey by Rogers and colleagues examined correlates of both barrier self-efficacy and task self-efficacy in breast cancer survivors (2008). Task self-efficacy relates to one's confidence in ability to perform an activity (i.e. exercise), while barrier self-efficacy is perceived ability to overcome barriers to activity participation. Based on the survey responses, they found higher task self-efficacy directly associated with lower fatigue and greater social support and activity enjoyment, while higher barrier self-efficacy correlated with the same three factors, as well as pre-diagnosis physical activity and perceived exercise barriers. Another important finding from this study was that higher current physical activity levels were directly associated with increased barrier self-efficacy and task self-efficacy. Better social support and higher pre-diagnosis activity levels also predicted higher current activity levels. As emotional self-efficacy is partly reliant on perceived social support (Collie et al., 2005; Han et al., 2005), it may also influence physical activity levels. That correlation was not examined in this study and therefore warrants exploration.

Though no studies could be found that directly examined the relationship between exercise and emotional self-efficacy in breast cancer patients, some research has been conducted in other groups. Valois and fellow researchers examined the link between self-reported physical activity and emotional self-efficacy levels in adolescents (2008). Regardless of gender, significant relationships were found to exist between low emotional self-efficacy and not meeting recommendations for vigorous or strengthening physical activity. It could not be concluded if low physical activity levels were a result of having low emotional self-efficacy, or if the relationship was reversed, but findings support the idea that a link exists between exercise and emotional self-efficacy. As very little research currently exists

exploring this link, especially in the breast cancer population, further research on this relationship may help fill this gap in the literature. Identifying breast cancer survivors with lower emotional self-efficacy may give an indication of who is at a higher risk of having low physical activity levels and potentially struggle to adhere to a program like the one in the current study.

Self-efficacy and adherence. Regardless of how beneficial a program may be, it must be adhered to for benefits to accrue. Research has suggested that one factor potentially influencing a participant's adherence is self-efficacy. Table 2 presents a summary of studies conducted on the link between adherence and self-efficacy.

Table 2

Summary of Self-Efficacy and Adherence Studies

Study	Details	Outcome	Notes
Allison & Keller, 2004	*older adults tested 6wks & 12wks post-cardiac event *self-efficacy coaching (SECI) over phone, standard telephone follow-up, & UC group	*all groups ↑ SE over 12wks *SECI highest mean distance walked on 6MWT at end of 12wks	*possible that ↑ SE→↑ PA adherence→↑ fitness, but further study warranted *as SE is a psychosocial parameter, worthwhile to examine if face-to-face coaching would have stronger impact than telephone coaching used in study
Karvinen et al., 2007	*endometrial cancer survivors *survey to examine factors associated w/ exercise motivation and behaviour	*higher SE independently correlated w/ better exercise intention & behaviour *obese survivors→lower SE *SE & perceived control had strongest influence on exercise in older & obese survivors	*need to examine if increasing SE can improve PA adherence in older & obese survivors *examine if increasing ESE can help increase psychosocial confidence to engage in more activity
McAuley, Lox, & Duncan, 1993	*examined SE & adherence in older adults *partaking in graded exercise testing 9 months after 5-month exercise program	*decline in physical performance & SE from conclusion of exercise to 9-month follow-up point *acute exercise bout at follow-up→temporary SE increase	*higher exercise SE→higher self-directed exercise adherence during 9-month follow-up period, emphasising need to monitor and promote long-term adherence
Pinto, Rabin, & Dunsiger, 2009	*breast cancer survivors *12wk home-based exercise program on predictors of adherence *measured minutes of exercise/wk, weekly # of steps, & meeting individual weekly exercise goals	*at end of 12wks, baseline exercise SE score predicted all 3 adherence outcomes *higher baseline SE→better adherence *adherence in achieving weekly goals declined after initial weeks regardless of SE	*no SE measures taken after baseline, so unclear if link b/t goal adherence decline and change in SE levels
Rovniak, Anderson, Winett, & Stephens, 2002	*examined PA in university students for 8wk period	*higher exercise SE→ more PA regularity *perceived social support indirectly influenced PA levels	*implication for ESE b/c social support thought to influence this (Han et al., 2005) *need to examine link b/t ESE and exercise adherence, esp in high-risk group where PA linked to survivorship (Holmes et al., 2005)

