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Using a Social Ecological Model to Identify Physical Activity Correlates in Breast Cancer Survivors:  
A Quantitative Study

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Using a Social Ecological Model to Identify  
Physical Activity Correlates in Breast Cancer Survivors:  
A Quantitative Study

by

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## ABSTRACT

In the breast cancer population to date, theoretical approaches and intervention strategies used to promote physical activity (PA) have relied upon intrapersonal (e.g., attitudes) and interpersonal (e.g., subjective norms) variables to understand PA behaviors.

Unfortunately, these studies were limited by not looking at variables beyond the individual and their social support networks. Using a social ecological framework, this study examined correlates of PA among breast cancer survivors (BCS') from a multilevel perspective that assessed correlates at the intrapersonal (task and barrier self-efficacy – SE), interspersonal (social support), institutional (health care climate) and community (accessibility to home exercise equipment and neighborhood facilities) levels of influence. Fifty BCS' were recruited and assessed over a period of one month.

Assessments included self-report questionnaires to assess the social ecological correlates for PA, a resting energy expenditure test to obtain basal metabolic rate, a DEXA scan to obtain percentage of total body fat and accelerometry to objectively assess total and average daily energy expenditure (EE). Quantitative findings revealed that barrier self-efficacy was a significant correlate of total EE ( $r = .290$ ,  $p = .043$ ) and daily EE ( $r = .315$ ,  $p = .029$ ) among BCS'. Specifically, do not feel like it, was a significant correlate for total energy expenditure ( $r = .316$ ,  $p = .027$ ), and no time ( $r = .345$ ,  $p = .018$ ), feeling under the weather ( $r = .364$ ,  $p = .011$ ) and do not feel like it ( $r = .315$ ,  $p = .029$ ) were significant correlates of average energy expenditure per day. A non-significant relationship between PA and the other levels of the social ecological model was found. Based on these preliminary findings, further investigation into the use of different variables at the social ecological levels of influence is warranted. The findings at the

intrapersonal level have practical implications in that a barrier self-efficacy scale specific to breast cancer should be developed to include the specific side effects that breast cancer treatments cause. Such a scale can assist in identifying the targets for PA program development by highlighting the issues that are of greater importance to breast cancer patients. In terms of a PA intervention, SE as it relates to time constraints, not feeling well and a lack of will power should be addressed. For example, behavioral counseling that targets the specific issues of the BCS could be incorporated into the PA intervention, whereby the counselor assists the BCS with the identification of coping strategies to overcome various barriers specific to PA.



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## **Chapter I**

### **Introduction**

The prevalence of breast cancer among women today is significant, in that the likelihood of developing (1 in 9) and dying (1 in 27) from it is overwhelming. Moreover, Ontario is ranked the highest for new female breast cancer cases and deaths among all other Canadian provinces. Fortunately, the five year survival rate of overcoming this disease is becoming more promising in that there exists a 73% to 86% range of successfully combating breast cancer.

The treatments necessary to treat breast cancer are very intensive. As a result, several physical and psychological obstacles arise during all phases of the breast cancer experience, which in turn, affects quality of life. Persistent physical and psychological stress due to the side effects of cancer treatments can further persist even years after treatment completion. Fortunately, physical activity (PA) has been illustrated as a complementary treatment in combating breast cancer throughout the literature. Moreover, the physiological and psychological benefits that PA can offer extend beyond the direct treatment that traditional medical treatments can offer. Traditional rehabilitative methods have not sufficiently addressed the diverse issues faced by breast cancer survivors (BCS'). Therefore, the use of PA, along side traditional cancer treatments, can assist in mitigating the side effects in treating breast cancer.

Unfortunately, the adherence issues highlighted within the breast cancer population, both during and after treatment, have indicated that motivation towards PA is an issue. Ambiguity does exist across studies regarding the operationalization of PA, however, the common trend among the breast cancer population in these studies is that PA levels never

reach pre-diagnosis levels during post-treatment. Therefore, adherence issues within this population need to be addressed.

To date, studies have assessed PA correlates within BCS'. The information that these studies have provided is valuable, yet, the theoretical frameworks used have been limited in their application and design. Specifically, these frameworks are aimed to assess the intrapersonal (i.e. self-efficacy, attitudes, perceived control) and interpersonal (i.e. social support, subjective norms) level of the BCS, with no regard for other influences that go beyond the individual (i.e. the health care system, community resources). Therefore, a need exists to incorporate broader correlates of PA within BCS'. Once key correlates are identified, rehabilitative efforts for this population can be further implemented. In doing so, an alternate and multi-faceted framework is needed to identify the PA correlates in order for an intervention to be properly implemented. The social ecological model is one multi-faceted framework that may assist in identifying such correlates within BCS'. This model highlights the importance of targeting multiple levels of health behavior and PA beyond the individual making the behavior change, by recognizing that behaviors are shaped by social and organizational influences at the intrapersonal (i.e., self-efficacy), interpersonal (i.e., social support), institutional (i.e., health care climate), community (i.e., accessibility to/opportunities for PA), and policy (i.e., PA policies, agency interventions) levels.

Therefore, the purpose of the present study is to identify six key variables housed within a social ecological framework that act as correlates of PA, during a one month period in 50 BCS' post-treatment. It is hypothesized that each level of the social ecological model will predict PA by providing an integrated account of the correlates that facilitate, debilitate and influence PA.

## **Chapter II**

### **Review of Literature**

#### ***What is a breast cancer survivor (BCS)?***

For the remainder of this proposal, a BCS will be defined as any individual diagnosed with breast cancer that has completed a medical treatment with a successful outcome and now strives for the balance of life (Courneya, 2003; Courneya, Mackey & Jones, 2000).

#### ***What is Breast Cancer?***

Breast cancer is any type of malignant (cancerous) growth in the breast tissue. In 90% of breast cancer cases, ductal carcinoma (carcinoma that arises in the ducts) is the cause while the remainder is due to lobular carcinoma (carcinoma that arises in the lobules). However, if the cancer within the breast remains uncontrolled, it can spread to other areas within the body, known as metastatic breast cancer. There is no single identifiable cause as to why a normal breast turns cancerous, therefore, breast cancer can be a result of a combination of causes. Such causes identified have been a family history of breast cancer, early onset menses, late menopause, bearing children later in life, obesity, use of hormones, diet, environmental toxins, existing medical conditions, malignancies in other areas, poor lifestyle choices and heredity defects (gene mutations) (Marieb, 2000).

#### ***Prevalence of breast cancer***

According to the National Cancer Institute of Canada (NCIC), breast cancer is the most frequently estimated diagnosis for women with the incidence rate being among the highest in the world (NCIC, 2004). More specifically, estimates of new breast cancer

cases and deaths in 2004 were expected to be 21,200 and 5,200 respectively.

Furthermore, a woman has a 1 in 9 chance of developing breast cancer and a 1 in 27 chance of dying from it in her lifetime (NCIC, 2004).

In relation to age distribution, occurrence rates illustrate that 21% of cases occur in women under the age of 50 years, 49% occur in women aged 50-69 years, and 30% in women aged 70 years and over (NCIC, 2004). However, the risk for breast cancer exists for any woman in adolescence and onwards, which illustrates the importance of treating this disease. Fortunately, the five year survival rate for breast cancer is 73% for women 40 years and under, 83% between the ages of 40-69 years, 86% between the ages 70-79 years and 78% between 80 years and over (Canadian Cancer Society – CCS, 2002). As a result, more women are living with a history of breast cancer in today's society.

The geographic patterns of cancer occurrence across Canada were estimated by the NCIC (2004) based on territorial cancer registries to predict the number of new cancer cases and deaths for the year 2004. Among the Canadian provinces, Ontario is ranked the highest for population estimates and female estimates for new cases and deaths resulting from cancer (NCIC, 2004). More importantly, Ontario ranked the highest in new breast cancer cases (see Appendix A1 for geographic patterns of new breast cancer cases) and the highest in breast cancer deaths for females in comparison to all other Canadian provinces (see Appendix A2 for geographic patterns of breast cancer deaths).

The likelihood of developing breast cancer for a woman is significant and the experiences of struggling with such a disease poses many challenges both within and outside of the cancer treatment. Therefore, the rehabilitation of breast cancer requires the



use of many resources that makes this area of the cancer experience critical for investigation. The possibility of recurrence is existent, even with the promising survival rates for breast cancer, therefore, an increased demand is being placed upon the rehabilitative services geared towards the breast cancer post-treatment population. The complexity of the BCS' needs is comprehensive, therefore, the planning, development and implementation of multidisciplinary actions within the health services field is becoming a necessity.

### ***Breast cancer treatments***

The treatment of breast cancer involves intensive medical treatments, which are divided into two categories: local and systemic. Local treatments (surgery and radiation) are used to remove, destroy, or control cancer cells within a specific area. Surgery involves either breast-sparing (lumpectomy) or mastectomy (partial, total, modified radical or radical). Radiation uses high energy rays to damage the cancerous cells to eliminate further growth.

Systemic treatments (chemotherapy, hormone or endocrine therapy and biologic therapy or immunotherapy) are drugs used to destroy and control cancer cells all over the body. Chemotherapy uses repeated dosages of drugs to stop the growth of cancer cells and is administered intravenously or orally during two to four week cycles over a period of three to six months. Hormone/endocrine therapy is used to prevent cancer cells from getting the hormones they need to grow by continuously or intermittently administering the drugs for many years. Biologic therapy/immunotherapy are relatively new treatments and are used to influence the body's own defense mechanisms to act against cancer cells. The therapy can also act as a catalyst to potentiate the effects of other drugs used in

treatment (Courneya, 2003). The timing, sequence and combination of treatments vary, but the possibility of being treated on multiple occasions with multiple modalities is very common (Courneya, 2003).

### ***What is post-treatment?***

After receiving treatments for breast cancer, many women are then recommended additional treatments referred to as “adjuvant” therapies to reduce the risk of recurrent disease. The primary adjuvant therapies are radiation therapy, chemotherapy and hormone therapy. Radiation therapy usually lasts six weeks, chemotherapy usually lasts over a nine-to-21 week period, and hormone therapy can be taken orally on a daily basis that can be continued for *many* years. As a result of the prolonged time in which hormonal therapy is administered, post-treatment will be defined as the successful completion of breast cancer treatments with the exception of continued hormonal therapy. The common hormonal therapies that will be included are antiestrogen therapies (i.e. tamoxifen) and aromatase enzyme inhibitors (i.e. arimidex, femara, aromasin).

### ***Treatment side effects and quality of life***

Quality of life is as an appraisal of and satisfaction with one’s current level of functioning compared to what one believes is ideal. In terms of QOL in relation to cancer treatment, the most important components identified have been physical, functional, emotional, and social aspects (Cella & Cherin, 1988). Cancer treatments have significant survival advantages, but the side effects of these treatments can lead to a greatly diminished QOL in terms of many biopsychosocial factors. As a result of such prolonged and intensive treatments, the physical, functional, emotional and social well-being of BCS’ are affected both during and after treatment (Courneya, 2003). The

importance of an intervention that targets these various aspects of QOL by assisting in the improvement of such side effects is a critical area for investigation within cancer care.

Longitudinal studies have identified persistent psychological distress after diagnosis and treatment even when improvements in physical functioning have occurred (Pinto, Trunzo, Reiss & Shiu, 2002). The emotional and social sequelae of the cancer experience include factors that affect the psychological aspects of QOL, such as depression, anxiety, body image concerns, decreased self-esteem, loss of control and social isolation (Courneya, 2001). The physical and functional side effects from the treatments for breast cancer include decreased cardiovascular function, diminished strength, decreased pulmonary function, loss of lean body mass, weight change, sleeping difficulties, fatigue, nausea, osteoporosis, early onset of menopause, wound complications, loss of function and lymphedema (Courneya, 2003; Mustian, Katula & Gill, 2002). Furthermore, even if prognosis of surviving is hopeful, dilemmas about the quality and meaning of life are common (Mickley & Soeken, 1993). Despite this high prevalence of QOL impairments, rehabilitation focusing on the psychosocial components of cancer treatments is limited and a secondary concern. This is evident since Western medical and scientific traditions have predominantly defined the breast cancer experience in terms of physical and biomedical outcomes (Mustian et al., 2002). The rehabilitation of women treated for breast cancer is critical based on the clinical and research data indicating the distress faced by women after being treated for breast cancer.

### ***Role of physical activity in breast cancer survivors***

Physical activity is deemed, “all leisure and non-leisure body movements produced by the skeletal muscles which result in a substantial increase in resting energy

expenditure” (Canadian Society for Exercise Physiology, 1996, p. 1-3). According to the American College of Sports Medicine (ACSM), the recommendations for physical activity are based upon guidelines for aerobic, anaerobic and flexibility training. The ACSM emphasizes that aerobic training activities should involve large muscle groups over prolonged periods, are rhythmic in nature, target 60-90% of one’s heart rate maximum, and are 20-60 minutes at a continuous, moderate level, three to five times per week. Overall, the ACSM recommends a minimal threshold of 300 kcal per activity session performed three days per week or 200 kcal per session performed four days per week. Physical activity programs should target approximately 1000 kcal of weekly caloric expenditure. In order to achieve optimal PA levels, the goal is to bring weekly caloric expenditure closer to 2000 kcal as health and fitness permit (Franklin, Whaley & Howley, 2000).

One review specifically looking at BCS’ and another review that looked at cancer populations, in which breast cancer cases accounted for two third of the studies, used the ACSM guidelines to assess PA levels. The findings indicated that BCS’, even during adjuvant therapy, are able and willing to adhere to a conventional PA prescriptions (Courneya, Mackey & McKenzie, 2002; Galvao & Newton, 2005). Specifically, Courneya, Mackey & McKenzie (2002) indicated that an aerobic exercise prescription at a moderate intensity (i.e., 50-75% of heart rate reserve), 3 to 5 days per week at 20 to 60 minutes per session is plausible for BCS’. Additionally, resistance training was also recommended to be incorporated into the fitness program. Moreover, recommendations also consisted of the program taking place in an environment in which psychological health is optimized (i.e., enjoyable, develops new skills, involves social interaction and

engages the mind and spirit). The role of PA in relation to breast cancer is a relatively new research area, but the information published thus far has been a very valuable contribution to the area. Most importantly, several studies have highlighted that PA has a positive impact on the functional, physical, psychological, and social challenges faced by BCS' (Courneya & Friedenreich, 1999a).

Historically, individuals with chronic diseases have been advised to rest and avoid PA, however, lack of PA can result in further consequences in functional capacity and QOL (Hyde, Wing, Lee & Kampert, 1994). The side effects that breast cancer inflicts upon women has led them to seek alternative and complementary treatments, alongside traditional medical treatments, to mitigate the side effects that impact QOL (VandeCreek, Rogers & Lester, 1999). Approximately 26% of the general population uses PA as a complementary and alternative method to medical treatments (Eisenburgh, Kessler, Foster, Norlock, Calkins & Deblanco, 1993). In comparison, VandeCreek et al. (1999) identified that 76% of BCS' have indicated interest in pursuing PA, while 38% actually use PA as a complementary therapy.

Clinical concerns about prescribing PA to cancer patients has been outlined by Courneya, Mackey and Jones (2000), which include the immunosuppressive effects of increased activity, the increased likelihood of bone fractures and compromising bone integrity, cardiotoxicity from chemotherapy or radiotherapy, severe pain, nausea and fatigue due to physical exertion and the inability or unwillingness of cancer patients to tolerate PA due to their weakened physical and emotional state. Fortunately, research in the area of PA in relation to cancer coping and rehabilitation has begun to dispel the myths of these concerns and highlight the safety, feasibility and efficacy of PA during

and after cancer diagnosis (Courneya, Mackey & Jones, 2000; Courneya & Friedenreich, 2001).

Studies reflecting on the use of PA after the treatment of breast cancer found improvement's in factors such as self-esteem (Baldwin & Courneya, 1997; Nelson, 1991), anxiety (Blanchard, Courneya & Laing, 2001; Segar, Katch, Roth, Garcia, Portner, Glickman, Haslanger & Wilkins, 1998), satisfaction with life (Peters, Lotzerich, Niemeier, Schule & Uhlenbruck, 1995), mood (Pinto, Maruyama, Engeretsen & Theborge, 1998), physical well-being (Pinto & Trunzo et al., 2002), depression (Segar et al., 1998), overall QOL (Young-McCaughan & Sexton, 1991), benefits to exercise capacity (Nieman, Cook, Henson, Suttles, Rejeski, Ribisli, Fagoga & Nehlsen-Cannarella, 1995), number of monocytes (Peters, Lotzerich, Niemer, Schule & Uhlenbruck, 1995), and natural killer cell cytotoxic activity (Peters, Lotzerich, Niemeier, et al., 1995). Similar improvements were also seen in the studies assessing PA interventions during breast cancer treatment (Courneya & Friedenreich, 1997; Kolden, Strauman, Ward, et al., 2002; Mock, Pickett, Ropka, et al., 2001; Segal, Evans, Johnson, et al., 2001). Therefore, the results from these studies pose several life-enhancing benefits due to PA in the treatment and rehabilitation of BCS'.

### ***Prevalence of regular physical activity in breast cancer survivors***

Health promotion has been an extensive concept communicated within most countries with an emphasis on promoting motivation and greater involvement; however, much of this has been based upon a health education approach (Wankel, 1985). By sharing information with the public about the benefits of living an active and healthy lifestyle, it is assumed that most people will initiate actions to promote their health. The knowledge

distributed to the population about the benefits individuals can reap from PA has obviously been limited in its impact since the statistics of a sedentary lifestyle still remain high within our population. For instance, according to the Canadian Fitness & Lifestyle Research Institute, 55% of Canadian adults are inactive, with Ontario having a 67% rate of physical inactivity (CFLRI, 2004). For those studies in which the ACSM guidelines were used as the criterion to assess PA levels, many variations among adult PA levels were found. More specifically, results ranged from 32-59% of the adult samples not meeting the recommended ACSM PA guidelines. Furthermore, according to Statistics Canada, out of 13,096,304 women surveyed, 7,050,197 were found to be inactive, 2,899,108 were found to be moderately active and only 2,415,216 women were found to be active (Statistics Canada, 2000-01). When looking at the physical inactivity levels of the general population, especially among women, and taking into consideration the physical and psychological sequelae as a result of breast cancer, it is evident that these additional challenges may further decrease these numbers for BCS'.

The impact that PA can have on the psychological and functional QOL aspects both during and following cancer treatment largely depends on the adherence of BCS' PA. In relation to PA across the cancer experience, from pre-diagnosis to treatment to post-treatment, research indicates a decline in PA levels following cancer diagnosis that are not recovered fully even after years of treatment completion (Blanchard, Courneya, Rodgers & Murnaghan, 2002; Courneya, 2001; Courneya & Friedenreich, 1997; Nelson, 1991; Rhodes, Courneya & Bobick, 2001). However, it should be noted that ambiguity exists in the reporting of the prevalence of PA within this population due to the lack of consistency in the operationalization and measurement of PA across studies. For

instance, PA/exercise has been assessed using the Leisure Score Index, questions pertaining to stages of readiness, as well as, self-report measures of the frequency, duration and intensity of PA/exercise in a typical week (Courneya & Friedenreich, 1997; Leddy, 1997; McBride, Clipp, Peterson, Lipkus & Denmark-Wahnefried, 2000; Nelson, 1991). For example, Courneya & Friedenreich (1997) found that BCS' reported a significant decrease in moderate, strenuous and total exercise from prediagnosis to active treatment, however, after treatment these BCS' moderate exercise levels returned to prediagnosis levels, but strenuous and total exercise levels remained below prediagnosis levels. Young-McCaughan and Sexton (1991) found that in their sample of 72 women treated for breast cancer, 41% of survivors did not exercise at least two times per week. Nelson (1991) illustrated that in a sample of 55 women post-treatment, 74% participated in PA compared to the non-breast cancer counterparts who had a rate of 85%. Finally, Leddy (1997) found that 38% of BCS' either exercised occasionally or not at all, whereas, McBride et al. (2000) found that 44% did not engage in PA on a weekly basis.

On the other hand, in a study done by Pinto, Maryuama, Clark, Cruess, Park and Roberts (2002), promising results were found in that 72% of the sample were in the action and maintenance stages of exercise, 54% engaged in regular, moderate intensity exercise prior to breast cancer diagnosis and 42% reported that exercise participation had increased due to breast cancer diagnosis. Additionally, 74% of the sample believed that exercise could positively change the course of breast cancer.

As can be seen, prevalence rates have varied greatly based on PA definitions. However, more recent studies have tried to overcome this limitation by measuring PA on the basis of recommendations suggested by the Center for Disease Control and



Prevention/American College of Sports Medicine (CDC/ACSM), which in turn, provides more consistency in their measures and makes the comparisons between studies more valid (Blanchard, Cokkinides, Courneya, Nehl, Stein & Baker, 2003; Pinto, Maryuama & Engebretson et al., 1998; Pinto & Trunzo et al.; 2002). Specifically, Pinto, Maryuama and Engebretson et al. (1998) assessed their sample of BCS' and found that according to the CDC/ACSM guidelines for PA, 80% were not meeting the recommended guidelines. Pinto et al. (2002) reviewed exercise participation after completion of breast cancer treatment over 12 months and found that in a sample of 69 women, 58% did not meet the recommended guidelines for PA outlined by the CDC/ACSM. Finally, Blanchard et al. (2003) had a sample of 335 women whom had had breast cancer, which were compared to non-cancer controls, and found that only 23% met the recommended PA guidelines by the CDC/ACSM. Generally speaking, despite the inconsistencies in PA definitions used across studies, it is clear that PA adherence is a problem.

### ***The need for theory (mediation framework)***

The positive physical and psychological benefits that PA can bring BCS' in terms of both coping with breast cancer and during rehabilitation has been illustrated through research (Pinto & Maryuama, 1999; Courneya, Mackey & Fairey, 2003). As a result, PA is emerging as an important alternative form of therapy in light of its benefits.

Unfortunately, based on the above PA adherence results, it is clear that PA adherence is a problem for BCS' despite the numerous benefits it can bring. Before developing an intervention to increase PA in this population, however, it is important to identify key theoretical mediating variables that account for significant variance in PA. Then, an

intervention can be designed to influence these mediating variables in addition to PA (see figure 1).

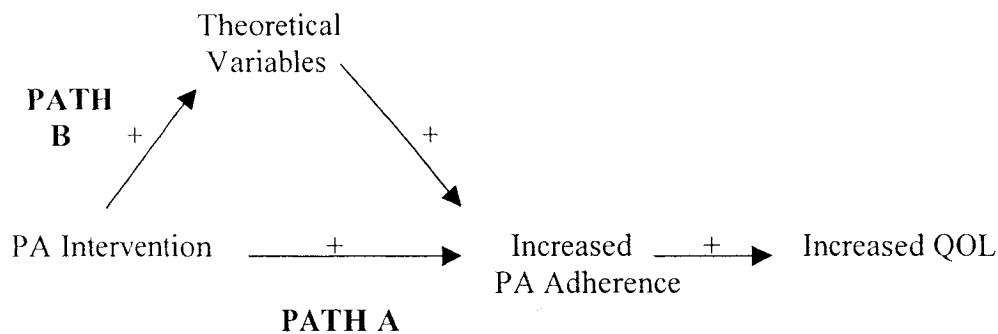


Figure 1. Mediation framework. (Baranowski, Anderson & Carmack, 1998)

For example, using this framework, PA can be increased via (1) a PA prescription (path A), and (2) by increasing the BCS' self-efficacy (i.e. confidence that they can adhere to PA) (path B). In using such a framework, positive changes within the mediational variables will lead to greater increases in PA that will improve overall QOL in BCS' after treatment.

#### ***What model should be used?***

To understand the issues underlying PA motivation and adherence within the breast cancer population, it is critical to identify the correlates associated with PA. The development of PA interventions is dependant upon this understanding and can be facilitated by the theoretical understanding of the correlates of PA within this population (Blanchard, Courneya & Rodgers et al., 2002; Courneya, Blanchard & Laing, 2001; Courneya & Friedenreich, 1999b; Leddy, 1997; Pinto, Maryuama & Clark, et al., 2002). In the breast cancer population to date, theoretical approaches and intervention strategies used to promote PA have relied upon intrapersonal (e.g., attitudes) and interpersonal (e.g., subjective norms) variables to understand PA behaviors. Unfortunately, these

studies were limited by not looking at variables beyond the individual and their social support networks (Blanchard, Courneya & Rodgers et al., 2002; Courneya, Blanchard & Laing, 2001; Courneya & Friedenreich, 1999b; Leddy, 1997; Pinto, Maryuama & Clark, et al., 2002).

Therefore, PA research and practice may benefit from the application of a model that is wider in scope and assesses the influences/correlates of PA from a more comprehensive framework (Sallis & Owen, 1997). Moreover, a model that addresses the multiple levels of influence on an individual's behavior and life circumstances is needed to expand upon past theoretical approaches (Powell, Kreuter & Stephens, 1991). The social ecological model highlights the importance of targeting multiple levels of health behavior and PA and posits that, "effective and lasting behavior change at the individual level requires interventions that target the individual, the individual's environment, social relationships, communities and governmental policies" (Emmons, 2000, p. 247) (**see figure 2**).

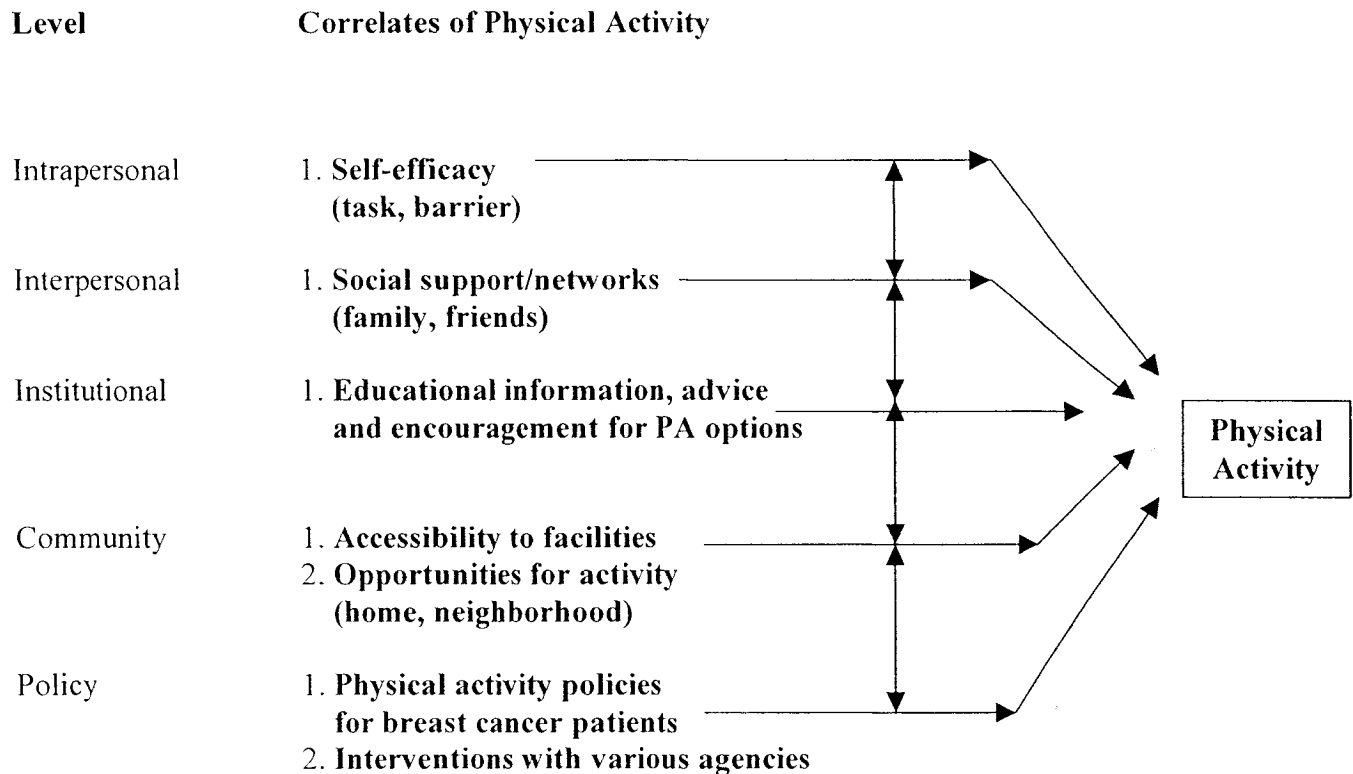


Figure 2. Social ecological model

(Emmons, 2000)

Fortunately, this model incorporates the theoretical perspectives used in past research on the breast cancer population (Blanchard, Courneya & Rodgers et al., 2002; Courneya & Blanchard et al., 2001; Courneya & Friedenreich, 1999b; Pinto, Maryuama & Clark et al., 2002) and other populations (Emmons, 2000; Sallis & Owen, 1997) to understand health behaviors and PA levels in addition to the assessment of PA from other sources that affect PA behaviors (i.e., institutional and environmental factors). The intrapersonal level pertains to individual behavior change that focuses on such factors as attitudes, perceived norms and the self-efficacy beliefs in one's ability. The interpersonal level focuses on the impact that social support and social networks have on the health behaviors of individuals and the motivational influences that these sources encompass. The institutional level focuses on the impact that organizations have on health behaviors,

such as interventions for cancer care to improve the reciprocal relationship between the physician and patient in terms of rehabilitation efforts to improve healthy living. The community level targets the resources available within the community for both opportunities and accessibility to PA and the advocacy and implementation of interventions to promote PA. Overall, the emphasis on both community and policy factors that influence health are important in that resources and policies need to be available to improve programs targeting positive behavior change, such as locality planning, social planning, social action, collaborative empowerment, culturally relevant practices and coalition building (Emmons, 2000).

Models that incorporate an integrated account of the possible correlates of PA, such as the social ecological model, offer a vast array of strategies in which PA can be increased. The central focus of the social ecological model is the environment and this allows for the recognition that people's behaviors are shaped by social and organizational influences (Humpel, Owen & Leslie, 2002). This recognition will further lead to the development of policies and interventions for various populations, such as those struggling with breast cancer, by identifying the factors that need to be changed on various levels to influence PA levels.

***What variables will be included in the model?***

At the **intrapersonal level**, the mediating variable that will be looked at is self-efficacy. Self-efficacy (SE) has illustrated itself as a robust predictor of PA (Bandura, 1986, 1995, 1997; Maddux, 1995; McAuley, 1994; McAuley & Jacobson, 1991; Marcus, Selby, Niaura & Rossi, 1992). More specifically, task SE and barrier SE will be reviewed within the breast cancer population. Task SE refers to an individual's,

“confidence in their ability to perform the elemental aspects of a task [whereas barrier SE refers to an individual’s] confidence in their ability to exercise in spite of environmental demands and challenges” (Rodgers, Hall, Blanchard, McAuley & Munroe, 2002, p. 406). These two forms of SE were chosen because they parallel the goal of PA promotion, which is not to just have people engage in PA, but rather to have them engage in it regularly. Therefore, the role of task and barrier SE in motivating BCS’ to engage in PA will be examined.

According to Self-Efficacy Theory reviews, SE has received “consistent” support within the PA domain and has been found to exert impacts on PA behaviors over time (i.e. initiation, action and maintenance stages of exercise) (McAuley & Courneya, 1993; McAuley & Mihalko, 2002). Moreover, Social Cognitive Theory (SCT) reviews have indicated that among all other psychosocial variables within SCT, SE was the most reliably observed relationship with PA (Baranowski et al., 1998; Marcus, Owen, Forsyth, Cavill & Fridinger, 1998; Stone, McKenzie, Welk & Booth, 1998). Additionally, Pinto et al. (2002) reported that lower task and barrier SE was a prominent finding among breast cancer women who reported lower levels of exercise, especially among those considered overweight. Moreover, the variable of perceived behavioral control (construct of the Theory of Planned Behavior-TPB) includes both self-efficacy and controllability components. Past research in BCS’ has indicated that perceived behavioral control is a significant correlate of intentions for PA behaviors (Blanchard, Courneya & Rodgers et al., 2002; Courneya & Blanchard et al, 2001; Courneya & Friedenreich, 1999a). As a result, task and barrier SE have been illustrated as prominent intrapersonal variables within the breast cancer population in relation to PA.

In addition, research has shown that task and barrier self-efficacy are associated with PA in both non-diseased (Everman, Hartz, Petosa & Suminski, 2004; McAuley, 2000; Motl, Dishman, Saunders, Dowda & Felton, 2002; Wilcox & Storandt, 1996; Winters, Petosa & Charlton, 2003) and chronic diseased populations, such as, fibromyalgia (Buckelew, Murray, Hewett, Johnson & Huyser, 1995; Oliver & Cronan, 2002), diabetes (Allen, 2004; Kavanagh, Gooley & Wilson, 1993), chronic obstructive pulmonary disease (Kaplan, Reis, Prewitt & Eakin, 1994; Toshima, Kaplan & Reis, 1990), cardiac rehabilitation (Blanchard, Rodgers, Courneya, Daub & Black, 2002), and ischemic heart disease (Maddison & Prapavessis, 2004). Therefore, further investigation into self-efficacy as a predictor of PA within the BCS population is warranted.

At the **interpersonal level**, the mediating variable that will be looked at is social support. More specifically, perceptions of social support from family and friends will be reviewed. Social support being the support and praise from significant others that provides assurance about confidence in being physically active (Culos-Reed, Gyuresik & Brawley, 2001). Research has shown that the normative beliefs that are a part of social norms have an impact on performing various behaviors (Courneya & Friedenreich, 1999b). The salient normative beliefs most prominent in a review of 18 studies by Godin and Kok (1996) in relation to PA in various populations has illustrated that family members and friends have the most prominent impact on PA-related behaviors. Additionally, a review of 91 studies assessing correlates of PA among women found that social support was an overwhelmingly positive correlate of PA for all women (Eyler, Wilcox, Matson-Koffman, Evenson, Sanderson, Thompson, Wilbur, Rohm-Young, 2002).

At the interpersonal level, perceptions of social support from family and friends and subjective norms (construct of the TPB) have illustrated that these social networks influence the perceptions of women with breast cancer who partake in PA and their adherence rates (Courneya & Friedenreich, 1999b; Mustian et al., 2002; Pinto, Maryuama & Engebretson et al., 1998). For example, Courneya and Friedenreich (1999b) suggested that the cancer experience is a novel situation where previous personal experience is unlikely, which may make it more likely for patients to rely on the views of significant others when deciding on behaviors they should do, such as PA. In addition, Rogers et al. (2004) and Leddy (1997) found that confidence in PA would occur if social networking and support was addressed and that support from family and friends was one of the strongest personally oriented incentives for PA in BCS'. Therefore, social support among family and friends for PA will be examined within this study.

At the **institutional level**, the mediating variable that will be looked at is the interpersonal climate of a group of providers/practitioners for health. The importance of social contexts in influencing the motivation, performance, and well-being of the individuals who operate within them has been highlighted through one of the central tenets of the Self-Determination Theory (SDT, 2005). It is noted that when assessing the health care climate of a group of providers/practitioners, the "interpersonal" context between the patients and this group is being looked at, however, most of the research on the effects of *environmental events* in intrinsic motivation has focused on the issues of autonomy versus control (Ryan & Deci, 2000). Therefore, the role that the health care providers/practitioners play within the organizations/institutions that contribute to the care of BCS' (i.e. staff at Ottawa Regional Cancer Centre) will be looked at in terms of



the autonomy, support and educational information given for PA behaviors. The individuals who provide care at the institutional level come with expertise that can be very persuasive in terms of behavior change. Therefore assessing the views of the BCS' in relation to these individuals is important and needs to be a focus of the intervention target within the social ecological model. Therefore, in health care, autonomy support is the orientation of providers/practitioners in relation to patient centeredness (Williams, Freedman & Deci, 1998). Support is distinguished as autonomous versus controlled in that, "behavior is autonomously motivated to the extent that people experience a sense of volition, self-initiation and personal endorsement of the behavior, [whereas when controlled] people feel pressured to behave by some interpersonal or intrapsychic forces" (Williams et al., 1998, p. 1644).

Research in other populations that have assessed patients' perceptions of health care staff's autonomy support have found that when health care providers' supported patients' autonomy, such as, listening carefully to patients' perspectives, encouraging questions, providing relevant information, offering choices about treatment regimens, supporting patient initiatives and minimizing control, patients were more autonomously motivated to behave in healthier ways (SDT, 2005). These findings included better adherence to prescribed regimens (Williams, Rodin, Ryan, Grolnick & Deci, 1998), long-term maintenance of exercise and weight loss in obese patients (Williams, Grow, Freedman, Ryan & Deci, 1996), maintenance of smoking cessation in adults (Williams & Deci, 2001), better glucose controls (HbA1c reduction) for patients with diabetes (Williams, Freedman & Deci, 1998) and active participation in an alcohol treatment program (Ryan, Plant & O'Malley, 1995).

To date, at the institutional level, studies have examined the influence that this level has among the breast cancer population and PA, however, it has been limited. For instance, the lack of knowledge and information from cancer care staff and health care providers regarding PA during rehabilitation has shown in past research studies to be very poor (Cooper, 1995; Courneya & Mackey et al., 2000; Rogers et al., 2004; Young-McCaughan & Sexton, 1991). For instance, most cancer patients are not counseled by their healthcare providers in that little or no information on PA is received nor is PA prescribed as a part of any rehabilitation efforts in recovery or during cancer treatment. Furthermore, among those studies within the breast cancer population, it was found that the role of physicians and knowledgeable staff in providing support, guidance and education for PA was needed (Courneya et al., 2001; Courneya & Friedenreich, 1999b; Rogers et al, 2004). Given that previous research has shown that the health care climate can have a positive effect on health-related behaviors in other populations, its impact on BCS' PA behaviors appears warranted.

At the **community level**, the mediating variables that will be looked at are environmental factors. More specifically, accessibility and opportunities existent within the home and neighborhood towards PA will be assessed. The PA of adults in general has been associated with factors from multiple domains and influenced by personal, social and environmental factors (Trost, Owen, Bauman, Sallis & Brown, 1996). Humpel et al. (2002) identified the significance that environmental variables can have on levels of PA among adults and the importance of focusing on these factors to induce positive changes within PA settings. Such variables within the home and neighborhood environment consist of accessibility to facilities (e.g., paths, parks, health clubs) and

opportunities for activity (e.g., home equipment, organized sports) (see Appendix B for findings regarding environmental influences on PA). Furthermore, Trost et al. (1996) provide a comprehensive summary that provides evidence that factors beyond the individual level play an important role in influencing PA among adults (see Appendix C for the summary of factors related to levels of adult PA), particularly, access to facilities and available home exercise equipment.

Finally, the association between environmental variables and PA within a breast cancer population has yet to be examined. Given that the environmental level of the social ecological model has been significantly associated with PA in non-diseased populations, examining its relationship with PA in BCS' may offer novel information to this particular group.

### ***Purpose of this study***

The social ecological model offers a framework for addressing multiple factors that influence PA levels among the breast cancer population by highlighting adherence issues through the identification of PA correlates. To date, no ecological perspective has used this approach within this population. By using this approach, delivery of knowledge, resources and action can be combined across the various levels of influence and focus on both the individual who makes the positive behavior change and also the social processes and agencies that facilitate these changes. As such, it will provide an integrated account of the correlates that facilitate, debilitate and influence PA within BCS'. Because of this, efforts to improve the rehabilitation of BCS' can be further implemented, which, in turn will enhance QOL within this population.

Therefore, this study proposes to:

- 1) to test six key variables housed within a social ecological framework that act as correlates of PA, during a one month period in 50 BCS' post-treatment.

It is hypothesized that:

- 1) self-efficacy (task and barrier), social support, the health care climate, and environmental factors (accessibility and opportunities within the home and neighborhood) will be independent correlates of PA within the intrapersonal, interpersonal, institutional and community levels of influence.

### ***Contributions of the study***

Physical activity research in relation to breast cancer is a relatively new area in the field that did not begin until the mid 1990's. To date, there have been significant contributions in terms of the emphasis on PA having important implications for cancer control across the entire cancer experience. With this being said, there is a growing interest in the possible role of PA within a breast cancer population based on the findings derived from preliminary research. However, future research is needed to build upon these positive findings in order to assist in the development of effective interventions for this population. Additionally, research on the correlates of PA during the post-treatment time period during the breast cancer experience has only received minimal attention, therefore requiring future inquiry.

By using a social ecological perspective to assess the mediating variables that account for significant variation in PA within a post-treatment breast cancer population, the identification of PA correlates can be acknowledged. Furthermore, a social ecological approach targets five levels of behavior change that will provide a variety of

ways to target adherence issues highlighted previously within this population. Moreover, this approach allows for a more realistic emphasis on PA expectations by not focusing solely on the individual who makes the health behavior choices, but also those social processes and agencies that profoundly influence those choices.

Most PA interventions to date are based upon a cognitive-behavioral approach that informs individuals about PA, but these programs have yet to produce the long-term effects on PA hoped for as seen from the PA prevalence data existent both within the general and breast cancer population. As a result, the goal of developing a theoretically based PA intervention aimed at increasing PA among BCS' can be pursued through the investigation of variables at four critical areas (i.e. intrapersonal, interpersonal, institutional and environmental) of the intervention target while using the support systems that will be established through this research (i.e. Breast Cancer Action Community Centre, Ottawa Regional Cancer Centre, voluntary BCS' participation) to carry out the multi-level intervention goal.

## **Chapter III**

### **Methodology**

The following section contains a description of the methodology that was used in the present study. The research design, sampling, measurement tools, procedures and data collection used to address the research hypotheses are discussed.

#### ***Research design***

A quantitative approach was taken to identify the key social ecological correlates of PA among BCS' due to the nature of the scales used and the output of the activity data obtained through the accelerometers. This approach was chosen because it allows for the, "manipulation of numerical data through statistical procedures for the purpose of describing phenomena [and] assessing the magnitude and reliability of relationships among them" (Polit, 1996). The independent variables were task SE, barrier SE, social support, the health care climate and the home and neighborhood environmental factors. The dependant variable was PA. This study utilized a repeated measures design in that a single group of participants (BCS') had a psychological assessment at two different time points (i.e., week 1 and week 4) in addition to wearing an accelerometer for the four week duration of the study.

#### ***Measures***

##### ***Psychological Indicators.***

The questionnaire was designed according the theoretical framework of the social ecological model (Emmons, 2000). The questionnaire consisted of seven sections, in which each section pertains to a certain level of influence within the model that assesses a variety of correlates of PA (see below):

### ***Intrapersonal Level.***

#### ***Part 1 – Demographics*** (see Appendix D)

Demographic information was measured to understand the characteristics of the people who were voluntarily participating in this study. Self-report measures included age, marital status, number of children, number of children living at home, education, annual family income, employment status, height, weight, date of treatment completion, date of breast cancer diagnosis and treatment modalities received.

#### ***Part 2 – Task Efficacy Scale*** (see Appendix E)

This measure was designed to tap the BCS' task SE (intrapersonal) with respect to engaging in regular PA during the next four weeks. Task SE was assessed by four questions answered on a 7-point Likert scale ranging from 1 (extremely unconfident) to 7 (extremely confident). The participants were asked, during the next 4 weeks, how confident are you that you will engage in regular PA for (a) one week out of four weeks; (b) two weeks out of four weeks; (c) three weeks out of four weeks; and (d) four weeks out of four weeks? In the present study, the mean was calculated to create the task SE scale. This scale was developed according to Bandura's (1986) recommendations to be context specific in that the questions reflect the generative capabilities of the BCS' to achieve the behavior in question (PA). Regular PA was defined within the Health Canada guidelines.

This scale has been shown to be valid and reliable in previous research (Blanchard, McGannon, Spence, Ryan, Rhodes, Nehl, Baker & Bostwick, 2005; Blanchard, Rodgers, Courneya, Daub & Black, 2002). Internal reliability was excellent in the present study ( $\alpha = .982$ ).

***Part 3 – Barrier Efficacy Scale*** (see Appendix F)

The barrier SE scale was an 11-item scale designed to measure the BCS' perceived capabilities to engage in regular PA over the next four weeks even in the face of commonly identified barriers to participation. The degree of confidence towards overcoming each barrier was answered based on a 7-point Likert scale ranging from 1 (extremely unconfident) to 7 (extremely confident). The following 11 barriers to PA were presented to the BCS', "during the next 4 weeks, how confident are you that you will engage in regular PA even if you are: too tired/lack energy, you have no time due to work, you are feeling under the weather, you do not feel like it, you have family commitments, the weather is bad (e.g., hot, humid, rainy, cold), you have to exercise alone, you are under personal stress of some kind, you feel self-conscious about your appearance, it costs too much, and you don't have access to facilities".

In the present study, the mean was calculated for the barrier SE scale (N=11). This scale was based on a modified version of McAuley's (1991) barrier SE scale and is in line with Bandura's (1977) recommendations in that the barriers should be within a context that relates to the behavior in question (PA).

This scale has previously shown to be both valid and reliable (Blanchard et al., 2005; McAuley, 1992; 1993). Internal reliability was excellent in the present study ( $\alpha = .913$ ).

***Interpersonal Level.***

***Part 4 – Social Support and Exercise Survey*** (SSES) (see Appendix G)

This measure was designed to tap the interpersonal level by measuring social support for PA. Family living in the BCS' household and friends, acquaintances or



coworkers were to be rated based on the past four weeks regarding their support for PA behaviors. The questions were based on a 5-point ranking system ranging from 1 (none) to 5 (very often). For example, participants were asked, during the past 4 weeks, my family (or members of my household) or friends engaged in PA with me). This survey was derived from Sallis (1986). Sallis, Grossman, Pinski, Patterson and Nader (2002) had reliability coefficients of 0.91 for family support and 0.84 for friend support. In the present study, the sum was calculated for the family support (N=10) and friend support (N=10) for PA participation scales and the internal reliability was assessed, resulting in cronbachs alphas of .916 and .944 respectively.

### ***Institutional Level.***

#### ***Part 5 – Health Care Climate Questionnaire (HCCQ) (see Appendix H)***

This measure was designed to tap the institutional level by evaluating the role that health-care providers/practitioners play in terms of promoting, facilitating or providing educational information regarding PA. The 6-item HCCQ is derived from the 15-item HCCQ and the items are worded according to the context in which it is applied (HCC/PA) (SDT, 2005). The original HCCQ has 15 items and has been used in several studies, with alphas ranging from 0.92 to 0.96 (Williams, Grow, Freedman, Ryan & Deci, 1996; Williams, McGregor, Zeldman, Freedman & Deci, 2004). The shortened version of the scale has been highly correlated with the full scale thus indicating adequacy (Williams, Freedman & Deci, 1998). With the 6-item scale, the alpha has been 0.82 (SDT, 2005). The HCCQ was answered based on a 7-point Likert scale ranging from 1 (not at all true) to 7 (very true). For example, participants were asked, I feel that my healthcare providers/practitioners have provided me with choices and options about PA

(including not being regularly active). Across domains (i.e., cessation of smoking, eating healthy, exercising and using alcohol responsibly), internal consistency for the HCCQ is good (i.e., alpha coefficient = .82) and it has been previously validated (SDT, 2005; Williams, Cox, Kouides & Deci, 1999; Williams & Deci, 2001; Williams, Freedman & Deci, 1998; Williams, Gagne, Ryan & Deci, 2002; Williams and Grow et al., 1996; Williams, Rodin, Ryan, Grolnick & Deci, 1998). In the present study, the mean was calculated for the health care-climate scale (N=6) and the internal reliability was assessed, resulting in a cronbach's alpha of .926.

### ***Environmental Level.***

#### ***Part 6 - Home Environment Scale*** (see Appendix I)

This measure was designed to tap the community level by evaluating the home environment. The Home Environment Scale assesses opportunities and accessibility to 13 commonly used pieces of equipment within the home. For example, participants were asked, during the next four weeks indicate which items you will have access to in your home, yard, or apartment complex: stationary aerobic equipment, bicycle, running shoes, etc. The accessibility options were answered based on a dichotomous rating of yes or no. This scale was derived from Sallis, Johnson, Calfas, Caparosa and Nichols (1997) and has a test-retest (intra-class correlation) of .89. This scale has been previously validated (Blanchard & McGannon, et al., 2005). In the present study, the sum was calculated for the home accessibility scale and the internal reliability was assessed. The cronbachs alpha was .620.

***Part 7 - Neighborhood Convenient Facilities Scale*** (see Appendix J)

This measure was designed to tap the community level by evaluating the neighborhood environment. The Neighborhood Convenient Facilities Scale assesses accessibility to nine common neighborhood facilities. For example, participants were asked, during the next 4 weeks indicate which items you will have access to in your neighborhood: bike paths, walking paths, public parks, etc. The accessibility options were answered based on a dichotomous rating of yes or no. This accessibility scale was derived from Sallis, Johnson, Calfas, Caparosa and Nichols (1997) and has a test-retest (intra-class correlation) of .80. This environmental scale has been previously validated (Blanchard & McGannon, et al., 2005). In the present study, the sum was calculated for neighborhood accessibility scale and the internal reliability was assessed. The cronbachs alpha was .738.

***Physiological Indicators.***

***Resting energy expenditure (REE) test.***

Resting energy expenditure (REE), or basal metabolic rate (BMR), represents the amount of calories required for a 24-hour period by the body during a non-active period. This comprises a series of functions that are essential for life, such as cell function and replacement; the synthesis, secretion and metabolism of enzymes and hormones to transport proteins and other substances and molecules; the maintenance of body temperature; uninterrupted work of cardiac and respiratory muscles; and brain function. Depending on age and lifestyle, REE/BMR represents 45 to 70 percent of daily total energy expenditure, and it is determined mainly by the individual's age, gender, body size and body composition (Brooks, Fahey, White & Baldwin, 2000).

Resting energy expenditure was assessed using the Deltatrac II Metabolic Monitor. Deltatrac, “is a very precise metabolic monitor, and is accurate within 3% for gas exchange and EE. [The respiratory quotient (i.e., the ratio of the volume of carbon dioxide expired to the volume of oxygen consumed)] is measured with greatest reproducibility and accuracy (within 0.2%), making the monitor particularly suitable for studies of substrate utilization” (Wells & Fuller, 1998, p. 536). Furthermore, REE/BMR measurements (indirect calorimetry) remains the most appropriate clinical tool for accurate measurement of REE (Flancbaum, Choban, Sambucco, Verducci & Burge, 1999) and has excellent reliability with a reproducibility index of 95% (Ventham & Reilly, 1999). The raw results from the Deltatrac were placed into an equation (Weir Formula) to determine the REE and substrate utilization. The middle 20 minute expiration results were used to identify the respiratory quotient (RQ) (average  $\text{VCO}_2/\text{average VO}_2$ ) and REE/day using the Weir formula ( $[(\text{RQ} \times 1.1) + 3.94] \times [\text{average VO}_2/1000] \times [60 \times 24]$ ).