Abbreviations: PA, physical activity; SE, self-efficacy; ESE, emotional self-efficacy; UC, usual care; 6MWT, 6-minute walk test

Though these studies have provided useful information in relation to self-efficacy and its relationship to exercise participation and adherence, further study is warranted to examine if patients with poorer adherence also exhibit lower improvements or even negative changes in self-efficacy. This is important because decreased physical activity has been associated with poorer disease prognosis, so monitoring and attempting to increase self-efficacy may ultimately have positive implications for survival (Holmes et al., 2005).

Breast Cancer Physical Side Effects

Breast cancer, along with the methods of treatment, creates a range of physical side effects that patients must endure in addition to the disease itself. Typical care includes a combination of local therapy, which is surgery with or without radiotherapy, and systematic adjuvant therapy, be it chemotherapy, hormone therapy or a combination of the two (Markes et al., 2006). Depending on the type of adjuvant treatment the patient undergoes, if any, he or she faces the potential of an array of both short- and long-term side effects. Short-term effects are typically experienced while treatment is being received, tending to clear up within months of completion; however, long-term effects may not appear until post-treatment and have the potential to last for years following therapy (Partridge et al., 2001). Treatment options and common side effects are summarised in the table below (Table 3).

Table 3

Treatments and Associated Side Effects

Treatment	**Side Effects**
Surgery *lumpectomy=isolated lump removal, retainment of surrounding breast *mastectomy=removal of one/both breasts and associated tissue	*scarring, altered body image (Fleming & Kleinbart, 2001) *fatigue (Cimprish, 1993) *strength loss (Schneider, Dennehy, & Carter, 2003) *decreased range of motion (Battaglini et al., 2007)
Radiotherapy	*brachial plexopathy (form of peripheral neuropathy), skin erythema, fatigue (Truong, Olivotto, Whelan, & Levine, 2004); decreased activity, strength loss, functional capacity→greater fatigue (Winningham et al., 1994)
Chemotherapy	*short-term: fatigue, nausea, emesis, stomatitis, alopecia, myalgias, neuropathy, myelosupression, thromboembolism *long-term: premature menopause, weight gain, fatigue, cardiac & cognitive dysfunction (Partridge, Burnstein, & Winter, 2001) *both chemo and radiotherapy linked to cardiorespiratory & pulmonary toxicity, decreased endurance, greater fatigue, anxiety, depression (Brockstein, Smiley, Al-Sadir, & Williams, 2000; Schneider et al., 2003, Spiegel et al., 2007) *combo=intensified effects on muscular & cardiopulmonary systems (Bezwada, Granick, Long, Moore, Lackman, & Weiss, 1998)
Hormonal therapy *for women with oestrogen receptor-positive breast cancer *Tamoxifen (TAM) common choice for premenopausal *Aromatase inhibitors (AIs) available for postmenopausal	*both associated w/ hot flashes, weight gain, insomnia, joint aches, sexual functioning issues, though AIs associated w/ less recurrence and longer disease-free survival *TAM mimicks effects of oestrogen and prevents bone loss, while AIs block oestrogen synthesis & associated w/ higher osteoporosis & fracture risk (Garreau et al., 2006)