The purpose in needing the REE/BMR values was because the accelerometers output activity energy expenditure values (AEE) did not take into account basal metabolism (BMR). As a result, when comparing total energy expenditure (TEE), basal metabolism needs to be considered because individuals with a higher percentage of body fat will naturally have higher energy expenditure values, therefore, the inclusion of basal metabolism provides a convenient way of controlling for age, sex, weight and body composition.

***DEXA (dual-energy x-ray absorptiometry).***

Dual-energy x-ray absorptiometry is most commonly used to measure bone density, but it also measures body fat percentage and indicates the regions where most of your fat is located. Presently, this scan is considered a gold standard for measuring body fat and bone density. For the test, a patient lies down on an examining table, and the scanner rapidly directs x-ray energy from two different sources towards the area being examined in an alternating fashion at a set frequency. DEXA is a simple, non-invasive procedure. Once on the table, the patient is asked to hold a steady position for a short time while the arm of the machine passes over the patient's body taking measurements. It is important that the patient stay as still as possible during the procedure to ensure a clear, useful image. No anesthesia is required.

The procedure is painless and radiation exposure is minimal. Exposure from the DEXA rays is equivalent to less than the natural background from one day of exposure to sunlight. This measurement is routinely performed and poses no serious risk to health (Mazess, Barden, Bisek & Hanson, 1990). DEXA has low precision errors in that a relative error of 0.8% for bone mineral density and 1.5% for lean body mass has been indicated (Mazess et al., 1990). Furthermore, DEXA has been shown to be an accurate (standard error ranging from 1.4 to 1.6 kg for fat total mass) (Salamone, Fuerst, Visser, Kern, Lang, Dockrell, Cauley, Nevitt, Tyllavsky & Lohman, 2000), reliable (minimal significant variability at 95% confidence level was 3% for % total body fat and 99 and 1.4% for total body fat free mass) (Gajardo & Barrera, 1998) and precise (mean all-point CV of .43%) (Orwell & Oviatt, 1991) method of body composition analysis. The purpose

in using the DEXA was to include the body composition values (total % region fat) in the decriptives for this sample.

***Actical accelerometer.***

A biaxial, multidirectional accelerometer was given to each BCS to wear for four weeks during all waking periods. Specifically, the Actical Accelerometer manufactured by Mini Mitters Inc. was used. The Actical is small (28 x 27 x 10 mm), lightweight (17.5 g) and waterproof (Biolynx, 2005). The Actical is designed for measurement of whole body PA. The preferred placement of the Actical is on the iliac crest (attached to a Velcro band that is similar to a belt) and in line with the plane of the knee. To insure consistency in measurement across all BCS', the right iliac crest and knee were chosen for Actical placement.

The Actical is sensitive to movements in the 0.5 to 3 Hz range, therefore allowing for detection of sedentary movements as well as high-energy movements. The Actical's reduced frequency range also minimizes the effect of undesirable noise impulses, which tend to skew energy expenditure results (Puyau, Adpolh, Vohra, Zakeri & Butte, 2004). The digital integration process of the Actical is recognized for reporting both intensity and range of motion and the sensor reports movement in all planes, rather than just an up/down direction.

The Actical has been found to account for 81% of the variability in activity energy expenditure and physical activity ratios (Puyau et al., 2004). The Actical has also been shown to be both valid and accurate in discriminating sedentary, light, moderate and vigorous levels of physical activity with the positive predictive values being 81, 68, 72 and 74% respectively (Puyau et al., 2004).

This measurement was used to objectively assess the amount of PA (duration and intensity) and energy expended each day by the BCS'. The purpose in choosing a four week time frame to assess PA using the accelerometers was due to the commitment of wearing the device on a daily basis and due to the financial and time constraints in having access to the accelerometers for 50 BCS'. As a result of the recoding time required, the Actical was set to record for 45 days at one minute epoch lengths. The accelerometer was used to assess total activity energy expenditure (taking into account a run-in period), average energy expenditure per day, and the amount of minutes and ratio of accumulated time within each activity range (sedentary, light, moderate and vigorous).

### ***Procedures***

#### ***Recruitment.***

Participants (BCS') for the study were recruited from Breast Cancer Action (BCA), an Ottawa based breast cancer support group, and the Ottawa Regional Cancer Centre (ORCC). Voluntary adult female BCS', >18 years, English and/or French speaking/reading/writing whom were one to five years post-treatment for breast cancer were approached. Using  $\alpha$ -Power for power estimation based on 6 correlates of PA ( $ES=0.25, \alpha=0.5, \beta=0.80$ ) it was determined that 50 BCS' would need to be recruited.

Posters (11 x 17) were given to Breast Cancer Action to attract interested BCS' containing information regarding the study as well as the research coordinators name and contact information at the Behavioral and Metabolic Research Unit at the Montfort Hospital (see Appendix K for poster advertisements in both official languages). Information sheets were also given to BCA as the contact sheets between interested BCS'

and the research coordinator (see Appendix L for participant information sheets in both official languages).

Recruitment within the Ottawa Regional Cancer Centre was coordinated between the research coordinator and Dr. Roanne Segal, the principal investigator for this study at the Ottawa Hospital. Dr. Segal presented a synopsis of the study to the other oncologists within the hospital so each oncologist was aware of what BCS' may be approached regarding the study's eligibility criteria. Posters (11 x 17) were also given to the ORCC to attract interested BCS' with contact information referring those interested to contact their primary oncologist (see Appendix M for poster advertisements in both official languages). Participant information sheets were also given to Dr. Segal to provide contact information between the research coordinator and interested BCS'.

Once information sheets were received from Breast Cancer Action and the Ottawa Regional Cancer Centre, initial communication began between interested BCS' and the research coordinator or interested BCS' contacted the research coordinator based on the contact information given in the posters and information sheets. Based on the contact numbers provided, the research coordinator would contact each BCS to confirm eligibility in the study according to the inclusion criteria (female, 18 years +, 1-5 year post-treatment range, and English and/or French) and to provide an in-depth explanation of the study protocol (to follow). Further questions on the BCS' behalf were addressed regarding the procedure of the study. Two appointments over a period of four weeks were required of each BCS. The month in which the appointments took place were screened to verify that it was within a time period that each BCS was within their normal lifestyle (i.e. not on vacation). This was a necessity because normal behavioral patterns



(i.e. PA levels) were to be assessed so accurate measurements could be made. If all eligibility criteria were met, a baseline appointment was set up for the BCS.

Study recruitment began on November 24, 2004 and finished on July 18, 2005. Information packages were mailed to the participants throughout September 2005. Fifty BCS' were recruited in total. Forty four BCS' were recruited through BCA. This recruitment was a combination of women who used BCA for a variety of reasons such as, for a support center, for the exercise classes offered there, for the information sessions held there (i.e. adjuvant therapy seminar) or due to BCA being a meeting location for BCS dragon boaters. Additionally, those BCS' on the BCA distribution list whom read the January 2005, volume 7, issue 1, newsletter in which the research coordinator had written an article entitled, *Can Physical Activity Improve Your Quality of Life*, and provided an opportunity for those interested in such information to take part in the research study was also a very successful recruitment strategy through BCA. Six BCS' were recruited from the ORCC through Dr. Roanne Segal.

Two BCS' whom wanted to participate were unable to due to not meeting the post-treatment criteria (under one year of post-treatment). Three BCS' who filled out information sheets were unable to be contacted due to incorrect contact information listed. Two BCS' dropped out of the study previous to the baseline assessment due to concern regarding the DEXA radiation and due to a recurrence of breast cancer. Three BCS' whom displayed interest declined participation once explained the study in further detail due to being too busy to commit to two appointments. Lastly, four BCS' had to be turned away due to the study reaching recruitment capacity and lack of funds to continue

recruitment any further. Furthermore, it was also identified that 12 of the BCS' recruited were a part of a dragon boat racing team.

### ***Data Collection***

The appointments took place at the Behavioral and Metabolic Research Unit, which is attached to the Montfort Hospital. The following sequence of events took place for each BCS' appointments:

#### ***Week 1: Baseline Assessments.***

##### ***Consent and 'PAR-Q & You'.***

BCS' were asked to sign a consent form regarding the background and the purpose of the study, which included an explanation of the study protocol. The 'PAR-Q & You' was given to assess for any possible medical conditions that may limit or prevent participation in PA (see Appendix N for consent form and 'PAR-Q & You' in both official languages).

##### ***Demographic and medical information.***

During the beginning of the baseline assessments, each BCS was asked about their breast cancer diagnosis, treatment modalities and dates of treatment(s). Furthermore, date of birth, age, height and weight were recorded.

##### ***Resting energy expenditure (REE) test.***

Eight hours of fasting prior to the test was required with the allowance of water only. After a 20 minute resting period in the supine position in a dimmed room, a plexiglass hood was placed over the head of the BCS to draw fresh air and analyze expired air (% oxygen and % carbon dioxide) for a period of 30 minutes (total time = 50 minutes).

***DEXA (dual-energy x-ray absorptiometry).***

The BCS' were asked to remove all clothing and jewelry and dress in a gown prior to lying on the DEXA examination table. Once on the table, the BCS was positioned according to the DEXA table lines and their body was pulled at the neck, shoulders and feet to ensure that they were fully extended. The BCS' arms were stretched and placed alongside their body with their palms facing down. Once positioned, the BCS was asked to remain completely still and not speak while the low-intensity x-ray scanned the entire body (total time = 6 minutes).

***Physical Activity Correlates Questionnaire.***

The questionnaire assessed the social ecological correlates of PA in order to evaluate factors that may explain why or why not BCS' engage in PA (total time = 20-25 minutes).

***Actical accelerometer.***

No obligation existed to wear the accelerometer when showering or bathing (total time = all waking periods/4 weeks), however, two bands were given to each BCS to allow for the Actical to be worn during water activities as well (i.e., swimming). Prior to submitting the Actical to the BCS', demographic information (age, height, weight and race) was uploaded into the Actical using the Actical Analysis Software Version 2.0. Thereafter, the Actical placement instructions (i.e., on right iliac crest in line with the knee) was given to the BCS and any questions were addressed.

***Incentive.***

Twenty-five dollars in cash was given to each BCS as an incentive to assist in traveling costs. Additionally, a consent form acknowledging the transfer of money was

signed by the research coordinator and the BCS as a stipulation put fourth by the study sponsors (see Appendix O (a) for proof of incentive transfer). Thereafter, the four week follow up appointment was booked and a parking pass for the hospital lot was administered.

***Reminder call.***

The research coordinator called each participant the day before the second appointment during week four as a reminder for the upcoming appointment.

***Week 4: Follow Up Appointment.***

***Physical Activity Correlates Questionnaire.***

The same questionnaire as filled out in week one was given again during the follow-up appointment (total time = 20-25 minutes).

***Actical Accelerometer.***

The accelerometer was returned and the research coordinator downloaded the information into the Actical Analysis Software Version 2.0 to ensure that the device recorded the PA measurements each day (total time = 20 minutes) and to retrieve the PA data output.

***Mailing Address.***

The mailing address of each BCS was recorded in order to send an information package after analysis of the data had taken place.

***Incentive.***

Twenty-five dollars in cash was given to each BCS as an incentive to assist in traveling costs for the follow-up appointment. Additionally, another consent form

acknowledging the transfer of money was signed by the research coordinator and the BCS (see Appendix O (b) for proof of incentive transfer).

## Chapter IV

### Statistical Analyses & Results

#### *Participant Sample*

As can be seen from Table 1, the 50 recruited BCS' had a mean age of 55.6 (SD = 9.0), a mean BMI of 25.7 (SD = 3.8), a mean total fat region of 37.9% (SD = 7.4), had been diagnosed with breast cancer approximately 40.5 months ago (SD = 16.2) and completed their breast cancer treatment(s) approximately 31.7 months (SD = 15.7) prior to study enrollment. Table 2 shows that 34% of the sample was married, 39% had higher than a university level of education, 25% reported an annual household income of more than \$80,000, 50% of the sample was both actively employed and retired and a combination of treatment modalities (i.e., surgery, radiation and chemotherapy) was the most common form of breast cancer treatment among the women (30%).

Table 1. Descriptives of continuous demographic variables.

| <b>Demographics</b>                      | <b>N</b> | <b>Mean</b> | <b>SD</b> |
|------------------------------------------|----------|-------------|-----------|
| Age                                      | 50       | 55.62       | 9.01      |
| Number of children                       | 50       | 1.84        | 1.43      |
| Number of children living at home        | 50       | 0.68        | 0.93      |
| Time since treatment completion (months) | 50       | 31.66       | 15.65     |
| Time since BC diagnosis (months)         | 46       | 40.54       | 16.24     |
| BMI                                      | 50       | 25.73       | 3.78      |
| Dexa (% total fat)                       | 50       | 37.86       | 7.41      |
| Waist circumference (inches)             | 45       | 32.80       | 4.53      |

Table 2. Descriptives of categorical demographic variables.

| <b>Demographics</b>          | <b>Frequency</b> | <b>%</b> |
|------------------------------|------------------|----------|
| <b>Marital status</b>        |                  |          |
| married                      | 34               | 68       |
| other                        | 16               | 32       |
| <b>Education</b>             |                  |          |
| <university                  | 11               | 22       |
| >university                  | 39               | 78       |
| <b>Income</b>                |                  |          |
| <\$79, 999                   | 21               | 42       |
| >/\$80, 000                  | 25               | 50       |
| <b>Employment</b>            |                  |          |
| employed                     | 25               | 50       |
| other                        | 25               | 50       |
| <b>Treatment modalities</b>  |                  |          |
| surgery/radiation/chemo      | 30               | 60       |
| other                        | 20               | 40       |
| <b>BMI weight categories</b> |                  |          |
| 18.5-24.9 – normal           | 25               | 50       |
| 25+ - overweight/obese I     | 25               | 50       |

### *Violations*

Data was analyzed using the SPSS Version 12.0. Prior to beginning any analyses, the normality of each continuous variable was checked. If skewness or kurtosis values for any variable exceeded 1.96, a violation of normality existed (Polit, 1996). For those variables in which normality violations existed, a z-score transformation was completed. For any variables that had a standardized value  $\pm 3.29$ , the original value was deleted for that variable. Based on this analysis, it was found that months since breast cancer diagnosis violated the normality assumption (skewness = 2.666 and kurtosis = 7.290). Therefore, cases 3 (132 months), 10 (177 months), 31 (180 months) and 33 (216 months) were removed and normality was achieved. The violations existent among the social

ecological correlates were for task SE in which cases 21 ( $X = 1$ ) and 47 ( $X = 1$ ) were deleted. However, even though outliers were deleted, a kurtosis violation (4.922) remained for this variable (skewness value = -1.865). Therefore, based on the z-score transformation procedure (Tabachnick & Fidell, 2001), no further values could be removed and the existing transformed variable was proceeded with.

Based on the total energy expenditure variables available through the accelerometer (total = 4 weeks), a run-in period of three days was chosen. A three day run-in period was chosen based on the finding that, “data for the first three experimental days was deleted because subjects tend to increase their PA levels at the beginning of the measurement period when wearing an accelerometer” (Ayabe, Brubaker, Dobrosielski, Miller, Ishi, Yahiro, Takuya, Kiyonaga, Shindo, Tanaka, 2004). Therefore, 25 days of energy expenditure, taking into account the inclusion of the BMR result was used as the total energy expenditure PA variable. A violation existed for the total energy expenditure PA variable and was corrected for by deleting case 4 (96025.50 kcals).

### ***Preliminary Analyses***

Prior to beginning the main analyses, a repeated measures analysis was used to determine if any significant differences between the baseline and post assessment emerged for the social ecological correlates. Based on this analysis, no significant differences (task SE:  $p = .961$ , barrier SE:  $p = .169$ , HCC:  $p = .582$ , SS family:  $p = .632$ , SS friends:  $p = .932$ , Home Access:  $p = .533$ , Neighborhood Access:  $p = .870$ ) were found. As a result, the time 1 task SE, barrier SE, SS, HCC, home access, neighborhood access PA correlates were used in the analysis.



### *Measurement Descriptives*

Below is a decriptives table (refer to table 4) of the PA correlates and energy expenditure PA variables.

Table 4. Descriptives for the social ecological correlates and energy expenditure values.

| <b>Variable</b>                                  | <b>Mean</b> | <b>SD</b> |
|--------------------------------------------------|-------------|-----------|
| T1 Task SE                                       | 6.55        | 0.67      |
| T1 Barrier SE                                    | 5.43        | 1.17      |
| T1 Social Support –<br>Family Participation      | 24.50       | 9.77      |
| T1 Social Support –<br>Friend Participation      | 24.00       | 10.57     |
| T1 Health Care Climate                           | 4.10        | 1.81      |
| T1 Home Exercise Equipment<br>Access             | 5.80        | 2.50      |
| T1 Neighborhood Facility Access                  | 6.80        | 2.11      |
| Total energy expenditure_BMR<br>(25 days) (kcal) | 52716.89    | 8426.70   |
| Average energy expenditure_BMR<br>per day (kcal) | 2092.98     | 318.53    |

T1: time 1, BMR: basal metabolic rate (RMR), kcal: kilocalories

Based on these results, it can be seen that the overall confidence (TSE) of this sample to engage in regular PA was high and that there existed very little variation in the TSE variable results among these BCS'. The mean of barrier SE indicated that overall, this sample was only *slightly confident* in overcoming the various barriers to PA. If family and friends had provided no participation support for PA, then the sum for this scale would have been approximately 10. However, if 100% of participation support was provided for PA, then the sum of the scale would have reached approximately 50. The

sum of family participation and friend participation for this sample indicated that participation support was received *some of the time* for PA from family members and friends. The health care practitioners/providers were perceived as only being *somewhat autonomy supportive* for PA in this sample. The average BCS had 5.80 home environmental supports out of the 13 common home environmental supports. Therefore, less than half of the home environmental supports were accessible in this sample. The average BCS had 6.80 accessible neighborhood environmental supports out of the possible nine most common neighborhood supports available. Overall, it can be seen that this sample appeared to have about 75% commonly identified neighborhood supports available to them in their communities.

### ***Energy Expenditure***

As outlined earlier in the measures section, basal metabolic rate (BMR) should be incorporated into the interpretation of activity energy expenditure results (AEE) when comparing individuals who may vary by age, sex, weight and body composition as a way to control for variations as a result of kilocalories (kcal) burned due to differences in the lean and fat body mass between individuals. There does not exist a generalized total energy expenditure value due to variations in BMR and taking into account the many variations in the lifestyle and physical activities individuals do daily. In contrast, there only exists a recommendation for a target range of energy expenditure for specific PA sessions. For example, the ACSM recommends a minimal threshold of 300 kcal per PA session performed three days per week or 200 kcal per session performed four days per week (minimal threshold of 1000 kcal per week from PA) (ACSM, 2000). Such guidelines are currently non-existent for total (24 hour) energy expenditure. Rather

dietary recording in relation to total energy expenditure are usually combined to monitor a balanced energy input-output ratio and to avoid a positive or negative energy balance.

The BCS' in the present study used a self report measure to indicate their level of confidence in complying with regular PA, however, one benefit of the present study was the ability to validate the "actual" PA levels of the BCS' using an objective assessment of regular PA compliance. As mentioned earlier, the Actical accelerometer has been shown to be both valid and accurate in discriminating sedentary, light, moderate and vigorous levels of physical activity (Puyau et al., 2004). The Actical output provides an overall breakdown of total energy expenditure minutes over a period of 24 hours (1440 minutes/day) (refer to Appendix P for Actical output sample). Therefore, based on this breakdown it was possible to identify whether or not these BCS' were meeting (or not) the Health Canada Guidelines for "regular" PA. Health Canada deems regular PA as accumulating 60 minutes of light intensity PA 4-7 times/week or accumulating 30 to 60 minutes of moderate intensity PA 4-7 times/week or accumulating 20 to 30 minutes of vigorous intensity PA 4-7 times/week. To meet the Health Canada Guidelines each BCS would have to meet the light and/or moderate and/or vigorous intensity range on at least 4 days out of each week the accelerometer was worn (i.e. 16 days). Based on the intensity range results every BCS (N=50) met the Health Canada Guidelines for both light and moderate intensity PA and five BCS' met the vigorous intensity PA guidelines. Overall, the Health Canada Guidelines provide a more descriptive overall representation as to the activity levels present in this sample of BCS' versus the energy expenditure PA variables alone. Based on these results it is evident that this sample of BCS' is quite active and does differ from the current PA literature existent within this population.

### *Correlational Analysis*

Zero-order (bivariate) correlations were conducted between each demographic variable and PA to determine if any of them were potential confounding variables. The bonferroni correction procedure was used (bonferroni correction = 0.05 significance level / 13 demographic variables = 0.004) to avoid making a type I error. Results showed that no demographic variables were correlated to PA.

Since no demographic variables were identified as confounders, zero-order (bivariate) correlations were run between PA and the social ecological correlates. The main correlates as well as the individual home and neighborhood environmental supports (i.e. stationary equipment, bicycle, weight lifting equipment, walking paths, public recreation center, gym, ect...) were used in the analysis (refer to table 5 for the main correlation table).

Table 5. Correlations among PA correlates and total energy expenditure and average energy expenditure per day.

|                           | T1 Task SE | T1 Barrier SE | T1 SS Family | T1 SS Friends | T1 HCC | T1 Home Equip. Access | T1 Neigh. Facility Access | EE_BMR_25days | Avg_EE_BMR/day |
|---------------------------|------------|---------------|--------------|---------------|--------|-----------------------|---------------------------|---------------|----------------|
| T1 Task SE                | 1          |               |              |               |        |                       |                           |               |                |
| T1 Barrier SE             | .608**     | 1             |              |               |        |                       |                           |               |                |
| T1 SS Family              | .206       | .144          | 1            |               |        |                       |                           |               |                |
| T1 SS Friends             | -.097      | -.184         | .021         | 1             |        |                       |                           |               |                |
| T1 HCC                    | .178       | .350*         | .363**       | -.026         | 1      |                       |                           |               |                |
| T1 Home Equip. Access     | -.069      | -.262         | .069         | .264          | -.265  | 1                     |                           |               |                |
| T1 Neigh. Facility Access | .121       | -.032         | .209         | .126          | .084   | -.283*                | 1                         |               |                |
| EE_BMR_25days             | .161       | .290*         | -.039        | -.099         | -.030  | .084                  | .171                      | 1             |                |
| Avg_EE_BMR_day            | .145       | .315*         | .008         | -.090         | .055   | .019                  | .170                      | .998**        | 1              |

SE: self-efficacy, EE: energy expenditure, BMR: basal metabolic rate (RMR)

\*p < 0.05, \*\*p < 0.01

As can be seen, results from this analysis showed that barrier SE was the only significant correlate of total energy expenditure ( $r = .290$ ,  $p = .043$ ) in this sample. No significant relationships resulted from the individual home or neighborhood environmental supports, therefore these individual environmental factors are not shown above. Similarly, for the average energy expenditure per day (Avg\_EE\_BMR/day), barrier SE was the only significant correlate of PA ( $r = .315$ ,  $p = .029$ ).

Being that barrier SE was the only significant correlate of PA in this sample, a follow up analysis was completed to examine which specific barriers were posing issues for PA. Zero-order (bivariate) correlations were run between PA and the specific barriers to PA. (refer to table 6 for the correlation table).

Table 6. Correlations among the individual barriers for barrier self-efficacy and total energy expenditure and average energy expenditure per day.

| Barrier                   | Total EE_BMR_25 days | Average_EE_BMR/day |
|---------------------------|----------------------|--------------------|
| Too tired/lacked energy   | .157                 | .236               |
| No time                   | .262                 | .345*              |
| Feeling under the weather | .274                 | .364**             |
| Do not feel like it       | .316*                | .315*              |
| Family commitments        | .087                 | .106               |
| Weather is bad            | .238                 | .234               |
| Exercise alone            | .270                 | .252               |
| Under personal stress     | .251                 | .267               |
| Self-conscious            | .155                 | .162               |
| Costs too much            | .146                 | .124               |
| No access to facilities   | .215                 | .194               |

EE: energy expenditure, BMR: basal metabolic rate (RMR), \* $p < 0.05$ , \*\* $p < 0.01$

As can be seen, results from this analysis showed that the barrier, do not feel like it, was a significant correlate for total energy expenditure ( $r = .316, p = .027$ ). Moreover, no time ( $r = .345, p = .018$ ), feeling under the weather ( $r = .364, p = .011$ ) and do not feel like it ( $r = .315, p = .029$ ) were significant correlates of average energy expenditure per day.

## Chapter V

### Discussion

The overall purpose of this study was to identify six key variables housed within a social ecological framework that act as correlates of PA, during a one month period in 50 BCS' post-treatment. The role of task SE, barrier SE, social support from family members and friends, the health care climate and environmental accessibility factors within the home and neighborhood were of interest.

#### *Intrapersonal Level*

Within the intrapersonal level of the social ecological model, one of the variables that was examined was task SE. Results showed that task SE had no significant relationship with PA. However, the confidence of this sample to engage in regular PA was very high ( $X = 6.55$  on a scale from 1 to 7) and there existed minimal variation for this outcome ( $SD = 0.67$ ), resulting in a "ceiling effect". Past research has shown that the more physically active you are, the more efficacious you are in your ability to comply and adhere to PA (Courneya & McAuley, 1994; Garcia & King, 1991; Robertson & Keller, 1992; Rudolph & McAuley, 1995), and studies using the transtheoretical model have documented that people in the active and maintenance stages of PA are more efficacious (McAuley & Blissmer, 2000); which is evident in the present sample. Moreover, Rogers, Shah, Dunnington, Greive, Shanmugham, Dawson & Courneya (2005) found that a higher daily energy expenditure (assessed using a pedometer) was associated with higher task SE. Based on the available literature, it would be expected that the task SE would be low to moderate considering that 55% of Canadians are inactive and generally there is a decline in PA levels across the cancer experience, from

prediagnosis to treatment to post-treatment, that are not recovered fully even after years of treatment completion (Blanchard, Courneya, Rodgers & Murnaghan, 2002; Courneya, 2001; Courneya & Friedenreich, 1997; Nelson, 1991; Rhodes, Courneya & Bobick, 2001).

When assessing SE outcomes, a major weakness across studies is that there exists a lack of consistency in the way SE outcomes are defined (McAuley & Mihalko, 2002). In a review of 85 studies assessing SE in relation to PA, six categories of SE beliefs were identified: behavioral, barriers, disease-specific/health behavior, perceived behavioral control, general and other (McAuley & Mihalko, 2002). The present study assessed the behavioral/task efficacy construct by tapping frequency and duration at mild, moderate and vigorous levels of intensity. However, it may have been more accurate to assess disease-specific/health behavior efficacy in the present sample because this measure is for populations that are engaged in secondary prevention of disease via PA rehabilitation. Moreover, this study was observational in nature and perhaps if task SE was assessed based on a specific PA prescription, results may have been more varied and removed the potential for general SE findings. Interestingly, Kingery (1990) found that PA efficacy was correlated more strongly with retrospective PA behavior versus prospective PA behavior assessment; therefore, perhaps a different study design would have provided more varied task SE results in this sample as well.

The second variable assessed within the intrapersonal level of the social ecological model was barrier SE. While this sample of BCS' are considered to be active, further analysis of the specific barriers to PA illustrated that they had low confidence to engage in regular PA when they did not feel like it, had no time because of work, and



were feeling under the weather. The barriers, did not feel like it and feeling under the weather, are not surprising obstacles considering the physiological and psychological sequelae that these BCS' endure after years of treatment (Courneya, 2003; Pinto et al., 2002). Additionally, the barrier of no time because of work could be attributed to the fact that 50% of the present sample reported that they were currently employed either full-time or part-time, however, work responsibilities in regards to volunteer duties and perceived social roles (e.g., care taking) may also be a factor for those women who reported being retired, unemployed and homemakers.

Similar results have been identified in other breast cancer populations. Rogers et al. (2004) found that fatigue, the responsibilities of daily life and work/job commitments were common barriers among breast cancer patients; while Prado, Mamede, de Almeida and Clapis (2004) found that a lack of willpower was the most prominent barrier to PA in this population. Moreover, Leddy (1997) assessed the incentives and barriers to be physically active in women with a history of breast cancer and found the most common barriers reported were lack of time, lethargy and PA not being a part of their routine. Those barriers that did not pose any problems for PA in this sample (i.e., being too tired, family commitments, bad weather, exercise alone, under personal stress, self-conscious, costs too much and do not have access to facilities) have been supported in other populations (Marcus, Eaton, Rossi & Harlow, 1994; McAuley, 1992), but not specifically in a breast cancer population, except for being too tired, which is related to the common side-effect of fatigue due to cancer treatments (Courneya, 2003; Mustian et al, 2002).

Perceived behavioral control has been identified as being conceptually similar to SE (Ajzen, 1991). However, controversy exists regarding this issue (McAuley &

Mihalko, 2002). This argument mostly stems from the perspective that appropriate measurement of PA related SE may be more specific than the recommended approach to the measurement of perceived behavioral control (Ajzen & Madden, 1986). Nonetheless, the theory of planned behavior has been used to assess PA behaviors in a breast cancer population in which control beliefs regarding PA were identified through the perceived behavioral control construct (Courneya, Blanchard & Laing, 2001; Courneya & Friedenreich, 1999). In these studies, the prominent control beliefs regarding PA identified were having no time, other health problems, no one to exercise with, fatigue and no support for exercise. When comparing the control beliefs that were assessed in these studies in relation to the barriers assessed in the present study, the main differences are that Courneya et al. (1999, 2001) included other health problems, pain and soreness, experiencing nausea, and no counseling for exercise. The inclusion of the control beliefs that Courneya and colleagues (1999, 2001) identified may have provided a more specific assessment of barriers in the current population due to their significance in past breast cancer populations. However, one of the benefits of identifying specific prominent barriers in the current study is that the BCS' have identified themselves what barriers are considered hardships for them in trying to engage in PA, which can now be used in the development of a barrier scale more specific to BCS' rather than the simple selection of barriers identified in the literature. Having the population under study be an active agent in identifying the compendium of barriers that are existent for them would provide a much better scale for barrier measurement in the future.

### ***Interpersonal Level***

At the interpersonal level of the social ecological model, the variable of interest was perceptions of social support from family and friends for PA participation. It was found that the degree to which the BCS' perceived family and friends as being socially supportive for PA participation had no significant relationship with their current PA levels. Overall, family and friend support for PA was received *some of the time*. Furthermore, it was surprising that friend support for PA was not significant considering that 12 of the BCS' in this sample were a part of the dragon boat racing team. However, it should be noted that this activity is seasonal for these survivors.

Past literature using the theory of planned behavior to assess determinants of PA among cancer patients has found intention to be the strongest determinant of PA behavior (Blanchard et al., 2002). Attitude and perceived behavioral control have generally accounted for more of the variation in PA intentions within the theory of planned behavior versus subjective norm. However, subjective norm has been found to explain between 14% to 35% of the variance in intentions to be physically active in breast cancer populations (Blanchard et al., 2002; Courneya, Blanchard & Laing, 2001; Courneya & Friedenreich, 1999b). Based on the results, it may be expected that social support would be significantly correlated to PA within this breast cancer sample as well. Possibly a parallel to past significance is not being seen in the present study due to the definitions associated with one's social support network. The theory of planned behavior defines subjective norm as "people important to me". The probes used in the current study to refer to one's social support network as "anyone living in your household" and "friends, acquaintances, or coworkers". As a result, the theory of planned behavior may

be a useful model to promote PA after cancer diagnosis, but nevertheless its results may not be as generalizable in other breast cancer populations who use different scales to assess the effect of social support on PA behaviors.

Courneya, Blanchard & Laing (2001) have pointed out that limited variability in scales may significantly reduce the magnitude of the relationship found between two variables. In the present study, there was not much variability in the family participation for PA scale ( $SD = 0.97$  on a scale ranging from 1 to 5) as was seen in the subjective norm scales in the theory of planned behavior studies ( $SD = 1.43$  on a scale ranging from 1 to 7;  $SD = 1.00$  on a scale ranging from 1 to 7; and  $SD = 1.96$  on a scale ranging from 1 to 7) (Blanchard et al., 2002; Courneya, Blanchard & Laing, 2001; Courneya & Friedenreich, 1999b). Therefore, the lack of variability in the present scale may account for the reduced significance seen in the family support for PA participation outcome as compared to the significant results found for the subjective norm component in previous breast cancer populations.

Pinto et al. (1998; 2002) assessed social support using the Duke-UNC Functional Social Support Questionnaire among women with early stage (1998) and recently diagnosed (2002) breast cancer. Findings indicated that inactive breast cancer women reported lower levels of affective social support than those women in the exercise group and affective support positively predicted physical role functioning. These findings may indicate that assessing social support using a confidant and affective subscale may have been more relevant to this sample of BCS'.

In terms of the PA literature available, it is apparent that women do find social support specific to PA to be important (Booth et al., 2000; Eyler et al. 1999; Kluge,

2002). The advantages that social support can have for BCS' after treatment is undeniable. The psychological sequelae that accompanies BCS' requires social support in many ways, not just in terms of PA participation. Past literature supporting the advantages of social support for a breast cancer population is evident, however, much of this support is centered on emotional support for coping and distress purposes (Kantor & Houldin, 1999; Spiegel, 1992). As a result, the importance of social support specific to PA as seen in the elderly and minority populations (Booth et al., 2000; Eyler et al. 1998; Kluge, 2002) may not be the same type of social support required in a breast cancer population. When studying the impact of cancer on people of all ages, many studies have highlighted unmet emotional needs and found that coping with emotional distress was the most frequently cited need in terms of social support (Houldin & Wasserbauer, 1996).

### ***Institutional Level***

At the institutional level of the social ecological model, the variable of interest was the interpersonal climate of a group of providers/practitioners for health. The role that the health care providers/practitioners play within the organizations/institutions that contribute to the immediate and long-term care of BCS' (e.g., staff at Ottawa Regional Cancer Centre) was looked at in terms of the autonomy, support and educational information given for PA behaviors.

In the present study, it was found that the degree to which the BCS' perceived their team of health care providers to be autonomy supportive for PA had no significant relationship with their current PA levels. Overall, the health care practitioners/providers were perceived as only being *somewhat autonomy supportive* for PA. Past research in other populations have indicated that an autonomy supportive relationship between

patients and health care providers/practitioners motivated patients to behave in healthier ways (SDT, 2005). The health care climate has been found to have a strong relationship in other populations such as, an obese population (Williams, Grow, Freedman, Ryan & Deci, 1996), in assessing patient's medication adherence (Williams, Rodin, Ryan, Grolnick & Deci, 1998), a smoking population (Williams & Deci, 2001) and diabetic populations (Williams, Freedman & Deci, 1998; Williams, McGregor, Zeldman, Freedman & Deci, 2004). The lack of significance found for the health care climate in the present study may be due to the fact that the health care climate questionnaire has not been validated in a breast cancer population to date, which may be one potential reason for the discrepancy among studies. Furthermore, the design of these studies may have also contributed to the discrepancy in the results found. For instance, the obese population study was based on a supervised 6-month weight loss program, the smoking population study was a randomized controlled trial in which the intervention group received autonomy supportive counseling sessions over a 30 month period and one of the diabetic population studies was also a randomized controlled trial over 12 months in which patients received active education sessions relating to diabetes. The health care climate was observed in the present study rather than the active implementation of any program or education sessions for comparison.

To date, the health care climate has not been extensively investigated among a breast cancer population, however, some literature around breast cancer and health care staff relationships has evolved. Rogers et al. (2004) assessed the information physicians provide to breast cancer patients regarding PA. Specifically, they found that the common responses to the question, "Has your physician provided you with any information

concerning exercise and breast cancer?”, given by the women were “...my advice came from other women”, and “my oncologist did not, but the surgeon recommended exercise only because I brought it up”. Overall, it appears that in this sample, the health care practitioners/providers at the institutional level of care did not incorporate PA discussions into their rehabilitative advice. The women from Rogers et al.’s sample were recruited from breast cancer support groups, therefore, the personal advice from the “other women” appeared to be a substitute for the lack of direction from the oncologists/surgeons. Similarly, Maly, Umezawa, Leake and Silliman (2005) found that in their breast cancer sample, women reported that physicians often referred them to a support group for further support beyond treatment.

Forty-four of the BCS’ in the present study were recruited from Breast Cancer Action Community Support Centre. Breast Cancer Action is a survivor-directed voluntary organization, who’s purpose is to inform, educate and support women and men living with breast cancer, their families and the community. Emotional support is provided by volunteers on a one-to-one basis. The Breast Cancer Action volunteers help breast cancer patients from diagnosis through treatment, and then on to active living as a survivor. Practical support is also provided by Breast Cancer Action’s resource library, audio/visual tape collection, aquatics, dry land exercise programs, special workshops, and monthly open meetings with guest speakers on topics of particular interest to BCS’. Therefore, the support and advice for PA from other breast cancer women and local support groups may be a more significant in influencing PA levels versus that of the health care providers/practitioners (e.g., oncologists, surgeons, nurses) in this sample as well.

In an Ontario breast cancer specialist's report (Charles, Gafni & Whelan, 2004) that assessed shared decision-making with patients, 56% of participating oncologists and 69% of participating surgeons reported that their usual approach to treatment decision-making was a "shared approach" versus an informed or paternalistic approach. The key facilitators identified included the patients' emotional readiness, support, information and trust in physician. Furthermore, to predict physicians' lifestyle counseling practices, personal, professional, and health behavior characteristics from responses to a self-administered survey of breast cancer risk reduction practices were assessed (Livaudais, Kaplan, Haas, Perez-Stable, Stewart & des Jarlais, 2005). In this survey, 56% reported counseling at least 75% of patients about PA. Further analyses identified that women, family practice, and internal medicine specialties emerged as significant predictors of counseling for lifestyle behaviors. Country of medical school and physicians' own levels of PA were also associated with PA counseling. Additionally, Jones, Courneya, Fairey and Mackey (2004) showed that when oncologists are trained in PA recommendations, BCS' do follow the PA advice received. In the above studies, the players at the institutional level provided their own perceptions as to the kind of care they deliver to their breast cancer patients. In contrast, the present study was answered from the patient's perceptions about the role that these institutional level health care providers/practitioners play in terms of their PA support. The current literature is limited regarding the type of support received at the institutional level (i.e., what information/resources/help is available? What is lacking? Are the oncologists comfortable in delivering PA advice?) and research evidence needs to be not only answered from the health care practitioners/providers role, but also to include that of the



patients themselves. Furthermore, the health care climate assessment did not inquire about the characteristics of the health care providers/practitioners which may have had an effect on who the BCS' perceived to be these institutional players. Additionally, knowledge of the characteristics of the oncologists at the Ottawa Regional Cancer Centre who were treating these BCS' may have had an effect on how these physicians approached PA support as seen in the study by Livaudais et al. (2005).

Emotional, social and informational support are well recognized needs among women with breast cancer. Research evidence about the subjective experience of the breast cancer woman have noted that practical support may be of more concern for this population and it is currently an unmet need in the health care climate. The health care climate assessed in the present study was focused on the issue of autonomy versus control between patient and health care staff interactions. Perhaps the roles that the health care climate plays in the lives of BCS' needed to focus more on the emotional, social, informational and practical support that the institutional level plays in terms of facilitating or hindering PA levels in this population versus that of autonomous support.

### ***Community Level***

At the community level of the social ecological model, the variables of interest were environmental factors. Specifically, the perceived accessibility and opportunities existent within the home and neighborhood was assessed. It was found that the degree to which the BCS' perceived their home and neighborhood environments to be accessible in terms of PA resources had no significant relationship with their current PA levels. Overall, only 45% of the BCS' had home exercise equipment accessible to them. The most prominent home equipment that these BCS' had access to (i.e., at least  $\geq 50\%$  of

sample has access) were a bicycle (70%), running shoes (90%), and weight lifting equipment (72%). Seventy-five percent of the BCS' had neighborhood facilities for PA accessible to them. The most common facilities available (i.e., at least  $\geq 50\%$  of sample has access) among this sample were bike paths (80%), walking paths (98%), public parks (74%), public recreation centers (80%), swimming pool/beach/lake (82%), basketball/tennis courts (66%), health clubs/gyms (88%), hiking trails (56%) and organized sports (56%). Based on these results, it is evident that home access to PA equipment was minimal in this sample compared to that of the neighborhood accessibility options. The assessment of the neighborhood features, perceived safety, neighborhood character and variations in weather may have indicated more insightful results as to how this sample perceived their PA options at the community level. Furthermore, issues relating to the costs of home exercise equipment and the density of pay and free facilities was not assessed and may account for the possible reasons as to why this relationship did not emerge as significant (Sallis et al., 1997).

Sallis et al. (1997) have illustrated that access to home equipment and convenience of facilities are related to PA, however, the sample of participants that contributed to this finding was a convenience sample of university students with a mean age of 20.6 years ( $SD = 2.5$ ) and were of several ethnicities. As a result, the significant findings illustrated in Sallis et al.'s work may not be comparable to the sample in the present study in which the participants are women in post-treatment for breast cancer, have a mean age of 55.6 years ( $SD = 9.0$ ) and are predominantly Caucasian. Furthermore, the home and neighborhood accessibility scales used were created by Sallis and may relate to a behavior setting more closely related to that seen in American

populations and did not encompass settings to include worksites and frequently traveled routes (Sallis, et al., 1997). The issue of a lack of assessing environmental correlates for specific behaviors and a general approach to community assessments has been found by Humpel and colleagues (2002, 2004) as a factor that may underestimate the effect that the environment can have on behaviors. The capacity to predict a behavior is enhanced when there is greater correspondence between the behavior in question and the specific environment. A central hypothesis of research examining environmental correlates of behavior is that the exposure to a supportive environment enhances PA. Perhaps the environmental assessment scales used in the present study should have been targeted to be more specific to the sample under study or the measurement scales used may not be considered home and neighborhood factors supportive for PA in BCS'.

When assessing the environment of an individual, many factors can be assessed due to the multidimensional and complex nature of human environments. Environments can be described in terms of their physical and social components, but they can also be assessed in terms of their objective (actual) or subjective (perceived) components (Stokols, 1992). Assessing the objective component overrides the limitations of self-reported perceptions and can have an effect on future health promotion initiatives taken in one's community. In the present study, an objective environmental assessment was not completed. As such, results may have varied if such an approach was to be taken.

Many factors at the community level have shown that correlates of PA are affected by environmental attributes (Humpel et al., 2002) while other studies have indicated a disappointingly low amount of variance in behavior accounted for by the physical environment (Giles-Corti, Timperio, Bull & Pikora, 2005). However, research

in this area is in the embryonic stage. Research assessing the affect of environmental factors in a breast cancer population is almost non-existent, in that only Rogers et al. (2004) has indicated that an environment that provides privacy and can cater to the stage of breast cancer treatment/post-treatment was of importance to breast cancer women. As a result, to understand if there does exist a correspondence between behavioral outcome measures and the physical environment further examination beyond the limited assessment of the environmental PA correlates done in the present study is required.

### ***Summary***

The social ecological model is based on the idea that the various levels of the model interact with one another, thereby influencing PA simultaneously or through one another. Based on the present results a hierarchical regression analysis could not be completed to test for these various levels of influence (interaction terms) in that only barrier SE came out as significant (intrapersonal level only). It was hypothesized that by approaching PA within the breast cancer population from an ecological perspective, the identification of various levels of influence that affect PA behaviors both internal and external to the BCS would be found to provide an integrated account of the correlates that facilitate, debilitate and influence PA levels. However, an important independent correlate to PA at the intrapersonal level of the BCS was identified (i.e. barriers) and future inquiry into the application of the ecological model to this population using different outcomes and approaches is needed.

One strength of the present study was to move beyond the simplistic PA measures used in past studies and to override the assessment of a one-time PA assessment by using accelerometry over a four week time period. The accelerometer did not assess bouts of

PA sessions; rather, it took an overall physical activity index by assessing total daily activity that included both structured and unstructured activities. One drawback of this assessment is that the overall PA index makes it difficult to compare specific PA bouts to the ACSM guidelines. However, there is a demand for current PA assessments to include measures of frequency, duration and intensity (American Cancer Society, 2002), which are given in the current Actical accelerometer output results for this study. Furthermore, the effect of PA on breast cancer may have been underestimated in past research because of the misclassification resulting from the use of previous simplistic measures. Furthermore, comparisons between studies assessing the effects of PA in a breast cancer population, and even other populations, are difficult because of the use of the widely differing PA measurements. Therefore, the objective assessment of PA in the present study may provide differing results between the psychological outcomes and PA results found in previous breast cancer studies.

### ***Limitations***

Despite the methodologic strengths and important information gained from this preliminary study, there are limitations that need to be taken into consideration when interpreting the results. First, the study used a prospective design which provided valuable insight as to the current levels of PA for these BCS', however, a more comprehensive understanding as to how the PA levels of this sample changed from the treatment to post-treatment phases for these women would have provided a better understanding as to what correlates of PA dominated throughout the breast cancer experience. A second limitation was that total PA was assessed objectively, which does provide an account of both structured and unstructured activity levels, but it is limiting in

that it does not provide a true representation of specific PA sessions versus a kilocaloric breakdown. The combination of an activity log and implementing markers into the Actical output may have captured these structured PA sessions. A third limitation of the present study was that BCS' who were more interested in PA would have been attracted to participate in this study due to the transparent purpose noted in the recruitment protocol. Additionally, due to the recruitment protocol non-participation surveys were not collected resulting in a lack of knowledge as to the type of BCS' that would have not participated in the current study. Moreover, Breast Cancer Action Community Centre offers BCS' many positive lifestyle behavior resources, which may have had an effect on the type of BCS' recruited. A fourth limitation was the small sample size. Fifty BCS' were sufficient based on the sample size estimation. A larger sample would allow for subgroup comparisons to provide further insight into social ecological correlates by demographics, as well as allowing for the testing of interactions across the model, which is what the social ecological suggests. A fifth limitation was that this sample had a lot of variation regarding time since breast cancer diagnosis (i.e. 14 months versus 216 months), which may have resulted in better coping strategies and sufficient time to pursue positive lifestyle changes for those women who were long-term BCS'. Moreover, this sample was mostly married (68%), had a high level of education (78% had >university level) and was of a higher socioeconomic class (25% had an annual household income of >\$80,000), which causes a lack of generalizability to other samples.

### ***Practical Implications & Future Directions***

Although this evidence is preliminary from a social ecological perspective, there are some practical implications to these findings. A barrier scale specific to breast cancer

should be developed to include the specific side effects that breast cancer treatments cause. Such a scale can assist in identifying the targets for PA program development by highlighting the issues that are of greater importance to breast cancer patients. In terms of a PA intervention, SE as it relates to time constraints, not feeling well and a lack of will power should be addressed. For example, behavioral counseling that targets the specific issues of the BCS could be incorporated into the intervention whereby the counselor could assist the BCS with the identification of coping strategies to overcome various barriers specific to PA.

The social ecological framework by Emmons (2000) was used, however, there does exist other ecological frameworks that could have been applied to this study approach as well (e.g., YPAP: Youth Physical Activity Promotion Model, SME: Structural Model of the Environment, EMPA: Ecological Model of Physical Activity) (Spence & Lee, 2003). Future directions need to consider the current ecological approach as well as the application of these other approaches in PA research. Moreover, a larger variety of outcomes need to be considered within the intrapersonal, interpersonal, institutional and community levels of the social ecological model. Additionally, future work at the institutional level is needed because there currently exists no validated scales in the breast cancer population at this level. The environmental level currently faces many limitations regarding the objective versus subjective measurement issues and the delineation between the specificity of behavior-specific environmental correlates. Therefore, future research in this area is needed in order to come to a better understanding as to how to approach various environmental outcomes. Overall, this research study was the first to apply a social ecological approach to understanding

objective PA levels in this population and provides good support for future work to be extended in this area.