Many of these treatment side effects may not manifest during or immediately after usual care concludes. Treatment-related fatigue, the most commonly experienced symptom, has been reported by up to 99% of women during treatment, with more than 60% rating it as moderate to severe (Jacobsen, Hann, Azzarello, Horton, Balducci, & Lyman, 1999). Fatigue has been shown to negatively impact not only physical aspects of daily life, but also result in psychosocial, cognitive, and socioeconomic issues (Holley, 2000; Hsieh et al., 2008). Another key side effect of treatment that exerts much longer-term consequences is weight gain and altered body composition. Not only does this physical issue threaten functional ability and immediate health, but it may also impact breast cancer recurrence and survival as well. A recent study involving over 5000 patients found a positive association between weight gain and higher recurrence and mortality rates, especially in never-smokers and premenopausal women (Kroenke et al., 2005). Goodwin and colleagues also examined the link between weight and recurrence of breast cancer, focusing on BMI values (2002). They found those women who had a BMI between 20 and 25 kg/m^2 faced a lower recurrence risk, while the risk steadily increased as BMI surpassed 25 kg/m^2. Weight gain in any individual, not just those with breast cancer, can have a detrimental effect on overall health. As weight increases, so does the risk

for developing chronic illnesses such as diabetes, hypertension, and cardiorespiratory disease (Visorsky, 2006).

As many of the physical side effects of breast cancer become more detrimental or arise after standard hospital-based care concludes, a need exists to recognise that care cannot stop once treatments like surgery or chemotherapy conclude. Additionally, women may face uncertainty about what sort of activity they can engage in without exacerbating these side effects and potentially decrease or cease exercise completely (Winnigham, 1991). To help alleviate this fear and hesitation, survivors should be offered advice on how to safely address these issues if they are to increase their functional ability, overall quality of life, and, most importantly, disease-free survival.

Exercise and physical side effects. Numerous studies have been conducted examining the impact of varying physical activity interventions on improving the physical well-being of breast cancer patients and survivors. A host of recent literature reviews and meta-analyses have attempted to summarise the findings of these trials and provide recommendations for further research (Table 4).

Table 4

Summary of Physical Activity Literature Reviews and Meta-Analyses

Authors	Studies examined	Findings	Recommendations
Kim, Kang, & Park, 2009	10 studies on cardiopulmonary function and BC improvements w/ bc women during & after adjuvant therapy	*n=8 AET, 2 AET/RET *n=7 on cardio, all showed improved after exercise *n=5 on BC, saw sign.↓ in %BF *average adherence of 87.4% (n=6 studies)	*utilise combination AET/RET programs *emphasise to participants importance of long-term adherence
Kirshbaum, 2006	29 studies w/ bc women during & after adjuvant therapy	*all AET studies *exercise effective to ↓ cancer-related fatigue *unclear how beneficial to other concerns (sleep, self-esteem, etc)	*important to include non-aerobic components in a program for body image and general well-being *need to address issue of patient motivation
Markes, Brockow, & Resch, 2007	9 studies w/ bc women during adjuvant therapy	*n=7 AET, 2 AET/RET *exercise=↑ cardio fitness, nausea relief, ↓ anxiety, sleep disturbance *no sign. changes in fatigue, weight, QOL, depression, strength, immune function, mood	*need consistency in measurement tools (ie hard to examine parameters like psychosocial distress b/c inconsistence quantification) *adherence important to address b/c key for program success *create programs w/ exercise variety *address self-efficacy to promote behaviour change and better adherence
McKneely et al., 2006	14 studies w/ bc women during & after adjuvant therapy	*n=8 AET, 6 AET/RET *exercise benefits QOL, physical functioning, peak O_2 consumption, fatigue *no signifcant change in weight or BMI (n=6) *4 studies reporting adverse effects→no lymphoedema; mainly back/shoulder injuries	*more detail needed when reporting exercise prescription *better monitoring of adherence & adverse effects
Visovsky, 2006	11 studies w/ bc women during chemotherapy	*n=6 RET, 5 AET/RET *AET beneficial to physical functioning, QOL, but not strength and BC *RET did not induce or worsen lymphoedema	*combined AET/RET program likely most beneficial *need longer-term programs (15+ wks) *include more diverse & neglected populations (obese, older women)

Abbreviations: BC, body composition; bc, breast cancer; AET, aerobic exercise training; RET, resistance exercise training; %BF, percent body fat; QOL, quality of life; BMI, body mass index.