## Chapter VI

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Appendix A1:  
Geographic Patterns of New Breast Cancer Cases

Table A1. Geographic patterns of new breast cancer cases.

|                        | New Cases           |              |            |              |              |               |               |              |              |              |               |
|------------------------|---------------------|--------------|------------|--------------|--------------|---------------|---------------|--------------|--------------|--------------|---------------|
|                        | Canada <sup>1</sup> | N.L.         | P.E.I.     | N.S.         | N.B.         | Que.          | Ont.          | Man.         | Sask.        | Alta.        | B.C.          |
| <b>Males</b>           |                     |              |            |              |              |               |               |              |              |              |               |
| <b>All Cancers</b>     | <b>74,800</b>       | <b>1,150</b> | <b>410</b> | <b>2,700</b> | <b>2,100</b> | <b>18,100</b> | <b>27,900</b> | <b>2,900</b> | <b>2,500</b> | <b>7,000</b> | <b>10,000</b> |
| Prostate               | 20,100              | 310          | 150        | 710          | 560          | 3,200         | 8,000         | 750          | 810          | 2,500        | 3,100         |
| Lung                   | 11,900              | 170          | 70         | 470          | 380          | 3,900         | 4,000         | 430          | 350          | 840          | 1,350         |
| Colorectal             | 10,400              | 230          | 50         | 370          | 260          | 2,600         | 3,900         | 400          | 330          | 820          | 1,350         |
| Bladder                | 3,700               | 30           | 10         | 170          | 130          | 1,400         | 1,200         | 120          | 160          | 140          | 370           |
| Non-Hodgkin's Lymphoma | 3,300               | 40           | 20         | 100          | 100          | 810           | 1,300         | 130          | 100          | 270          | 470           |
| Kidney                 | 2,600               | 40           | 15         | 95           | 75           | 640           | 1,050         | 120          | 75           | 230          | 290           |
| Melanoma               | 2,300               | 30           | 15         | 100          | 60           | 340           | 980           | 70           | 55           | 240          | 360           |
| Leukemia               | 2,300               | 15           | 15         | 65           | 55           | 560           | 870           | 85           | 95           | 250          | 270           |
| Oral                   | 2,100               | 55           | 10         | 75           | 55           | 500           | 800           | 100          | 65           | 170          | 260           |
| Stomach                | 1,800               | 50           | 5          | 50           | 50           | 460           | 650           | 65           | 65           | 150          | 240           |
| Pancreas               | 1,600               | 5            | 10         | 50           | 45           | 460           | 570           | 60           | 50           | 130          | 230           |
| Brain                  | 1,300               | 20           | 5          | 40           | 30           | 350           | 490           | 45           | 40           | 100          | 170           |
| Multiple Myeloma       | 990                 | 10           | 5          | 30           | 25           | 270           | 380           | 40           | 30           | 75           | 130           |
| Larynx                 | 970                 | 25           | 5          | 30           | 25           | 350           | 320           | 30           | 30           | 60           | 100           |
| <b>Females</b>         |                     |              |            |              |              |               |               |              |              |              |               |
| <b>All Cancers</b>     | <b>70,700</b>       | <b>970</b>   | <b>350</b> | <b>2,400</b> | <b>1,850</b> | <b>18,300</b> | <b>26,800</b> | <b>2,800</b> | <b>2,200</b> | <b>6,100</b> | <b>8,900</b>  |
| Breast                 | 21,200              | 340          | 100        | 690          | 540          | 5,700         | 7,900         | 810          | 610          | 1,850        | 2,600         |
| Lung                   | 9,800               | 100          | 45         | 340          | 230          | 2,800         | 3,500         | 400          | 250          | 780          | 1,250         |
| Colorectal             | 8,800               | 160          | 50         | 340          | 250          | 2,200         | 3,400         | 340          | 270          | 660          | 1,050         |
| Body of Uterus         | 3,800               | 60           | 20         | 130          | 85           | 870           | 1,500         | 180          | 110          | 350          | 470           |
| Non-Hodgkin's Lymphoma | 2,900               | 35           | 10         | 75           | 95           | 710           | 1,150         | 110          | 85           | 230          | 370           |
| Ovary                  | 2,300               | 30           | 10         | 80           | 55           | 630           | 910           | 90           | 70           | 160          | 290           |
| Thyroid                | 2,100               | 25           | 5          | 40           | 50           | 450           | 1,050         | 65           | 45           | 190          | 180           |
| Melanoma               | 1,950               | 30           | 25         | 90           | 60           | 320           | 800           | 65           | 55           | 240          | 270           |
| Pancreas               | 1,700               | 5            | 10         | 65           | 55           | 480           | 590           | 70           | 50           | 140          | 240           |
| Leukemia               | 1,650               | 15           | 5          | 50           | 35           | 420           | 620           | 70           | 60           | 160          | 190           |
| Kidney                 | 1,600               | 25           | 5          | 60           | 60           | 410           | 620           | 65           | 55           | 140          | 160           |
| Cervix                 | 1,350               | 25           | 10         | 60           | 40           | 270           | 510           | 55           | 50           | 170          | 160           |
| Bladder                | 1,250               | 10           | 5          | 55           | 45           | 470           | 410           | 40           | 55           | 50           | 120           |
| Oral                   | 1,050               | 15           | 5          | 40           | 20           | 230           | 390           | 45           | 35           | 85           | 160           |
| Brain                  | 1,050               | 15           | 5          | 30           | 25           | 280           | 410           | 35           | 30           | 80           | 120           |
| Stomach                | 1,000               | 20           | 5          | 30           | 25           | 290           | 350           | 35           | 35           | 95           | 130           |
| Multiple Myeloma       | 850                 | 5            | 5          | 25           | 20           | 220           | 350           | 30           | 25           | 60           | 110           |

<sup>1</sup> Canada totals include provincial and territorial estimates. However, territories are not listed separately because of the small numbers.

**Note:** Total of rounded numbers may not equal rounded total number. The Canada and provincial totals for all cancers exclude an estimated 76,000 cases of non-melanoma (basal and squamous) skin cancer. Because of changes and improvements in source data and in methodology (as described in *Appendix II: Methods*), caution is needed if the 2004 estimates are compared with previously published estimates. These estimates may vary from actual figures. Please see *Appendix I* for most current actual data or contact provincial/territorial cancer registries for further information.

**Source:** Surveillance and Risk Assessment Division, CCDPC, Health Canada

## Appendix A2

### Geographic Patterns of Breast Cancer Deaths

Table A2. Geographic patterns of breast cancer deaths.

|                        | Deaths              |            |            |              |              |              |               |              |              |              |              |
|------------------------|---------------------|------------|------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|--------------|
|                        | Canada <sup>1</sup> | N.L.       | P.E.I.     | N.S.         | N.B.         | Que.         | Ont.          | Man.         | Sask.        | Alta.        | B.C.         |
| <b>Males</b>           |                     |            |            |              |              |              |               |              |              |              |              |
| <b>All Cancers</b>     | <b>36,200</b>       | <b>700</b> | <b>190</b> | <b>1,350</b> | <b>1,050</b> | <b>9,900</b> | <b>13,100</b> | <b>1,400</b> | <b>1,250</b> | <b>2,800</b> | <b>4,500</b> |
| Lung                   | 10,700              | 220        | 60         | 450          | 340          | 3,500        | 3,500         | 370          | 330          | 740          | 1,200        |
| Colorectal             | 4,500               | 100        | 25         | 150          | 110          | 1,250        | 1,600         | 180          | 160          | 330          | 520          |
| Prostate               | 4,200               | 70         | 25         | 160          | 120          | 900          | 1,600         | 170          | 230          | 400          | 540          |
| Pancreas               | 1,600               | 30         | 10         | 60           | 45           | 420          | 560           | 55           | 55           | 120          | 220          |
| Non-Hodgkin's Lymphoma | 1,550               | 15         | 5          | 70           | 45           | 340          | 620           | 85           | 45           | 110          | 230          |
| Leukemia               | 1,300               | 15         | 5          | 45           | 30           | 280          | 520           | 50           | 45           | 120          | 170          |
| Stomach                | 1,150               | 45         | 5          | 35           | 25           | 360          | 400           | 40           | 40           | 75           | 140          |
| Bladder                | 1,150               | 30         | 5          | 40           | 30           | 270          | 430           | 45           | 40           | 85           | 160          |
| Kidney                 | 950                 | 20         | 5          | 35           | 25           | 230          | 320           | 65           | 30           | 85           | 130          |
| Brain                  | 930                 | 20         | –          | 30           | 20           | 270          | 310           | 35           | 30           | 85           | 110          |
| Oral                   | 690                 | 20         | 5          | 30           | 20           | 190          | 250           | 25           | 20           | 45           | 85           |
| Multiple Myeloma       | 670                 | 10         | 5          | 30           | 20           | 160          | 260           | 30           | 25           | 40           | 90           |
| Melanoma               | 520                 | 5          | –          | 20           | 10           | 95           | 250           | 20           | 10           | 35           | 65           |
| Larynx                 | 420                 | 10         | –          | 15           | 20           | 150          | 140           | 15           | 15           | 20           | 45           |
| <b>Females</b>         |                     |            |            |              |              |              |               |              |              |              |              |
| <b>All Cancers</b>     | <b>32,100</b>       | <b>560</b> | <b>150</b> | <b>1,150</b> | <b>820</b>   | <b>8,500</b> | <b>11,900</b> | <b>1,250</b> | <b>1,050</b> | <b>2,600</b> | <b>4,000</b> |
| Lung                   | 8,200               | 120        | 50         | 260          | 170          | 2,300        | 2,900         | 320          | 280          | 670          | 1,100        |
| Breast                 | 5,200               | 95         | 25         | 200          | 130          | 1,400        | 2,000         | 200          | 150          | 410          | 620          |
| Colorectal             | 3,900               | 90         | 25         | 180          | 100          | 1,100        | 1,400         | 160          | 120          | 240          | 440          |
| Pancreas               | 1,700               | 25         | 10         | 65           | 55           | 450          | 610           | 70           | 65           | 140          | 240          |
| Ovary                  | 1,550               | 30         | 5          | 50           | 40           | 360          | 580           | 60           | 55           | 130          | 220          |
| Non-Hodgkin's Lymphoma | 1,350               | 15         | 5          | 55           | 40           | 310          | 530           | 55           | 45           | 100          | 180          |
| Leukemia               | 930                 | 15         | 5          | 30           | 15           | 210          | 370           | 40           | 35           | 90           | 130          |
| Stomach                | 750                 | 35         | –          | 25           | 15           | 230          | 240           | 20           | 30           | 60           | 80           |
| Body of Uterus         | 700                 | 10         | 5          | 30           | 20           | 180          | 270           | 30           | 20           | 60           | 75           |
| Brain                  | 690                 | 10         | 5          | 25           | 20           | 210          | 240           | 25           | 20           | 60           | 80           |
| Multiple Myeloma       | 580                 | 10         | 5          | 20           | 15           | 150          | 230           | 25           | 20           | 45           | 70           |
| Kidney                 | 560                 | 10         | 5          | 15           | 20           | 170          | 170           | 25           | 30           | 45           | 70           |
| Bladder                | 490                 | 10         | –          | 15           | 15           | 120          | 180           | 20           | 15           | 45           | 65           |
| Cervix                 | 410                 | 10         | 5          | 20           | 10           | 85           | 150           | 15           | 15           | 40           | 50           |
| Oral                   | 340                 | –          | –          | 10           | 5            | 85           | 130           | 15           | 10           | 30           | 45           |
| Melanoma               | 330                 | 5          | –          | 10           | 5            | 55           | 160           | 10           | 10           | 25           | 45           |

– Fewer than 3 deaths

<sup>1</sup> Canada totals include provincial and territorial estimates. However, territories are not listed separately because of the small numbers.

**Note:** Total of rounded numbers may not equal rounded total number. Because of changes and improvements in source data and in methodology (as described in *Appendix II: Methods*), caution is needed if the 2004 estimates are compared with previously published estimates. These estimates may vary from actual figures.

**Source:** Surveillance and Risk Assessment Division, CCDPC, Health Canada

## Appendix B

### Findings Regarding Environmental Influences on Physical Activity

Table B3. Summary of the findings from studies examining the associations of environmental attributes in relation to physical activity behaviors in adults.

| <b>Environmental variable</b>                      | <b>Studies (citation #)</b> |
|----------------------------------------------------|-----------------------------|
| <b>Accessibility of facilities</b>                 |                             |
| A cycle path is accessible                         | 23                          |
| Access to facilities (local park)                  | 22                          |
| Facilities on frequently traveled route            | 21                          |
| Density of pay and free facilities                 | 31                          |
| Park or beach in walking distance                  | 23                          |
| Shops are in walking distance                      | 23                          |
| <b>Opportunities for activity</b>                  |                             |
| Home equipment                                     | 19,21,22,25,26              |
| Awareness of facilities                            | 24                          |
| Satisfaction with recreation facilities            | 20                          |
| Neighborhood environment                           | 19,25                       |
| My area offers opportunities for physical activity | 28                          |
| Local clubs and others provide opportunities       | 28                          |
| Coastal residence                                  | 30                          |
| <b>Safety</b>                                      |                             |
| Footpaths are safe                                 | 22                          |
| Unattended dogs                                    | 17,18                       |
| How safe from crime is your neighborhood           | 27                          |
| <b>Aesthetics</b>                                  |                             |
| Neighborhood friendly                              | 23                          |
| Pleasant near home                                 | 23                          |
| Local area is attractive                           | 23                          |
| Enjoyable scenery                                  | 17,18                       |
| Hills                                              | 17,18                       |
| Living environment                                 | 20                          |

(Humpel et al., 2002)

## Appendix C

### Summary of Factors Related to Levels of Adult Physical Activity



| Determinant                                      | Sallis and Owen (36) | Updated Review | References                                  | Change? |
|--------------------------------------------------|----------------------|----------------|---------------------------------------------|---------|
| Demographic and biological factors               |                      |                |                                             |         |
| Age                                              | --                   | --             | 1,2,6,7,12,23,25,26,27,34,35,38,39,40,41,45 |         |
| Blue-collar occupation                           | --                   | --             | 39                                          |         |
| Childless                                        | --                   | --             | 41                                          |         |
| Education                                        | --                   | --             | 6,12,23,26,27,34,35,38,39,41,45             |         |
| Gender (male)                                    | --                   | --             | 1,2,7,12,25,34,35,38,39                     |         |
| Hereditary                                       | --                   | --             |                                             |         |
| High risk for heart disease                      | --                   | --             | 12,35                                       |         |
| Income/socioeconomic status                      | --                   | --             | 1,3,4,6,7,12,35,38,39                       |         |
| Injury history                                   | --                   | --             | 40                                          |         |
| Marital status (married)                         | 0                    | --             | 2,5,6,23,24,39,41                           |         |
| Overweight/obesity                               | 00                   | --             | 6,28,35,38,40,41                            |         |
| Race/ethnicity (nonwhite)                        | --                   | --             | 6,12,23,40,41,45                            |         |
| Psychological, cognitive, and emotional factors  |                      |                |                                             |         |
| Attitudes                                        | 0                    | 00             | 2,3,4,14,16,22,29,46                        |         |
| Barriers to exercise                             | --                   | --             | 2,3,11,23,26,30,41,45                       |         |
| Control over exercise                            | --                   | --             | 3,4,16,22,29,40                             |         |
| Enjoyment of exercise                            | --                   | --             | 2,25                                        |         |
| Expect benefits                                  | --                   | --             | 12,30,33,40                                 |         |
| Health locus of control                          | 0                    | 0              |                                             |         |
| Intention to exercise                            | --                   | --             | 3,4,14,16,22,29                             |         |
| Knowledge of health and exercise                 | 00                   | 00             | 12,26,35                                    |         |
| Lack of time                                     | --                   | --             | 2,23,41                                     |         |
| Mood disturbance                                 | --                   | --             |                                             |         |
| Normative beliefs                                | 00                   | 00             | 3,4,14,16,22,24                             |         |
| Perceived health or fitness                      | --                   | --             | 2,7,11,12,23,41                             |         |
| Personality variables                            | --                   | --             | 14,15                                       |         |
| Poor body image                                  | --                   | --             |                                             |         |
| Psychological health                             | --                   | --             |                                             |         |
| Self-efficacy                                    | --                   | --             | 2,7,9,11,12,30,31,33,40,41,42,46            |         |
| Self-motivation                                  | --                   | --             | 4,41                                        |         |
| Self-schemata for exercise                       | --                   | --             | 46                                          |         |
| Stage of change                                  | --                   | --             | 33,42                                       |         |
| Stress                                           | 0                    | 0              | 7,33                                        |         |
| Susceptibility to illness/seriousness of illness | 00                   | 00             | 7,35                                        |         |
| Value of exercise outcomes                       | 0                    | 0              | 7,8,33                                      |         |
| Behavioral attributes and skills                 |                      |                |                                             |         |
| Activity history during childhood/youth          | 00                   | 0              | 43                                          |         |
| Activity history during adulthood                | --                   | --             | 3,4,11,31                                   |         |
| Alcohol                                          | 0                    | 0              | 21                                          |         |
| Contemporary exercise program                    | 0                    | 0              |                                             |         |
| Dietary habits (quality)                         | --                   | --             | 6,21,26                                     |         |
| Past exercise program                            | --                   | --             | 3,4,11,22,31                                |         |
| Processes of change                              | --                   | --             | 42                                          |         |
| School sports                                    | 00                   | 0              | 43                                          |         |
| Skills for coping with barriers                  | --                   | --             |                                             |         |
| Smoking                                          | 00                   | --             | 6,21,26,34,35,39,41                         |         |
| Sports media use                                 | 0                    | 0              |                                             |         |
| Type A behavior pattern                          | --                   | --             |                                             |         |
| Decisional balance sheet                         | --                   | --             | 42                                          |         |
| Social and cultural factors                      |                      |                |                                             |         |
| Class size                                       | 0                    | 0              |                                             |         |
| Exercise models                                  | 0                    | 0              |                                             |         |
| Group cohesion                                   | --                   | --             |                                             |         |
| Past family influences                           | 0                    | 0              |                                             |         |
| Physician influence                              | --                   | --             | 7,12                                        |         |
| Social isolation                                 | --                   | --             | 12,40                                       |         |
| Social support from friends/peers                | --                   | --             | 2,8,9,16,20,25,41,45                        |         |
| Social support from spouse/family                | --                   | --             | 2,9,16,20,26,41,45                          |         |
| Social support from staff/instructor             | --                   | --             |                                             |         |
| Physical environment factors                     |                      |                |                                             |         |
| Access to facilities: actual                     | --                   | --             |                                             |         |
| Access to facilities: perceived                  | 00                   | --             | 2,27                                        |         |
| Adequate lighting*                               | --                   | 0              | 23,45                                       |         |
| Climate/season                                   | --                   | --             | 1,23                                        |         |
| Cost of programs                                 | 0                    | 0              | 2,27                                        |         |
| Disruptions in routine                           | --                   | --             |                                             |         |
| Enjoyable scenery*                               | --                   | --             | 1,23,45                                     |         |
| Frequently observe others exercising*            | --                   | --             | 2,23,45                                     |         |
| Heavy traffic*                                   | --                   | 0              | 23,45                                       |         |
| Home equipment                                   | 0                    | --             | 2,23                                        |         |
| High crime rates in the region*                  | --                   | 0              | 10,23,45                                    |         |
| Hilly terrain*                                   | --                   | --             | 23,44                                       |         |
| Neighborhood safety*                             | --                   | --             | 10,23,34,45                                 |         |
| Presence of sidewalks*                           | --                   | 0              | 2,23,45                                     |         |
| Satisfaction with facilities*                    | --                   | --             | 2,27                                        |         |
| Unattended dogs*                                 | --                   | 0              | 23,44                                       |         |
| Urban location*                                  | --                   | --             | 1,5,6,23,34,45                              |         |
| Physical activity characteristics                |                      |                |                                             |         |
| Intensity                                        | --                   | --             |                                             |         |
| Perceived effort                                 | --                   | --             |                                             |         |

\*, variable not examined in previous reviews; ++, repeatedly documented positive association with physical activity; +, weak or mixed evidence of positive association with physical activity; 00, repeatedly documented lack of association with physical activity; 0, weak or mixed evidence of no association with physical activity; --, repeatedly documented negative association with physical activity; -, weak or mixed evidence of negative association with physical activity. Blank spaces indicate no data available.

Appendix D

Demographic Information

**PART ONE: Demographics & Medical History**

**Directions:** This part of the questionnaire is needed to help understand the characteristics of the people participating in the study. For this reason, it is very important information. All information is held in strict confidence.

1. Age\_\_\_\_\_
  
2. Marital status:      Never married\_\_\_\_\_      Married\_\_\_\_\_      Common-law\_\_\_\_\_
   
                                  Separated\_\_\_\_\_      Widowed\_\_\_\_\_      Divorced\_\_\_\_\_
  
3. (a) number of children:\_\_\_\_\_      (b) number of children living at home\_\_\_\_\_      118. Education
  
4. Education (Please check highest level attained):
   
     Some high school \_\_\_\_\_      Completed high school \_\_\_\_\_      Some university/college \_\_\_\_\_
   
     Completed university/college \_\_\_\_\_      Some graduate school \_\_\_\_\_      Completed grad. School \_\_\_\_\_
  
5. Annual family income: < \$20,000 \_\_\_\_\_      \$20-\$39,999 \_\_\_\_\_      \$40-\$59,999 \_\_\_\_\_
   
                                  \$60-\$79,999 \_\_\_\_\_      \$80-\$99,999 \_\_\_\_\_      >\$100,000 \_\_\_\_\_
  
6. Employment status: Homemaker\_\_\_\_\_      Retired\_\_\_\_\_      Part-time\_\_\_\_\_
   
                                  Full-time\_\_\_\_\_      Temporarily unemployed\_\_\_\_\_
  
7. Height and weight information: weight in pounds\_\_\_\_\_ or kilograms\_\_\_\_\_
   
                                  height in feet/inches\_\_\_\_\_ or meters/cent.\_\_\_\_\_
  
8. How long has it been since you completed your last treatment? \_\_\_\_\_ months \_\_\_\_\_ years
  
9. How long has it been since you were diagnosed with breast cancer? \_\_\_\_\_ months \_\_\_\_\_ years
  
10. What type of treatment did you receive (if any)?
   
     surgery only \_\_\_\_\_ chemo only\_\_\_\_\_ radiation only \_\_\_\_\_ tamoxifan only \_\_\_\_\_
   
     surgery + chemo\_\_\_\_\_ surgery + radiation\_\_\_\_\_ surgery + tamoxifan\_\_\_\_\_
   
     surgery + radiation + chemo\_\_\_\_\_ other\_\_\_\_\_

Appendix E

Task Efficacy Scale

## INSTRUCTIONS

In this part of the questionnaire, we are going to ask you about your thoughts and feelings towards engaging in *regular physical activity over the next month*. The definition of regular physical activity is below...

**Regular physical activity** is defined as meeting at least one (or more) of the following recommendations put forth by Health Canada.

1. accumulating **60 minutes** of **light intensity** physical activity (e.g., light walking, easy gardening, stretching) **4 – 7 times per week**...

AND/OR

2. accumulating **30 to 60 minutes** of **moderate intensity** physical activity (e.g., brisk walking, biking, raking leaves, swimming, dancing) **4 – 7 times per week**...

AND/OR

3. accumulating **20 to 30 minutes** of **vigorous intensity** physical activity (e.g., aerobics, jogging, fast swimming) **4 – 7 times per week**...

**NOTE.** Please keep this definition in mind when your answering the remaining questions.

## PART TWO: Task Self-Efficacy

**Directions:** The items listed below are designed to assess your beliefs in your ability to continue engaging in regular physical activity during the next four weeks. Using the scale below, please indicate how confident you are that you will be able to continue engaging in regular physical activity.

During the **next 4 weeks**, how confident are you that you will engage in **regular physical activity**...

|                                      | Extremely unconfident | Moderately unconfident | Slightly unconfident | Neutral | Slightly confident | Moderately confident | Extremely confident |
|--------------------------------------|-----------------------|------------------------|----------------------|---------|--------------------|----------------------|---------------------|
| 1. one week out of the four weeks    | 1                     | 2                      | 3                    | 4       | 5                  | 6                    | 7                   |
| 2. two weeks out of the four weeks   | 1                     | 2                      | 3                    | 4       | 5                  | 6                    | 7                   |
| 3. three weeks out of the four weeks | 1                     | 2                      | 3                    | 4       | 5                  | 6                    | 7                   |
| 4. all four weeks                    | 1                     | 2                      | 3                    | 4       | 5                  | 6                    | 7                   |

## Appendix F

## Barrier Efficacy Scale

**PART THREE: Barrier Self-Efficacy**

**Directions:** The items listed below are designed to assess your confidence that will overcome each barrier to physical activity to make sure you engage regular physical activity during the next four weeks. Using the scale below, please indicate how confident you are that you will overcome each barrier to physical activity to enable you to engage in regular physical activity during the next 4 weeks.

During the **next 4 weeks**, how confident are you that you will engage in regular physical activity **EVEN IF...**

|                                                  | <i>extremely unconfident</i> | <i>moderately unconfident</i> | <i>slightly unconfident</i> | <i>neutral</i> | <i>slightly confident</i> | <i>moderately confident</i> | <i>extremely confident</i> |
|--------------------------------------------------|------------------------------|-------------------------------|-----------------------------|----------------|---------------------------|-----------------------------|----------------------------|
| 1. you are too tired / lacked energy             | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |
| 2. you have no time because of work              | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |
| 3. you are feeling under the weather             | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |
| 4. you don't feel like it                        | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |
| 5. you have family commitments                   | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |
| 6. the weather is bad (hot, humid, rainy, cold)  | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |
| 7. you have to exercise alone                    | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |
| 8. you are under personal stress of some kind    | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |
| 9. you feel self-conscious about your appearance | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |
| 10. it costs too much                            | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |
| 11. you don't have access to facilities          | 1                            | 2                             | 3                           | 4              | 5                         | 6                           | 7                          |

## Appendix G

### Social Support and Exercise Survey



**PART FOUR: Social Support**

**Directions:** Below is a list of things people might do or say to someone who is trying to engage in regular physical activity. If you are not trying to engage in regular physical activity, then some of the questions may not apply to you, but please read and give an answer to every question. Please rate each question *twice*. Under **FAMILY**, rate how often anyone living in your household has said or done what is described during the last month. Under **FRIENDS**, rate how often your friends, acquaintances, or coworkers have said or done what is described during the last three months.