In conclusion, meta-analyses and reviews looking at various exercise interventions in breast cancer patients have found exercise beneficial and safe. Specifically, programs that combine aerobic and resistance training appear most capable of combating the negative physiological impacts of breast cancer treatment, such as decreased strength, cardiorespiratory fitness, and lean body mass and increased body fat and weight gain. Since much of the weight changes in women with breast cancer are in the form of sarcopenic obesity, with fat mass gained and lean body mass lost, simple aerobic exercise may not be enough to reverse this change. The addition of resistance training to a physical activity regime is commonly recommended to effectively produce body composition changes and prevent or counteract sarcopenic obesity (Heber, Ingles, Ashley, Maxwell, Lyons, & Elashoff, 1996). Additionally, longer-term programs are desirable to allow both physical and psychological changes

time to arise, as well as interventions that better monitor adverse effects. Since a program will only be successful if it is adhered to, more research is needed that both monitors participation and examines its link to other parameters to find potential ways of increasing this program adherence.

Physiological impact of aerobic and resistance training programs. As interventions utilising both aerobic and resistance training components appear the most beneficial to women with breast cancer, it is important to examine the recent programs that have taken this approach. Reviewing other programs is important in aiding to design a study that aims to address some of the gaps in the research and determine whether similar designs exist to allow for evaluation of program effectiveness (Table 5).

Table 5

Summary of Aerobic and Resistance Training Programs

Study	Participants	Treatment	Outcomes	Notes
Battaglini et al., 2007	n=20 recently diagnosed bc women (10 UC, 10 exercise)	AET & RET 2x/wk for 21wks	*exercise group ↑ strength, LBM, ↓ %BF vs. UC	*100% adherence *no psychosocial measures
Campbell et al., 2005	n=19 bc women undergoing chemo/radiation (10 UC, 12 group exercise)	AET/RET group exercise 2x/wk for 12wks + behavioural change theme 1st 6wks	*exercise group ↑ physical functioning, self-reported PA, general QOL *average adherence of 70%	*many women kept exercising together after 12-wk study *mo measure of parameters covered in behavioural change seminars (ie self-efficacy)
Courneya et al., 2007	n=242 bc women in adjuvant treatment (82 UC, 82 RET, 78 AET)	AET & RET groups exercise 3x/wk for chemo + 3 wks after	*AET ↑ self-esteem, fitness, ↓ %BF vs. UC *RET ↑ self-esteem, strength, LBM, chemo completion rate vs. UC *lhigher adherence & psychosocial ↑	*aerobic and resistance training separated, need to see benefits of combo program
Demark-Wahnefried et al., 2002	n=9 bc women receiving chemo in intervention, compared to 36 historic controls	AET 3-5x/wk, lower-body RET 2-3x/wk for 6 months	*↓ body mass, %BF, fat mass vs. controls *diet counselling, but component not analysed *exercise adherence self-reported	*no psychosocial factors assessed in conjunction w/ observed body comp changes *self-reported adherence vulnerable to mis-estimating PA
Hseih et al., 2008	n=96 bc women, groups based on treatment (surgery, surgery+chemo, surgery+radiation, or all three)	AET & RET 2-3x/wk for 6 months	*all ↑ cardio functioning; group w/ all 3 ↓ RHR, ↑ pulmonary function *3 groups with surgery + other treatment ↓ fatigue domains	*no monitoring of adherence *no control, so unsure if changes typical during weeks post-treatment or a result of program
Milne et al., 2008	n=58 post-treat bc women (29 IEG, 29 DEG)	*IEG w/ 12wks supervised AET/RET→12wks follow-up w/ 4 phone calls *DEG w/ 12wks phone calls, no led exercise→12wks AET/RET	*w/ 12wks of supervised exercise, both groups ↑ QOL, aerobic fitness, strength, ↓ fatigue, SPA *shift from extrinsic to intrinsic motivation to exercise, correlated w/ better psych needs satisfaction *↑ adherence correlated w/ greater physical & QOL ↑	*no report of IEG PA levels during 2nd 12wks of study when unsupervised
Mutrie et al., 2007	n=203 bc women undergoing chemo/radiation (102 UC, 101 group exercise)	AET/RET group exercise 2x/wk for 12wks + behavioural change theme 1st 6wks	*exercise group ↑ physical functioning, shoulder mobility, self-reported PA, QOL, positive mood *improvements continued at 6-month follow-up w/ exception of PA	*no measure of parameters covered in behavioural change seminars (ie self-efficacy) *adherence not reported
Schneider et al., 2007	n=113 bc women in or done with treatment	AET & RET 2-3x/wk for 6 months	*all ↓ systolic BP, ↑ time on treadmill; post-treat ↑ lung function tests *all ↓ behavioural, sensory, total fatigue; post group ↓ psych-based fatigue components (affective, cognitive/mood)	*no monitoring of adherence
Turner, Hayes, & Reul-Hirche, 2004	n=10 bc women post-surgery/ chemo	AET 1x/wk, RET added mid-program, for 8wks	*↑ QOL at end of program & 3-month follow-up *trends suggesting ↓ fatigue, ↑ mood & general well-being *no ↑ lymphoedema	*100% adherence & self-reported ↑ exercise confidence & enjoyment & body image *peer support deemed one of greatest benefits