**PLEASE WRITE ONE NUMBER FROM THE FOLLOWING RATING SCALE IN EACH SPACE.**

| None | Rarely | A few times | Often | Very often |
|------|--------|-------------|-------|------------|
| 1    | 2      | 3           | 4     | 5          |

**During the past 4 weeks, my family (or members of my household) or friends...**

|                                                                                                                       | <b>Family</b> | <b>Friends</b> |
|-----------------------------------------------------------------------------------------------------------------------|---------------|----------------|
| 1. Engaged in physical activity with me.                                                                              | 1. _____      | 1. _____       |
| 2. Offered to engage in physical activity with me.                                                                    | 2. _____      | 2. _____       |
| 3. Gave me helpful reminders to engage in physical activity ('Are you going to engage in physical activity tonight?') | 3. _____      | 3. _____       |
| 4. Gave me encouragement to stick to my physical activity program.                                                    | 4. _____      | 4. _____       |
| 5. Changed their schedule so we could engage in physical activity together.                                           | 5. _____      | 5. _____       |
| 6. Discussed physical activity with me.                                                                               | 6. _____      | 6. _____       |
| 7. Complained about the time I spend engaging in physical activity.                                                   | 7. _____      | 7. _____       |
| 8. Criticized me or made fun of me for engaging in physical activity.                                                 | 8. _____      | 8. _____       |
| 9. Gave me rewards for engaging in physical activity.                                                                 | 9. _____      | 9. _____       |
| 10. Planned for physical activity on recreational outings.                                                            | 10. _____     | 10. _____      |
| 11. Helped plan activities around my physical activity.                                                               | 11. _____     | 11. _____      |
| 12. Asked me for ideas on how they can get more physical activity.                                                    | 12. _____     | 12. _____      |
| 13. Talked about how much they like to engage in physical activity.                                                   | 13. _____     | 13. _____      |

## Appendix H

### Health Care Climate Questionnaire

**PART FIVE: Health Care Climate**

**Directions:** Health-care practitioners (doctors, nurses, counselors, etc.) have different styles in dealing with patients, and we would like to know very specifically about your experience of your provider(s) in any encounters when your physical activity was discussed. In some cases, you may have met with only your physician; in other cases you may have discussed your physical activity with several people. If you have met only with your physician, please respond with respect to him or her; if you have met with several practitioners concerning this issue, please answer in terms of your experience of all these practitioners together.

**Please use the following scale to answer questions 1-6.**

|                                                                                                                                                       | <i>Not at all true</i> |   | <i>Somewhat true</i> |   |   | <i>Very true</i> |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---|----------------------|---|---|------------------|---|
| 1. I feel that my health-care practitioners have provided me with choices and options about physical activity (including not being regularly active). | 1                      | 2 | 3                    | 4 | 5 | 6                | 7 |
| 2. I feel my health-care providers understand how I see things with respect to my physical activity behaviour.                                        | 1                      | 2 | 3                    | 4 | 5 | 6                | 7 |
| 3. My health-care providers convey confidence in my ability to make changes regarding my physical activity behaviour.                                 | 1                      | 2 | 3                    | 4 | 5 | 6                | 7 |
| 4. My health care practitioners listen to how I would like to do things regarding my physical activity behaviour.                                     | 1                      | 2 | 3                    | 4 | 5 | 6                | 7 |
| 5. My health-care practitioners encourage me to ask questions about physical activity.                                                                | 1                      | 2 | 3                    | 4 | 5 | 6                | 7 |
| 6. My health-care practitioners try to understand how I see my physical activity behaviour before suggesting any changes.                             | 1                      | 2 | 3                    | 4 | 5 | 6                | 7 |

Appendix I  
Home Environment Scale

**PART SIX: Home Environment (i.e., where you currently live)**

**Directions:** During the next 4 WEEKS, please indicate which (1) items you will have access to in your home, yard, or apartment complex, and (2) whether or not you will use them.

**Please circle Yes or No for each item in column 1 and column 2.**

|                                                  | Column 1<br>Do you have it? |    | Column 2<br>Will you use it? |    |
|--------------------------------------------------|-----------------------------|----|------------------------------|----|
| 1. Stationary aerobic equipment                  | Yes                         | No | Yes                          | No |
| 2. Bicycle                                       | Yes                         | No | Yes                          | No |
| 3. Trampoline for jogging in place               | Yes                         | No | Yes                          | No |
| 4. Running shoes                                 | Yes                         | No | Yes                          | No |
| 5. Swimming pool                                 | Yes                         | No | Yes                          | No |
| 6. Weight lifting equipment (e.g., free weights) | Yes                         | No | Yes                          | No |
| 7. Toning devices (e.g., ankle weights)          | Yes                         | No | Yes                          | No |
| 8. Aerobic workout video or audiotapes           | Yes                         | No | Yes                          | No |
| 9. Step aerobics, slide aerobics                 | Yes                         | No | Yes                          | No |
| 10. Skates (roller, in-line, or ice)             | Yes                         | No | Yes                          | No |
| 11. Sports equipment (balls, racquets)           | Yes                         | No | Yes                          | No |
| 12. Canoe, row boat, kayak                       | Yes                         | No | Yes                          | No |
| 13. Skis (snow or water)                         | Yes                         | No | Yes                          | No |

## Appendix J

## Neighborhood Convenient Facilities Scale

**BREAST CANCER SURVIVOR QUESTIONNAIRE - 7****PART SEVEN: Neighborhood Environment**

**Directions:** During the next 4 weeks, please indicate which (1) items you will have access to in your neighborhood, and (2) whether or not you will use them.

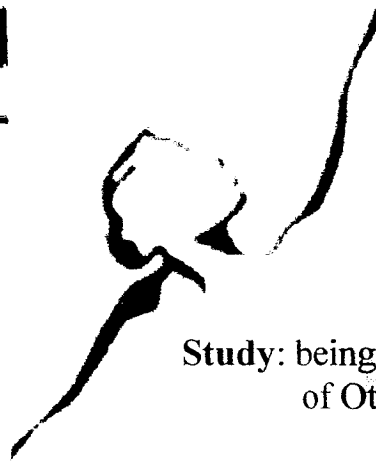
**Please circle Yes or No for each item in column 1 and column 2.**

|                                      | Column 1                             |    | Column 2         |    |
|--------------------------------------|--------------------------------------|----|------------------|----|
|                                      | Do you have it in your neighborhood? |    | Will you use it? |    |
| 1. Bike paths                        | Yes                                  | No | Yes              | No |
| 2. Walking paths                     | Yes                                  | No | Yes              | No |
| 3. Public park with playing field    | Yes                                  | No | Yes              | No |
| 4. Public recreation center          | Yes                                  | No | Yes              | No |
| 5. Swimming pool, beach, or lake     | Yes                                  | No | Yes              | No |
| 6. Basketball or tennis courts       | Yes                                  | No | Yes              | No |
| 7. Health club or gym near your home | Yes                                  | No | Yes              | No |
| 8. Hiking trails                     | Yes                                  | No | Yes              | No |
| 9. Organized sports                  | Yes                                  | No | Yes              | No |

## Appendix K

## Breast Cancer Action Recruitment Posters





# ***EXERCISE and Breast Cancer?***

## ***There are BENEFITS....***

**Study:** being done by Chris Blanchard PhD, a researcher of the University of Ottawa

**Sponsors:** University of Ottawa and the National Cancer Institute of Canada.

**Supporting Agency:** Breast Cancer Action

**The following volunteers are needed:**

Female breast cancer survivors 18 years+.  
>1 to < 5 years post-treatment.  
English and/or French speaking.

**How will you benefit?**

Non-invasive assessments of activity levels, dietary intake, resting energy expenditure, and body composition measurements.

**Will you have to change your daily activities in order to participate?**

No. You are not required to change your day-to-day activity levels. You may remain in your current lifestyle.

**Purpose of the study:**

To help increase the quality of life for breast cancer survivors.

**Length:** 2 visits over a period of 4 weeks.

**Compensation:** total of \$ 50.00.

**Contact:** Lisa McDonnell, research assistant, at the Montfort Hospital BMRU at (613) 746-4621 ext. 6033.

- If interested, please complete a participant information sheet and leave completed form with Executive Director at Breast Cancer Action.



# ***L'EXERCICE et le Cancer du Sein?***

## ***Il y en a des BÉNÉFICES....***

**Étude:** étant fait par Chris Blanchard PhD, un chercheur de l'Université d'Ottawa

**Commanditaires:** L'Université d'Ottawa et l'Institut national du cancer du Canada.

**Agence de support :** Sensibilisation du cancer du sein.

**Les bénévoles suivants sont au besoin :**

Survivantes du cancer du sein chez les femmes 18 ans +.  
>1 à <5 ans post-traitement.  
Anglophones et/ou francophones

**Comment allez-vous bénéficier?**

Des évaluations non-effractives gratuites du niveau d'activité physique, de l'apport alimentaire, de la dépense énergétique au repos, ainsi que des mesures de la composition corporelle.

**Devez-vous modifier vos activités quotidiennes afin de participer?**

Non. Il n'y a aucune exigence de modifier votre niveau d'activité quotidien. Vous pouvez demeurer dans votre présent style de vie.

**But de l'étude:**

Pour aider à l'augmentation de la qualité de vie des survivantes du cancer du sein.

**Durée:** 2 visites à l'intérieur d'une période de 4 semaines.

**Compensation:** 50.00\$ en total.

**Contactez:** Lisa McDonnell, assistante de recherche, à l'hôpital Montfort URM (613) 746-4621 ext. 6033.

- Si vous êtes intéressé, svp complétez un formulaire d'information du participant et laissez votre formulaire complété avec la Directrice Exécutive du centre de sensibilisation du cancer du sein .

Appendix L

Participant Information Sheets



# Université d'Ottawa - University of Ottawa

Faculté des sciences de la santé  
École des sciences de l'activité physique

Faculty of Health Sciences  
School of Human Kinetics

## **Participant Information Sheet** **The Relationship of Exercise & Quality of Life in Breast Cancer Survivors After Treatment**

### **PURPOSE OF STUDY**

Physical activity improves quality of life (e.g. decreased anxiety) in breast cancer survivors. In this study, we are attempting to determine how much physical activity is needed to improve quality of life in breast cancer survivors. We are also attempting to explain why you engage (or not) in regular physical activity.

### **INVESTIGATIONS**

You are asked to participate in this study because you have been diagnosed with breast cancer and have completed treatment. If you choose to participate, you will be asked to go to the physical activity lab at the Montfort Hospital twice in a 4-week period. Your specific tasks are outlined below.

### **PARTNER**

Breast Cancer Action is a supporting agency in this project to assist in our efforts to enhance the quality of life for survivors of breast cancer.

### **Week 1: Baseline Assessment (at the Montfort Hospital)**

- (i) Complete your consent form, physical activity readiness questionnaire, and a survey that will assess your current quality of life and your determinants of physical activity (e.g., depression, social support, etc) (Total time = 30-45 min)
- (ii) Resting energy expenditure (i.e., # of cal. body naturally burns/day) will be evaluated. After a 30 min. resting period, lying on your back, a plexiglass hood placed over your head will draw fresh air and analyze expired air (% oxygen and carbon dioxide). Amount of oxygen consumed and resting energy expenditure is determined. No risks are associated with this procedure (Total time = 1 hr).
- (iii) DEXA will be used to measure bone density, percent fat, and percent lean body mass. Body weight/height is measured. You will be asked to lie on an examination table, fully clothed, while a low-intensity x-ray scans the entire body. The risk is minimal x-ray exposure of less than, 0.5 millirem. Exposure is less than the natural background from 1 day of exposure to sunlight. This measurement is routinely performed and poses no risk to your health. (Total time = 20min)
- (iv) You will receive an accelerometer, (size of a small pager) to wear around your waist (waking hours only) for a 4-week period. This motion sensor tells us how much physical activity you do!
- (v) You will record a 7-day dietary record of what you eat for 7 days during the 4<sup>th</sup> week of the study.

### **Week 4: Assessments**

- (i) During the 4<sup>th</sup> week, you will be telephoned to remind you to complete your dietary record, which will take approximately 10-15 min. to complete each of the 7 days.
- (ii) You will return to the lab at the end of week 4 to return your 7-day dietary record, accelerometer, and complete the same questionnaire for the last time. (Total time: 1 hr)

The information you provide is for research purposes only and will remain strictly confidential. The individuals (e.g. doctors, nurses, etc.) directly involved in your care will not see your results.

### RISKS & BENEFITS

The risks associated with this study are very few. You may feel some discomfort with the questions asked given the personal nature of them. If you do not want to answer a question, you can skip it. You are not required to do more physical activity than usual, or change eating habits. The resting energy expenditure and body composition tests pose no health threat to you.

This study offers you an opportunity to obtain accurate assessments of your (1) physical activity levels during a 4-wk period, (2) dietary intake (i.e., energy intake), (3) resting energy expenditure, and (4) body composition. Results from this study will potentially help health care professionals (e.g., doctors, nurses, or psychologists) prescribe proper amounts of physical activity to improve quality of life in other breast cancer survivors after treatment.

### PAYMENTS

You will be given \$25.00 at the beginning of your 1<sup>st</sup> and last visit to the lab for a total of \$50.00.

### CONFIDENTIALITY

In order to guarantee confidentiality and anonymity, all precautions and necessary measures will be taken to ensure that results and personal information are kept confidential.

- Your name will not appear on any reports or publications. A number code will be used to identify you on all research documents.
- All information that can be linked to you will not be made public, and will be kept confidential.
- The data collected will be in a locked file/room with limited access at the research lab of the Montfort Hospital. Computer files will be protected by a password. The data will be destroyed five years following their publication.

### VOLUNTARY PARTICIPATION

There is no obligation to participate and if you choose to participate, you may withdraw from the study at any time. This will not affect the quality or standard of your treatment.

### FURTHER QUESTIONS

Any questions or concerns about this research, or for further explanation about the study, please contact Lisa McDonnell at 746-4621 ext. 6033 (email: [lmcd062@uottawa.ca](mailto:lmcd062@uottawa.ca)).

☐ I agree that a Graduate Student from the University of Ottawa, may telephone me, to arrange an appointment in the physical activity lab at the Montfort Hospital.

Best time to contact you: ☐ (8am – 12pm) ☐ (1 – 5pm) ☐ (6:30- 8pm)

Primary Contact: \_\_\_\_\_ Alternative Contact: \_\_\_\_\_  
area code phone #

Can we leave a simple message on your phone? Circle: YES or NO

Participant's Name (Please Print) \_\_\_\_\_

Patient's Signature \_\_\_\_\_

Date \_\_\_\_\_

- Please leave your information contact sheet with the Executive Director at Breast Cancer Action.
  - You will be contacted by Lisa McDonnell once this form is completed and received to book an appointment.
- Thank you!



**Formulaire de consentement et de renseignements sur la patiente**  
**Lien entre l'exercice et la qualité de vie post-traitement chez les survivantes d'un**  
**cancer du sein**

**OBJECTIF DE L'ÉTUDE**

L'activité physique améliore la qualité de vie (par exemple en diminuant l'anxiété) des femmes qui ont eu un cancer du sein. Dans le cadre de la présente étude, nous essaierons de déterminer le niveau d'activité physique nécessaire pour améliorer la qualité de vie des survivantes d'un cancer du sein. Nous tenterons aussi d'établir ce qui les motive (ou pas) à faire de l'activité physique sur une base régulière.

**ENQUÊTE**

On vous demande de participer à cette recherche parce que vous avez reçu un diagnostic de cancer du sein et que vous avez terminé le traitement prescrit. Si vous acceptez d'y prendre part, vous devrez aller au laboratoire d'activité physique de l'hôpital Montfort à deux reprises durant une période de quatre semaines. Les tâches précises que vous devrez accomplir sont indiquées ci-dessous.

**PARTENAIRE**

Sensibilisation au cancer du sein est une agence de support dans ce projet qui assistera dans nos efforts d'augmenter la qualité de vie des survivantes du cancer du sein.

**Semaine 1 — Évaluation initiale (à l'hôpital Montfort)**

- (i) Vous devrez remplir le formulaire de consentement et répondre au questionnaire de préparation à l'activité physique et une enquête qui permettra d'évaluer votre qualité de vie et les facteurs déterminants de votre niveau d'activité physique (par exemple dépression, appui social, etc.)  
(Durée : 30–45 minutes)
- (ii) On procédera à l'évaluation de votre dépense énergétique au repos (c'est-à-dire le nombre de calories que votre corps consomme naturellement par jour). Après une période de repos de 30 minutes, couchée sur le dos, un masque en plexiglas sera placé sur votre visage. De l'air frais vous sera donné et l'air que vous expirezerez sera analysé (pourcentage d'oxygène et de dioxyde de carbone). La quantité d'oxygène consommée et la dépense énergétique au repos seront déterminées. Cette étape ne comporte aucuns risques. (Durée : 1 heure)
- (iii) Au moyen du test DEXA, on mesurera votre densité osseuse, votre pourcentage de gras ainsi que votre masse corporelle maigre. Votre masse et votre taille seront consignées. On vous demandera de vous coucher sur une table d'examen, entièrement vêtue, le temps qu'un rayon X à faible intensité balaye votre corps. Le risque est une faible exposition à des rayons X de moins de 0,5 millirem, ce qui représente une quantité inférieure au rayonnement ambiant d'une journée ensoleillée. Il s'agit d'une procédure courante qui ne comporte aucun risque pour la santé. (Durée : 20 minutes)
- (iv) Vous recevrez un accéléromètre (de la grosseur d'un téléavertisseur) à porter autour de votre taille (durant les heures d'éveil seulement) pour une période de quatre semaines. Ce détecteur de mouvement nous indiquera votre niveau d'activité physique!
- (v) Vous tiendrez un journal hebdomadaire de ce que vous mangez durant les sept jours de la quatrième et dernière semaine de l'étude.

## **Semaine 4 - Évaluation**

- (i) Durant la quatrième semaine, on vous téléphonera pour vous rappeler de remplir votre journal diététique, ce qui demandera entre 10 et 15 minutes de votre temps chaque jour.
- (ii) Vous retournerez au laboratoire à la fin de la quatrième semaine pour remettre votre journal diététique, l'accéléromètre et pour remplir une deuxième fois le questionnaire de départ. (Durée : 1 heure)

L'information que vous nous fournirez servira seulement à la recherche et sera tenue confidentielle. Les personnes qui vous soignent (c'est-à-dire les médecins, les infirmières, etc.) ne verront pas les résultats.

## **RISQUES ET AVANTAGES**

Les risques associés à cette étude sont minimes. Certaines des questions posées pourraient vous gêner. Vous pouvez choisir de ne pas répondre. Vous ne serez pas obligée de faire plus d'activité physique que d'habitude, ni de changer vos habitudes alimentaires. Les tests de dépense énergétique au repos et de composition corporelle ne présentent aucun danger pour la santé.

Cette étude vous permet d'obtenir une évaluation précise de votre niveau d'activité physique durant une période de quatre semaines; de votre apport alimentaire (c'est-à-dire votre apport énergétique); de votre dépense énergétique au repos et, de votre composition corporelle. Les résultats de cette étude pourraient aider des spécialistes des soins de santé (par exemple médecins, des infirmières ou des psychologues) à prescrire la quantité idéale d'activité physique pour améliorer la qualité de vie d'autres femmes qui ont terminé leur traitement pour le cancer du sein.

## **COMPENSATION FINANCIÈRE**

Vous recevrez 25.00 \$ au début de la première et de la dernière visite au laboratoire pour une somme totale de 50.00 \$.

## **CONFIDENTIALITÉ**

Pour garantir la confidentialité des renseignements et pour garder l'anonymat des participantes, toutes les précautions et les mesures nécessaires seront prises pour restreindre l'accès aux résultats à l'information personnelle.

- Votre nom ne sera pas mentionné dans les rapports ni les publications. Un code numérique sera utilisé pour vous identifier sur tous les documents de la recherche.
- Toutes les informations permettant de vous identifier seront gardées confidentielles et ne seront pas rendues publiques.
- L'information recueillie sera placée dans un classeur verrouillé dans une salle à accès limité au laboratoire de recherche de l'hôpital Montfort. Les dossiers informatiques seront protégés par un mot de passe. L'information sera détruite dans les cinq ans suivant la publication des rapports.

## **PARTICIPATION VOLONTAIRE**

Il n'y a aucune obligation de participer et si vous choisissez de participer, vous pouvez vous retirer de l'étude en tout moment. Cela ne nuira pas à la qualité de votre traitement.

## **RENSEIGNEMENTS SUPPLÉMENTAIRES**

Veuillez communiquer avec Lisa McDonnell si vous avez des questions ou des préoccupations au sujet de cette recherche, par téléphone au 746-4621 poste 6033 ou par courriel à [lmcd062@uottawa.ca](mailto:lmcd062@uottawa.ca).

J'accepte qu'un(e) étudiant(e) du deuxième cycle de l'Université d'Ottawa me téléphone pour fixer un rendez-vous au laboratoire d'activité physique de l'hôpital Montfort.

Meilleur moment pour me joindre : ☐ (8h – 12h) ☐ (13h – 17h) ☐ (18h30–20h)

Numéro de téléphone principal : (\_\_\_\_) \_\_\_\_\_

Deuxième numéro : (\_\_\_\_) \_\_\_\_\_

Peut-on vous laisser un message? OUI ou NON (veuillez encercler votre réponse)

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Nom de la patiente en lettres moulées

Signature de la patiente

Date

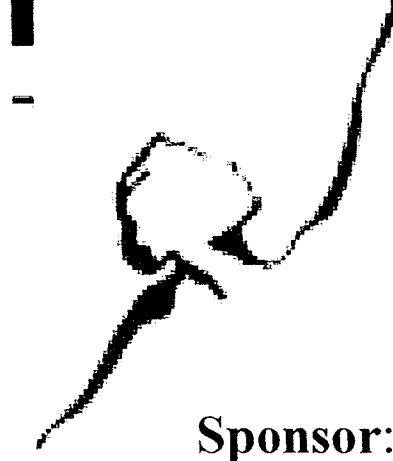
- Svp laisser votre formulaire de consentement et de renseignement avec la Directeur Générale, Sensibilisation au cancer du sein.
- Lorsque ce formulaire sera complété et reçu, vous allez être contacté par Lisa McDonnell pour réserver un rendez-vous.

Merci!



## Appendix M

### Recruitment Posters for the Ottawa Regional Cancer Centre



# ***EXERCISE and Breast Cancer?***

## ***There are BENEFITS....***

**Sponsor:** University of Ottawa and the National Cancer Institute of Canada.

**Who:** - Female breast cancer survivors 18 years+.  
- >1 to < 5 years post-treatment.  
- English and/or French speaking.

**What:** - *Free* non-invasive assessments of activity levels, dietary intake, resting energy expenditure, and body composition measurements (estimated value = \$300).  
- No requirement to change day-to-day activity levels...remain in current lifestyle.

**Why:** - Participation in a pilot study to help increase the quality of life for yourself and other breast cancer survivors.  
- \$50 incentive per participant.

**How long:** 2 visit's over a period of 4 weeks.

**Contact:** your primary Oncologist for further information.

- Working together with the Ottawa Regional Cancer Center to improve quality of life!



# ***L'EXERCICE et le Cancer du Sein?***

## ***Il y en a des BÉNÉFICES...***

**Commanditaire:** L'Université d'Ottawa et l'Institut National du cancer du Canada.

**Qui:** - Survivants du cancer du sein chez les femmes 18 ans +.  
- >1 à <5 ans de post-traitement.  
- Anglophones et/ou francophones.

**Quoi:** - Des évaluations non-effractives gratuites du niveau d'activité physique, de l'apport alimentaire, de la dépense énergétique au repos, ainsi que des mesures de la composition corporelle (valeur estimée = 300\$).  
- Aucune exigence pour modifier votre niveau d'activité quotidien – demeurez dans votre présent style de vie.

**Pourquoi:** - Participation dans une étude pilote afin d'améliorer votre qualité de vie, ainsi que celle des autres survivantes du cancer du sein.  
- 50\$ en prime pour chaque participant.

**Durée:** 2 visites à l'intérieur d'une période de 4 semaines.

**Qui contacter:** votre oncologue primaire pour de plus amples renseignements.

- Nous travaillons ensemble avec le Centre régional de cancérologie d'Ottawa afin d'améliorer votre qualité de vie !

## Appendix N

### Consent Form and 'PAR-Q & You'



## CONSENT FORM

**TITLE:** The Relationship between Exercise and Quality of Life in Breast Cancer Survivors After Treatment

**INVESTIGATORS:** Dr. Chris Blanchard, University of Ottawa, 613-562-5800 ext. 4283

Dr. Roanne Segal, Ottawa Regional Cancer Center, 613-737-7700 ext. 5680

**RESEARCH ASSISTANT:** Lisa McDonnell, University of Ottawa, 613-746-4621 ext. 6033

**1. INVITATION TO PARTICIPATE:** You are being asked to participate in this research study conducted by Lisa McDonnell and Chris Blanchard, PhD. The sponsor of this project is the University of Ottawa and the National Cancer Institute of Canada.

**2. BACKGROUND AND PURPOSE:** Breast cancer diagnosis and its treatments (e.g., surgery, chemotherapy, and radiotherapy) are often associated with negative side effects such as reduced quality of life (e.g., increased anxiety). Furthermore, once breast cancer survivors complete treatment, many still have poorer quality of life (e.g., increased depression and fatigue) than women who have not had breast cancer. Fortunately, physical activity is one intervention that has been shown to improve quality of life in breast cancer survivors. Unfortunately, this result has only been found when breast cancer survivors used a questionnaire to record how often they did physical activity. This is a problem because breast cancer survivors overestimate the amount of physical activity they do by as much as 20%. Furthermore, previous studies did not take into account the breast cancer survivors resting energy expenditure (i.e., how many calories the body naturally expends throughout the course of day), dietary intake, or body composition. Therefore, to get a more accurate description of the relationship between physical activity and quality of life, the present study will use an accelerometer, which looks like a small beeper that is worn on your waist. This device has a motion sensor that measures a full range of body movements from sedentary to intense physical activity throughout the day. Furthermore, we will measure your resting energy expenditure, dietary intake, and body composition to be able to more accurately assess the unique relationship between physical activity and quality of life. Therefore, the purpose of this study is to determine how much physical activity is needed to improve quality of life in breast cancer survivors while taking your resting energy expenditure, dietary intake, and body composition into account. Additionally, we are also attempting to explain why you engage (or not) in regular physical activity. Specifically, we are going to ask you about your motivation to be physically active, who supports you to do so, and the availability of various facilities and equipment to be active.

**3. METHOD:** If you agree to participate in the present study, you will be asked to come to our physical activity lab at the Montfort hospital two times over a 4-week period. The specific tasks that you will engage in are outlined below.

**Week 1: Baseline Assessment (at the Montfort Hospital)**

- (i) You will pass in your consent form and complete an *rPAR-Q*, the revised physical activity readiness questionnaire, which will assess any potential risks that may prevent you from engaging

in physical activity, and a baseline questionnaire to assess your current quality of life and your determinants of physical activity (e.g., your current levels of anxiety, depression, emotional support, etc). This will take approximately 30 to 45 minutes.

- (ii) You will have your resting energy expenditure evaluated. After lying on your back for a 30 minute resting period, a measurement of your resting energy expenditure (i.e., how many calories your body naturally burns throughout the course of a day) will be performed. A plexiglass hood will be placed over your head through which fresh air will be drawn. The expired air will be sampled for analysis and percentages of oxygen and carbon dioxide determined. With this measurement, we will be able to determine the amount of oxygen that is consumed and derive your resting energy expenditure. This test requires you to lie quietly and relaxed in bed for approximately 30 minutes. There are no risks associated with this procedure (Total time for this test is 1 hour).
- (iii) You will have your body composition evaluated. Body weight and height will be measured. A method called dual-photon x-ray (DEXA) will be used to measure bone density, percent fat, and percent lean body mass. You will be asked to lie on an examination table, fully clothed, while a low-intensity x-ray will scan the entire body. The measurement takes 20 minutes. The only risk is a minimal x-ray exposure of less than 0.5 millirem. This exposure is less than the natural background from 1 day of exposure to sunlight. This measurement is routinely performed and poses no risk to your health.
- (iv) You will be given a small accelerometer the size of a small pager to wear around your waist during the waking hours of the day for a 4-week period. This small motion sensor simply tells us how much physical activity you will do on a daily basis!
- (v) You will be given one 7-day dietary record that will ask you to record what you eat for seven days during the fourth week of the study (5 weekdays and 2 weekend days).

#### **Week 4: Assessments**

- (i) During the 3rd week, you will be contacted by a research assistant to remind you to complete your 7-day dietary record, which will take approximately 10-15 minutes to complete each of the seven days.
- (ii) You will be asked to come back to the Montfort Hospital at the end of week 4 to return your 7-day dietary record, your accelerometer, and complete the same questionnaire for the last time. This appointment will last 1 hour.

**4. RISKS:** The risks associated with this study are very few. You may feel some discomfort with the questions asked given the personal nature of them. However, if you do not want to answer a certain question, you can skip it. As well, you are not required to do more physical activity than you usually would throughout the course of a day or change your eating habits. Furthermore, the resting energy expenditure and body composition tests pose no health threat to you.

**5. BENEFITS:** The present study will offer you an opportunity to obtain accurate assessments of (1) your physical activity levels throughout a 4-week period, (2) your dietary intake (i.e., your energy intake), (3) your resting energy expenditure, and (4) your body composition. Additionally, results from this study will be used to potentially help health care professionals (e.g., doctors, nurses, or psychologists) prescribe the proper amount of physical activity needed to improve quality of life in other breast cancer survivors after treatment.

**6. COMPENSATION:** You will be given \$25.00 at the beginning of your first and last visit to the physical activity lab at the Montfort Hospital for a total of \$50.00.

**7. CONFIDENTIALITY AND ANONYMITY:** In order to guarantee confidentiality and anonymity, all precautions and necessary measures will be taken to ensure that results and personal information are kept confidential.

- Your name will not appear on any reports. A number code will be used to identify you on all research documents.
- If results are used for subsequent analyses, only your number code will appear on research documents.
- All material and information that can be linked to you will not be made public, and will be kept confidential.
- The data collected will be kept in a locked file in a room with limited access. In addition, the computer files will be protected by a password. The data will be destroyed five years following their publication.

**8. VOLUNTARY PARTICIPATION:** Please keep in mind that participating in the present study is completely voluntary. As well, you can withdraw from the study at any time.

**9. RIGHTS OF PARTICIPANTS:** Any information about your rights as a research participant may be addressed to the Protocol Officer for Ethics in Research, University of Ottawa, 550 Cumberland Street, Tabaret Hall, room 159, Ottawa, Ontario, K1N 6N5, tel: 613-562-5841, e-mail: [ethics@uottawa.ca](mailto:ethics@uottawa.ca).

Additionally, if you have any questions concerning this project, please contact Lisa McDonnell at 613-746-4621 ext. 6033 (email: [lmcd062@uottawa.ca](mailto:lmcd062@uottawa.ca)) or Dr. Chris Blanchard (e-mail: [chblanch@uottawa.ca](mailto:chblanch@uottawa.ca)).

**10. INTERESTED?:** If you are interested in learning more about this exciting study, please contact Lisa McDonnell at 613-746-4621 ext. 6033 (email: [lmcd062@uottawa.ca](mailto:lmcd062@uottawa.ca)) or Dr. Chris Blanchard, Assistant Professor, University of Ottawa, School of Human Kinetics (e-mail: [chblanch@uottawa.ca](mailto:chblanch@uottawa.ca)) to learn more about the study and what it requires. If you are still interested after speaking with us, we'll schedule an appointment to get your participation started. We hope that you will take the time to participate in the present study and help out other breast cancer survivors in the future.

**11. SIGNING OF CONSENT:** Please note that there are two copies of the consent form. If you agree to participate in the study, we ask that you please sign both copies and keep one for yourself and take the second one to the Montfort Hospital during your first appointment.

Participant's Name: \_\_\_\_\_

Participant's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Investigator's Name: \_\_\_\_\_

Investigator's Signature: \_\_\_\_\_ Date: \_\_\_\_\_



# Université d'Ottawa - University of Ottawa

Faculté des sciences de la santé  
École des sciences de l'activité physique

Faculty of Health Sciences  
School of Human Kinetics

## FORMULAIRE DE CONSENTEMENT

**TITRE:** La relation entre l'exercice et la qualité de vie chez les survivantes du cancer du sein après le traitement

**INVESTIGATEUR:** Dr Chris Blanchard, Université d'Ottawa, 613-562-5800 poste 4283  
Dr Roanne Segal, Centre Régional de Cancérologie de l'Hôpital d'Ottawa, 613-737-7700 ext. 5680

**L'ASSISTANTE DE RECHERCHE:** Lisa McDonnell, Université d'Ottawa, 613-746-4621 ext.6033

**1. INVITATION À PARTICIPER:** Vous êtes invitée à participer à ce projet de recherche conduit par Lisa McDonnell et Chris Blanchard, PhD. Ce projet est parrainé par l'Université d'Ottawa et l'Institut National du Cancer du Canada.

**2. HISTORIQUE ET BUT :** Le diagnostic du cancer du sein et ses traitements (ex. : chirurgie, chimiothérapie, et radiothérapie) sont souvent associés à des effets secondaires négatifs tels qu'une qualité de la vie réduite (ex. : augmentation de niveau d'anxiété). De plus, une fois que les survivantes du cancer du sein terminent leur traitement, beaucoup demeurent avec une qualité de vie plus faible (ex. : dépression et fatigue accrue) que les femmes qui n'ont pas eu le cancer du sein. Heureusement des études ont démontré que l'activité physique est une intervention qui peut améliorer la qualité de vie chez les survivantes du cancer du sein. Toutefois, cette relation entre l'activité physique et la qualité de vie doit être interprétée avec prudence, car ce résultat a été trouvé alors que les survivantes du cancer du sein n'ont utilisé qu'un questionnaire pour inscrire combien de fois elles ont fait de l'activité physique. Ceci cause un problème car les survivantes du cancer du sein surestiment d'au moins 20% la quantité d'activité physique qu'elles font. De plus, les études précédentes n'ont pas tenu compte de la dépense énergétique au repos des participantes (c'est-à-dire, combien de calories le corps dépense naturellement au cours d'une journée), de l'alimentation ou de la composition du poids corporel. Par conséquent, pour obtenir une description précise de la relation entre l'activité physique et la qualité de vie, le projet utilisera un accéléromètre, qui ressemble à un petit pagette qui est portée sur la taille. Cet appareil a une sonde de mouvement qui mesure les mouvements du corps tout au long de la journée, que la personne soit sédentaire ou qu'elle soit en train de faire de l'activité physique intense. De plus, nous allons mesurer la dépense énergétique pendant le repos, l'alimentation et la composition du poids corporel. Ces mesures permettront d'évaluer plus précisément la relation unique entre l'activité physique et la qualité de la vie. Par conséquent, le but de ce projet de recherche est de déterminer le niveau d'activité physique nécessaire pour améliorer la qualité de vie des survivantes du cancer du sein tout en tenant compte de la dépense énergétique reliée au repos, de l'alimentation et de la composition du poids corporel. Nous essayons également d'expliquer pourquoi vous vous engagez ou ne vous engagez pas, à faire de l'activité physique de façon régulière. Spécifiquement, nous allons vous interroger au sujet de votre motivation à être physiquement active, au sujet des gens qui vous



soutiennent à ce niveau et au sujet de la disponibilité des divers équipements et centres récréatifs pour une vie active.

**3. MÉTHODE :** Si vous acceptez de participer à ce projet de recherche, vous serez invitée à venir à notre laboratoire d'activité physique à l'hôpital Montfort à deux reprises à l'intérieur d'une période de quatre semaines. Les tâches spécifiques que vous ferez sont décrites ci-dessous.

**Semaine 1 : Évaluation de base (à l'hôpital Montfort)**

(i) Après avoir signé le présent formulaire de consentement, vous remplirez un formulaire *rPAR-Q*, qui évaluera tous risques potentiels qui peuvent vous empêcher de faire de l'activité physique. Vous remplirez aussi un questionnaire de ligne de base pour évaluer votre qualité de vie à l'heure actuelle et vos déterminants d'activité physique (par exemple, vos niveaux actuels d'anxiété, de dépression, de support émotionnel etc.). Ceci prendra environ 30 à 45 minutes.

(ii) Votre dépense énergétique de repos sera évaluée. Après avoir été couchée sur votre dos pendant une période de 30 minutes, une mesure de votre dépense énergétique de repos (c'est-à-dire, combien de calories votre corps brûle naturellement pendant une journée) sera effectuée. Une hotte de plexiglas sera placée au-dessus de votre tête par laquelle l'air frais sera retiré. L'air expiré sera prélevé pour analyse et les pourcentages d'oxygène et de l'anhydride carbonique seront déterminés. Avec cette mesure, nous pourrions déterminer la quantité d'oxygène qui est consommée et ainsi dériver votre dépense énergétique de repos. Ce test demande que vous soyez détendue et couchée dans le lit pendant approximativement 30 minutes. Il n'y a aucun risque relié à ce procédé (temps total pour cet essai : 1 heure).

(iii) Votre composition de poids corporel sera évaluée. Le poids corporel et la taille seront mesurés. Une méthode appelée le rayon X de dual-photon (DEXA) sera employée pour mesurer la densité des os, le pourcentage de graisse, et le pourcentage de masse musculaire du corps. On vous demandera de vous étendre sur une table d'examen, entièrement vêtue, alors qu'un rayon X de basse intensité balayera tout votre corps. Cela prendra 20 minutes. Le seul risque est une exposition minimale au rayon X de moins de 0.5 millirem, ce qui est moins qu'une exposition à un fond naturel de la lumière du soleil pendant une journée. Cette mesure est effectuée souvent en pratique et ne pose pas de risque à votre santé.

(iv) On vous donnera un petit accéléromètre de la taille d'un petit pagette pour porter autour de votre taille pendant toute la journée au cours d'une période de quatre semaines. Cette petite sonde de mouvement nous indique simplement la quantité d'activité physique que vous ferez quotidiennement !

(v) On vous donnera un journal alimentaire de sept jours sur lequel vous inscrirez ce que vous mangez pendant sept jours durant la quatrième semaine de l'étude.

**Semaine 4 : Évaluations**

(i) Pendant la 4<sup>ième</sup> semaine, un assistant de recherche vous contactera pour vous rappeler de compléter votre journal alimentaire de sept jours, qui prendra approximativement de 10 à 15 minutes par jour, à compléter.

(ii) Vous serez invitée à revenir à l'hôpital Montfort à la fin de la 4<sup>ème</sup> semaine pour remettre le journal alimentaire de sept jours, l'accéléromètre et pour remplir le même questionnaire, pour la dernière fois. Ce rendez-vous durera 1 heure.

**4. RISQUES :** Les risques associés à ce projet de recherche sont très minimes. Vous pouvez parfois ressentir un certain inconfort à cause de la nature personnelle des questions qui vous seront posées. Cependant, si vous ne voulez pas répondre à une certaine question, vous n'êtes pas obligée d'y répondre. Aussi, vous n'êtes pas obligée de faire plus d'activité physique que vous n'en faites habituellement au cours d'une journée, ni de changer vos habitudes alimentaires. De plus, les tests pour la dépense énergétique et la composition du poids corporel ne constituent aucune menace pour votre santé.

**5. AVANTAGES :** Le projet de recherche vous donnera une occasion d'obtenir des **évaluations précises** (1) de vos niveaux d'activité physique tout au long d'une période de quatre semaines, (2) de votre alimentation (c'est-à-dire, votre consommation d'énergie), (3) de votre dépense énergétique au repos, et (4) de votre composition de poids corporel. De plus, les résultats de cette étude seront utilisés pour aider des professionnels dans le domaine de la santé (ex. : médecins, infirmières ou psychologues) à prescrire la quantité appropriée d'activité physique requise pour améliorer la qualité de vie chez d'autres survivantes du cancer du sein, après traitement.

**6. COMPENSATION :** On vous donnera **\$25.00** au début de chaque rendez-vous au laboratoire d'activité physique à l'hôpital Montfort pour un montant total de \$50.00.

**7. CONFIDENTIALITÉ ET ANONYMAT :** Afin de garantir la confidentialité et l'anonymat, toutes les précautions et mesures nécessaires seront prises pour s'assurer que les résultats et l'information personnelle sont gardés confidentiels.

- Votre nom n'apparaîtra sur aucun rapport. Un numéro vous sera assigné sur tous les documents de recherches afin de masquer votre identité.
- Si des résultats étaient utilisés pour d'autres projets de recherches, seulement votre numéro serait alors utilisé.
- Tous documents de recherche et toutes informations pouvant révéler votre identité seront gardés sous la confidentialité la plus stricte, aucune information sur votre identité ne sera rendue publique.
- Les données seront gardées dans un cabinet verrouillé avec accès limité. De plus, les fichiers électroniques seront protégés par un mot de passe. Les données seront détruites cinq ans après leur publication.

**8. PARTICIPATION VOLONTAIRE :** Votre participation à ce projet de recherche est **complètement volontaire**. Si vous décidez de participer, vous pouvez vous **retirer** de l'étude à tous moments.

**9. DROITS DES PARTICIPANTS :** Toutes demandes relatives à vos droits en tant que participante de recherche peuvent être adressées à la responsable de l'éthique en recherche, Université d'Ottawa, 550 rue Cumberland, Pavillon Tabaret, pièce 159, Ottawa, Ontario, K1N 6N5, téléphone : 613-562-5841, courriel : [ethics@uottawa.ca](mailto:ethics@uottawa.ca).



## CONSENT FORM

**TITLE:** The Relationship between Exercise and Quality of Life in Breast Cancer Survivors After Treatment

**INVESTIGATORS:** Dr. Chris Blanchard, University of Ottawa, 613-562-5800 ext. 4283

Dr. Roanne Segal, Ottawa Regional Cancer Center, 613-737-7700 ext. 5680

**RESEARCH ASSISTANT:** Lisa McDonnell, University of Ottawa, 613-746-4621 ext. 6033

**1. INVITATION TO PARTICIPATE:** You are being asked to participate in this research study conducted by Lisa McDonnell and Chris Blanchard, PhD. The sponsor of this project is the University of Ottawa and the National Cancer Institute of Canada.

**2. BACKGROUND AND PURPOSE:** Breast cancer diagnosis and its treatments (e.g., surgery, chemotherapy, and radiotherapy) are often associated with negative side effects such as reduced quality of life (e.g., increased anxiety). Furthermore, once breast cancer survivors complete treatment, many still have poorer quality of life (e.g., increased depression and fatigue) than women who have not had breast cancer. Fortunately, physical activity is one intervention that has been shown to improve quality of life in breast cancer survivors. Unfortunately, this result has only been found when breast cancer survivors used a questionnaire to record how often they did physical activity. This is a problem because breast cancer survivors overestimate the amount of physical activity they do by as much as 20%. Furthermore, previous studies did not take into account the breast cancer survivors resting energy expenditure (i.e., how many calories the body naturally expends throughout the course of day), dietary intake, or body composition. Therefore, to get a more accurate description of the relationship between physical activity and quality of life, the present study will use an accelerometer, which looks like a small beeper that is worn on your waist. This device has a motion sensor that measures a full range of body movements from sedentary to intense physical activity throughout the day. Furthermore, we will measure your resting energy expenditure, dietary intake, and body composition to be able to more accurately assess the unique relationship between physical activity and quality of life. Therefore, the purpose of this study is to determine how much physical activity is needed to improve quality of life in breast cancer survivors while taking your resting energy expenditure, dietary intake, and body composition into account. Additionally, we are also attempting to explain why you engage (or not) in regular physical activity. Specifically, we are going to ask you about your motivation to be physically active, who supports you to do so, and the availability of various facilities and equipment to be active.

**3. METHOD:** If you agree to participate in the present study, you will be asked to come to our physical activity lab at the Montfort hospital two times over a 4-week period. The specific tasks that you will engage in are outlined below.

### Week 1: Baseline Assessment (at the Montfort Hospital)

- (i) You will pass in your consent form and complete an *rPAR-Q*, the revised physical activity readiness questionnaire, which will assess any potential risks that may prevent you from engaging

# PAR-Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

| YES                      | NO                       |                                                                                                                                            |
|--------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Has your doctor ever said that you have a heart condition <u>and</u> that you should only do physical activity recommended by a doctor? |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Do you feel pain in your chest when you do physical activity?                                                                           |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. In the past month, have you had chest pain when you were not doing physical activity?                                                   |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. Do you lose your balance because of dizziness or do you ever lose consciousness?                                                        |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity?    |
| <input type="checkbox"/> | <input type="checkbox"/> | 6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?                       |
| <input type="checkbox"/> | <input type="checkbox"/> | 7. Do you know of <u>any other reason</u> why you should not do physical activity?                                                         |

If  
you  
answered

## YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want — as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programs are safe and helpful for you.

## NO to all questions

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:

- start becoming much more physically active — begin slowly and build up gradually. This is the safest and easiest way to go.
- take part in a fitness appraisal — this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively. It is also highly recommended that you have your blood pressure evaluated. If your reading is over 144/94, talk with your doctor before you start becoming much more physically active.

### DELAY BECOMING MUCH MORE ACTIVE:

- if you are not feeling well because of a temporary illness such as a cold or a fever — wait until you feel better; or
- if you are or may be pregnant — talk to your doctor before you start becoming more active.

**PLEASE NOTE:** If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

**Informed Use of the PAR-Q:** The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

**No changes permitted. You are encouraged to photocopy the PAR-Q but only if you use the entire form.**

NOTE: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

"I have read, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction."

NAME \_\_\_\_\_

SIGNATURE \_\_\_\_\_

SIGNATURE OF PARENT \_\_\_\_\_  
or GUARDIAN (for participants under the age of majority)

DATE \_\_\_\_\_

WITNESS \_\_\_\_\_

**Note: This physical activity clearance is valid for a maximum of 12 months from the date it is completed and becomes invalid if your condition changes so that you would answer YES to any of the seven questions.**



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continued on other side...

# Q-AAP et VOUS

(Un questionnaire pour les gens de 15 à 69 ans)

L'exercice physique pratiqué d'une façon régulière constitue une occupation de loisir saine et agréable. D'ailleurs, de plus en plus de gens pratiquent une activité physique de façon régulière. Règle générale, augmenter la pratique sportive n'entraîne pas de risques de santé majeurs. Dans certains cas, il est cependant conseillé de passer un examen médical avant d'entreprendre un programme régulier d'activités physiques. Le Q-AAP (questionnaire sur l'aptitude à l'activité physique) vise à mieux cerner les personnes pour qui un examen médical est recommandé.

Si vous prévoyez modifier vos habitudes de vie pour devenir un peu plus actif(ve), commencez par répondre aux 7 questions qui suivent. Si vous êtes âgé(e) de 15 à 69 ans, le Q-AAP vous indiquera si vous devez ou non consulter un médecin avant d'entreprendre votre nouveau programme d'activités. Si vous avez plus de 69 ans et ne participez pas d'une façon régulière à des activités physiques exigeantes, vous devriez consulter votre médecin avant d'entreprendre ces activités.

Lisez attentivement et répondez honnêtement à chacune des questions suivantes. Le simple bon sens sera votre meilleur guide pour répondre correctement à ces questions. Cochez OUI ou NON.

| OUI                      | NON                      |                                                                                                                                                                                                           |
|--------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Votre médecin vous a-t-il déjà dit que vous souffriez d'un problème cardiaque et que vous ne deviez participer qu'aux activités physiques prescrites et approuvées par un médecin?                     |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. Ressentez-vous une douleur à la poitrine lorsque vous faites de l'activité physique?                                                                                                                   |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. Au cours du dernier mois, avez-vous ressenti des douleurs à la poitrine lors de périodes autres que celles où vous participiez à une activité physique?                                                |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. Éprouvez-vous des problèmes d'équilibre reliés à un étourdissement ou vous arrive-t-il de perdre connaissance?                                                                                         |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. Avez-vous des problèmes osseux ou articulaires (par exemple, au dos, au genou ou à la hanche) qui pourraient s'aggraver par une modification de votre niveau de participation à une activité physique? |
| <input type="checkbox"/> | <input type="checkbox"/> | 6. Des médicaments vous sont-ils actuellement prescrits pour contrôler votre tension artérielle ou un problème cardiaque (par exemple, des diurétiques)?                                                  |
| <input type="checkbox"/> | <input type="checkbox"/> | 7. Connaissez-vous une autre raison pour laquelle vous ne devriez pas faire de l'activité physique?                                                                                                       |

Si vous  
avez  
répondu

## OUI à une ou plusieurs questions

Consultez votre médecin AVANT d'augmenter votre niveau de participation à une activité physique et AVANT de faire évaluer votre condition physique. Dites à votre médecin que vous avez complété le questionnaire sur l'aptitude à l'activité physique et expliquez-lui précisément à quelles questions vous avez répondu «OUI».

- Il se peut que vous n'ayez aucune contre-indication à l'activité physique dans la mesure où vous y allez lentement et progressivement. Par ailleurs, il est possible que vous ne puissiez faire que certains types d'efforts adaptés à votre état de santé. Indiquez à votre médecin le type d'activité physique que vous comptiez faire et suivez ses recommandations.
- Informez-vous quant aux programmes d'activités spécialisés les mieux adaptés à vos besoins, offerts dans votre localité.

## NON à toutes ces questions

Si, en toute honnêteté, vous avez répondu «NON» à toutes les questions du Q-AAP, vous êtes dans une certaine mesure, assuré(e) que:

- vous pouvez augmenter votre pratique régulière d'activités physiques en commençant lentement et en augmentant progressivement l'intensité des activités pratiquées. C'est le moyen le plus simple et le plus sécuritaire d'y arriver.
- vous pouvez faire évaluer votre condition physique. C'est le meilleur moyen de connaître votre niveau de condition physique de base afin de mieux planifier votre participation à un programme d'activités physiques.

## REMETTRE À PLUS TARD L'AUGMENTATION DE VOTRE PARTICIPATION ACTIVE:

- si vous souffrez présentement de fièvre, d'une grippe ou d'une autre affection passagère, attendez d'être remis(e); ou
- si vous êtes enceinte ou croyez l'être, consultez votre médecin avant de modifier votre niveau de pratique sportive régulière.

**Veillez noter** que si votre état de santé se trouve modifié de sorte que vous deviez répondre «OUI» à l'une ou l'autre des questions précédentes, consultez un professionnel de la santé ou de la condition physique, afin de déterminer s'il vous faut modifier votre programme d'activités.

**Formule de consentement du Q-AAP:** La Société canadienne de physiologie de l'exercice, Santé Canada et ses représentants n'assument aucune responsabilité vis-à-vis des accidents qui pourraient survenir lors de l'activité physique. Si, après avoir complété le questionnaire ci-dessus, un doute persiste quant à votre aptitude à faire une activité physique, consultez votre médecin avant de vous y engager.

**Toute modification est interdite. Nous vous encourageons à copier le Q-AAP dans sa totalité.**

Dans la mesure où le Q-AAP est administré avant que la personne ne s'engage dans un programme d'activités ou qu'elle fasse évaluer sa condition physique, la section suivante constitue un document ayant une valeur légale et administrative.