Notes: bc, breast cancer; UC, usual care; RET, resistance exercise training; AET, aerobic exercise training; %BF, percent body fat; LBM, lean body mass; BP, blood pressure; RHR, resting heart rate; QOL, quality of life; PA, physical activity; IEG, immediate exercise group; DEG, delayed exercise group; SPA, social physique anxiety

Based on these recent studies, it seems essential to utilise an exercise program combining exercise and resistance training to best elicit positive physical changes.

Parameters commonly impacted by cancer treatment, such as strength, cardiorespiratory endurance, and body composition, all appear to benefit most from combination programs rather than those using just aerobic or resistance training. Longer-term programs that are monitored for intensity and adherence are desirable, as well as interventions that examine links to such adherence. Even with the physical benefits reported in the studies little was mentioned about the psychological impact of such improvements. More research is needed exploring the link between taking a physical approach to rehabilitation and the effect on mental and emotional health.

Conclusion

Both psychosocial and physiological parameters are negatively impacted by diagnosis and treatment of breast cancer. The end of treatment does not mean the conclusion of side effects as well, with some issues even intensifying. However, there is evidence that interventions may alleviate these negative effects. Emotional self-efficacy, one psychosocial parameter affected by breast cancer, has primarily been addressed through group or peer counselling. Most of these interventions have only indirectly studied emotional self-efficacy though, and often used metastatic patients or women still in treatment. A need remains to directly assess emotional self-efficacy, especially in post-treatment women, and utilise one-on-one counselling, recognises the fact that each individual's issues and experience are unique. Additionally, links have been suggested between varying types of self-efficacy and both program adherence and physical activity and well-being. These relationships need to be explored for emotional self-efficacy, specifically in the breast cancer population rather than adolescents or the elderly.

In relation to physical improvements, exercise programs combining aerobic and resistance training seem most effective in producing positive changes. A need remains for longer-term programs that monitor adherence and adverse effects. Additionally, research is lacking on the psychological benefits exercise interventions may produce on areas like self-efficacy.

Though emotional self-efficacy may correlate with physical improvement, very little research has monitored this psychosocial parameter during physical activity

interventions. Programs have shown counselling may produce psychosocial benefits, while exercise generates physical and psychological improvements, but the two modalities have been used in isolation. An approach is necessary that recognises the benefits of both types of programs and combines them in an attempt to accrue even greater all-around improvements (Mills et al., 2009). As little is known about the feasibility and efficiency of such a multi-modal program, the proposed study is necessary.

CHAPTER 3