«Je sous-signé(e) affirme avoir lu, compris et complété le questionnaire et avoir reçu une réponse satisfaisante à chacune de mes questions.»

NOM \_\_\_\_\_

SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

SIGNATURE D'UN PARENT  
ou TUTEUR (pour les mineurs) \_\_\_\_\_

TÉMOIN \_\_\_\_\_

**N.B.— Cette autorisation de faire de l'activité physique est valide pour une période maximale de 12 mois à compter du moment où le questionnaire est rempli. Elle n'est plus valide si votre état de santé change de telle sorte que vous répondiez «OUI» à l'une des sept questions.**



© Société canadienne de physiologie de l'exercice

Avec l'appui de:



Santé Canada Health Canada

suite au verso...

## Appendix O (a, b)

## Proof of Incentive Transfer



# Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé  
École des sciences de l'activité physique

Faculty of Health Sciences  
School of Human Kinetics

---

I, \_\_\_\_\_, hereby confirm that I have participated in  
(name of participant/ID #)

the Study entitled "The Relationship between Exercise and Quality of life in Breast Cancer Survivors After Treatment" that was conducted by Chris Blanchard and Lisa McDonnell of the School of Human Kinetics at the University of Ottawa. For this reason, I have therefore received monetary compensation of the first \$25.00 of a \$50.00 incentive as stipulated in my consent to participate in this study.

Researchers signature: \_\_\_\_\_

Date: \_\_\_\_\_

Participants signature: \_\_\_\_\_

Date: \_\_\_\_\_

For further information contact: the BMRU (Behavioral and Metabolic Research Unit) at the Montfort Hospital at 746-4621 ext. 6033.



# Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé  
École des sciences de l'activité physique

Faculty of Health Sciences  
School of Human Kinetics

---

I, \_\_\_\_\_, hereby confirm that I have participated in  
(name of participant/ID #)

the Study entitled "The Relationship between Exercise and Quality of life in Breast Cancer Survivors After Treatment" that was conducted by Chris Blanchard and Lisa McDonnell of the School of Human Kinetics at the University of Ottawa. For this reason, I have therefore received monetary compensation for the final \$25.00 of a \$50.00 incentive as stipulated in my consent to participate in this study.

Researchers signature: \_\_\_\_\_

Date: \_\_\_\_\_

Participants signature: \_\_\_\_\_

Date: \_\_\_\_\_

For further information contact: the BMRU (Behavioral and Metabolic Research Unit) at the Montfort Hospital at 746-4621 ext. 6033.



## Appendix P

## Actical Output Sample

# Actical Actogram Printout

Identity: BCS 26

Start Date: 02-Mar-2005 (Wed)

Start Time: 09:00

Activity Scale: 11798

File: C:\Breast Cancer Survival Study\ACTICAL RESULTS\BCS26.AWC

Age: 50

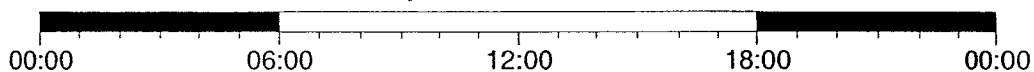
Gender: Female

Interval: 1.00 min

Height: 156.5 cm (61.6 in)

Weight: 52.8 kg (116.4 lbs)

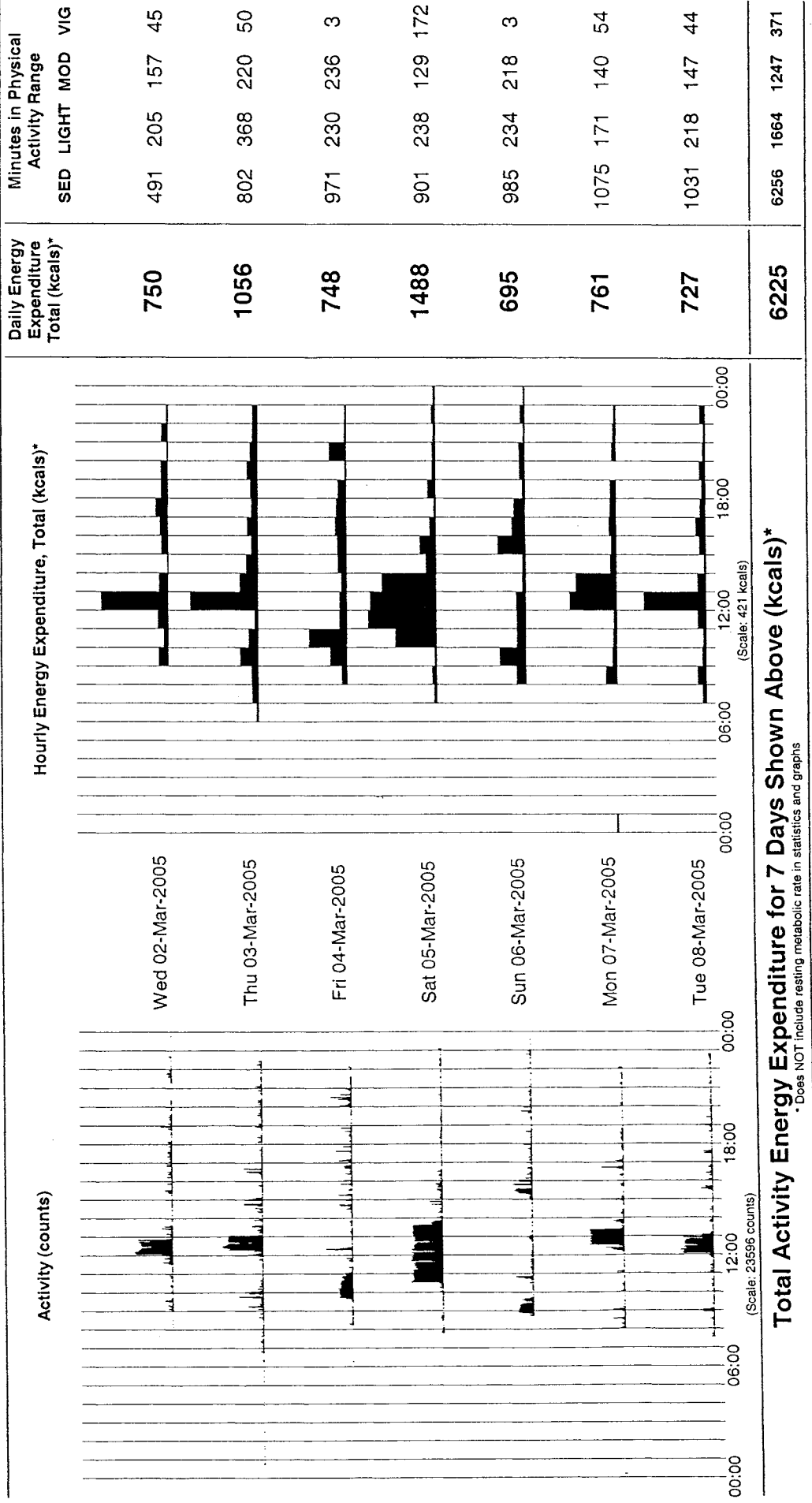
Activity Zero: 0



|             |  | Total   | Average |
|-------------|--|---------|---------|
| Wed, 02-Mar |  | 572772  | 397.8   |
| Thu, 03-Mar |  | 768801  | 533.9   |
| Fri, 04-Mar |  | 466042  | 323.6   |
| Sat, 05-Mar |  | 1527588 | 1060.8  |
| Sun, 06-Mar |  | 411346  | 285.7   |
| Mon, 07-Mar |  | 647365  | 449.6   |
| Tue, 08-Mar |  | 557144  | 386.9   |
| Wed, 09-Mar |  | 583754  | 405.4   |
| Thu, 10-Mar |  | 595023  | 413.2   |
| Fri, 11-Mar |  | 685276  | 475.9   |
| Sat, 12-Mar |  | 535023  | 371.5   |
| Sun, 13-Mar |  | 1093968 | 759.7   |
| Mon, 14-Mar |  | 798381  | 554.4   |
| Tue, 15-Mar |  | 1127765 | 783.2   |
| Wed, 16-Mar |  | 196550  | 136.5   |
| Thu, 17-Mar |  | 690048  | 479.2   |
| Fri, 18-Mar |  | 524678  | 364.4   |
| Sat, 19-Mar |  | 326820  | 227.0   |
| Sun, 20-Mar |  | 1787595 | 1241.4  |
| Mon, 21-Mar |  | 535158  | 371.6   |
| Tue, 22-Mar |  | 757203  | 525.8   |
| Wed, 23-Mar |  | 691015  | 479.9   |
| Thu, 24-Mar |  | 784205  | 544.6   |
| Fri, 25-Mar |  | 371056  | 257.7   |
| Sat, 26-Mar |  | 653667  | 453.9   |
| Sun, 27-Mar |  | 1091842 | 758.2   |
| Mon, 28-Mar |  | 405688  | 281.7   |
| Tue, 29-Mar |  | 755558  | 524.7   |
| Wed, 30-Mar |  | 1007199 | 699.4   |
| Thu, 31-Mar |  | 580703  | 403.3   |
| Fri, 01-Apr |  | 25838   | 17.9    |

# ActiCal Activity and Energy Expenditure Report (AEE)

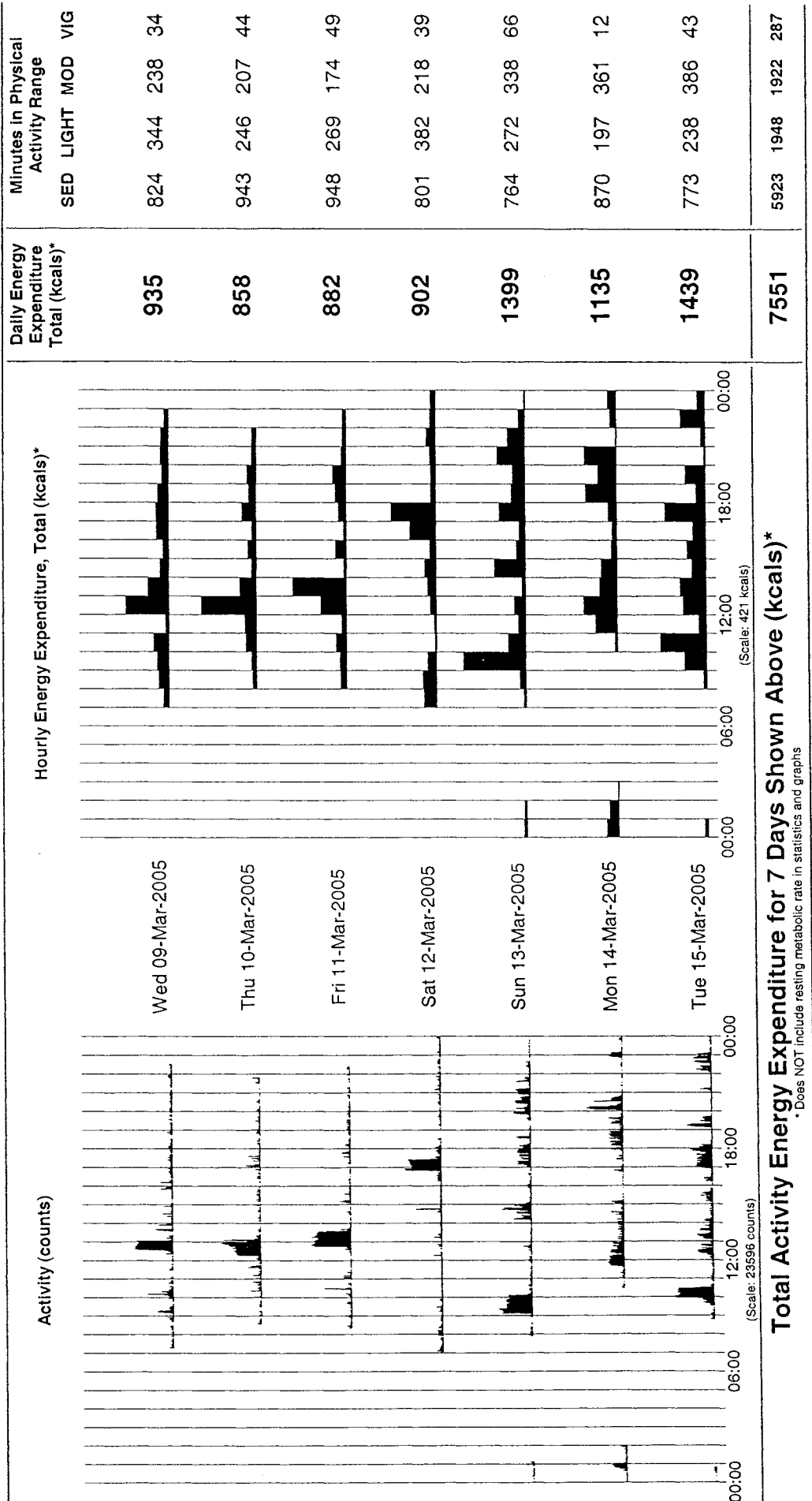
|                                                                                                 |                                                                                  |                                                                                    |                                                             |                         |
|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------|
| <b>Subject Identity</b><br>Subject Height                                                       | BCS 26<br>156.5 cm (61.6 in)                                                     | <b>Weight</b><br>52.8 kg (116.4 lbs)                                               | <b>Gender</b><br>Age                                        | Female<br>50 years      |
| <b>Data Collection Start Time</b><br>Energy Expenditure Output Type<br>Light/Moderate Cut-point | Wed, 02-Mar-2005, 09:00<br>Activity Energy Expenditure (AEE)<br>0.031 kca/min/kg | <b>Data Collection End Time</b><br>Regression Model<br>Moderate/Vigorous Cut-point | <b>Device Serial Number</b><br>Age Level<br>Device Location | C830683<br>Adult<br>Hip |



**A person of this age, gender, weight, and height needs 1215 calories to maintain their normal bodily functions.**  
(Based on Harris J, Benedict F. A biometric study of basal metabolism in man. Washington D.C. Carnegie Institute of Washington. 1919)

# ActiCal Activity and Energy Expenditure Report (AEE)

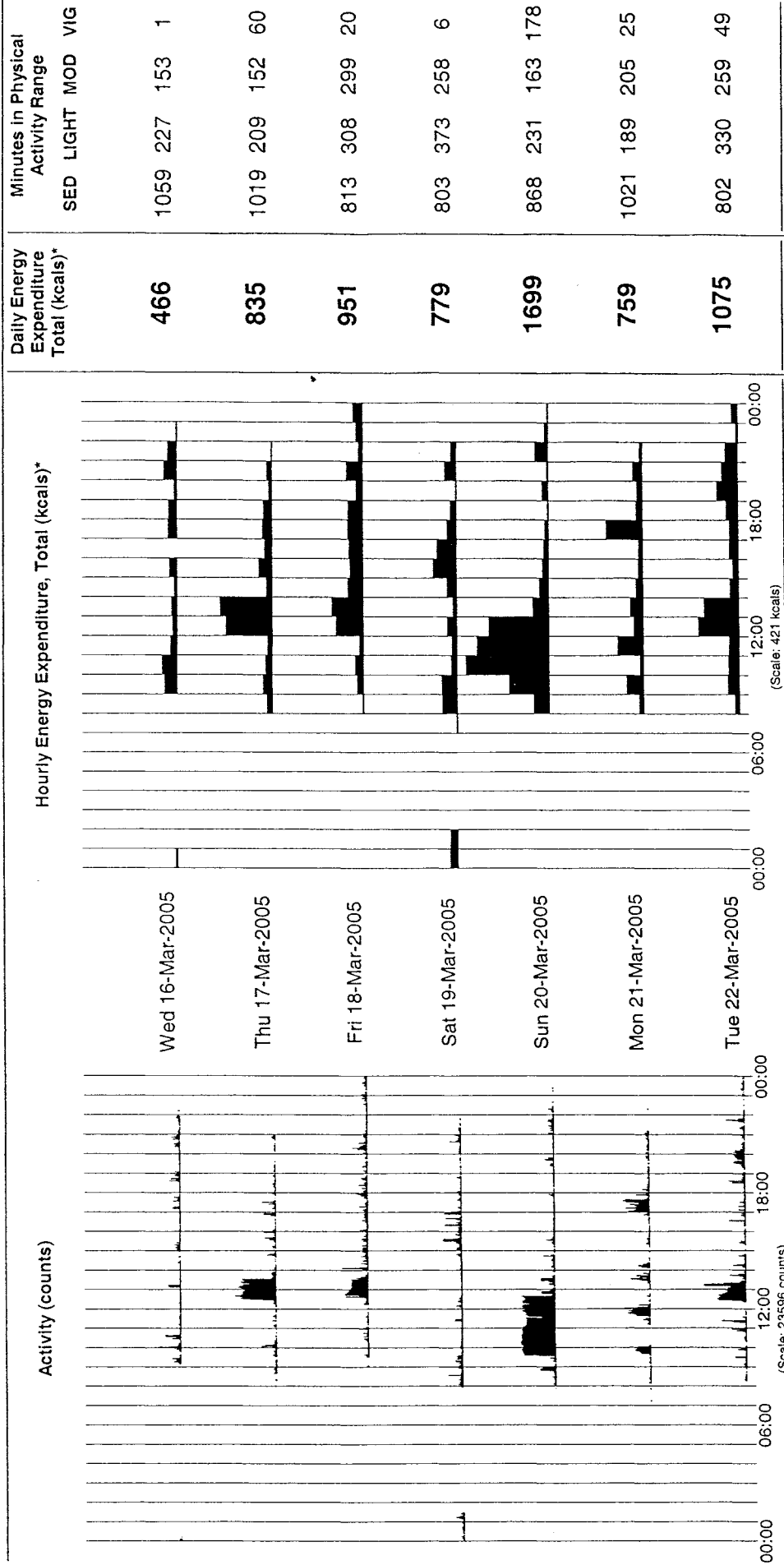
|                                       |                                   |                             |          |
|---------------------------------------|-----------------------------------|-----------------------------|----------|
| <b>Subject Identity</b>               | BCS 26                            | <b>Gender</b>               | Female   |
| <b>Subject Height</b>                 | 156.5 cm (61.6 in)                | <b>Age</b>                  | 50 years |
| <b>Data Collection Start Time</b>     | Wed, 02-Mar-2005, 09:00           | <b>Device Serial Number</b> | C830683  |
| <b>Energy Expenditure Output Type</b> | Activity Energy Expenditure (AEE) | <b>Age Level</b>            | Adult    |
| <b>Light/Moderate Cut-point</b>       | 0.031 kcals/min/kg                | <b>Device Location</b>      | Hip      |
| <b>Data Collection End Time</b>       | Fri, 01-Apr-2005, 09:11           |                             |          |
| <b>Regression Model</b>               | Single (1R)                       |                             |          |
| <b>Moderate/Vigorous Cut-point</b>    | 0.083 kcals/min/kg                |                             |          |



**A person of this age, gender, weight, and height needs 1215 calories to maintain their normal bodily functions.**  
(Based on Harris J. Benedict F. A biometric study of basal metabolism in man. Washington D.C. Carnegie Institute of Washington. 1919)

# ActiCal Activity and Energy Expenditure Report (AEE)

|                                       |                                   |                             |          |
|---------------------------------------|-----------------------------------|-----------------------------|----------|
| <b>Subject Identity</b>               | BCS 26                            | <b>Gender</b>               | Female   |
| <b>Subject Height</b>                 | 156.5 cm (61.6 in)                | <b>Age</b>                  | 50 years |
| <b>Data Collection Start Time</b>     | Wed, 02-Mar-2005, 09:00           | <b>Device Serial Number</b> | C830683  |
| <b>Energy Expenditure Output Type</b> | Activity Energy Expenditure (AEE) | <b>Age Level</b>            | Adult    |
| <b>Light/Moderate Cut-point</b>       | 0.031 kcal/min/kg                 | <b>Device Location</b>      | Hip      |
| <b>Data Collection End Time</b>       | Fri, 01-Apr-2005, 09:11           |                             |          |
| <b>Regression Model</b>               | Single (1R)                       |                             |          |
| <b>Moderate/Vigorous Cut-point</b>    | 0.083 kcal/min/kg                 |                             |          |



**Total Activity Energy Expenditure for 7 Days Shown Above (kcal)\***

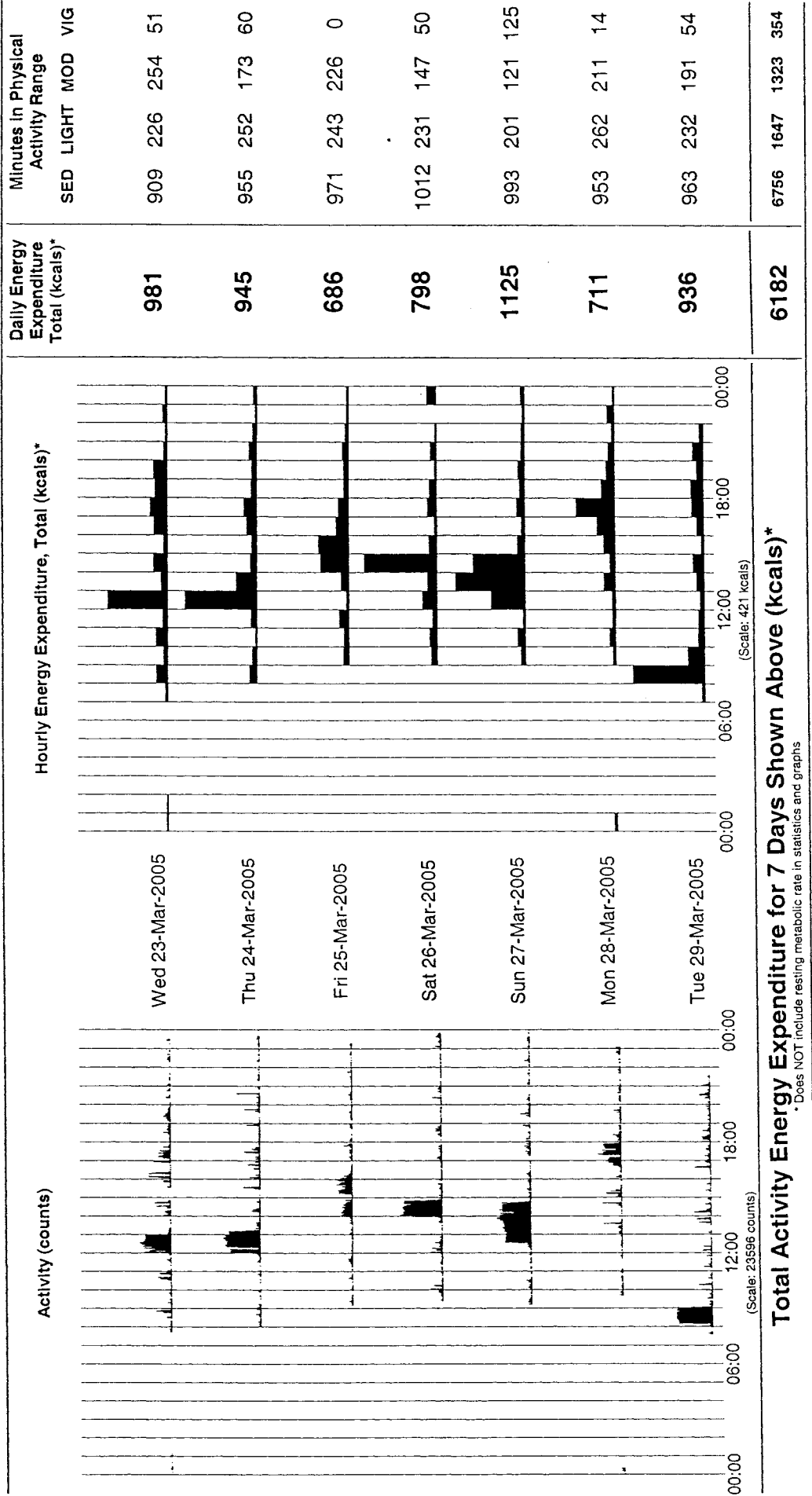
\* Does NOT include resting metabolic rate in statistics and graphs

**A person of this age, gender, weight, and height needs 1215 calories to maintain their normal bodily functions.**

(Based on Harris J, Benedict F. A biometric study of basal metabolism in man. Washington D.C. Carnegie Institute of Washington. 1919)

# ActiCal Activity and Energy Expenditure Report (AEE)

|                                       |                                   |                             |          |
|---------------------------------------|-----------------------------------|-----------------------------|----------|
| <b>Subject Identity</b>               | BCS 26                            | <b>Gender</b>               | Female   |
| <b>Subject Height</b>                 | 156.5 cm (61.6 in)                | <b>Age</b>                  | 50 years |
| <b>Data Collection Start Time</b>     | Wed, 02-Mar-2005, 09:00           | <b>Device Serial Number</b> | C830683  |
| <b>Energy Expenditure Output Type</b> | Activity Energy Expenditure (AEE) | <b>Age Level</b>            | Adult    |
| <b>Light/Moderate Cut-point</b>       | 0.031 kcals/min/kg                | <b>Device Location</b>      | Hip      |
| <b>Data Collection End Time</b>       | Fri, 01-Apr-2005, 09:11           |                             |          |
| <b>Regression Model</b>               | Single (1R)                       |                             |          |
| <b>Moderate/Vigorous Cut-point</b>    | 0.083 kcals/min/kg                |                             |          |



A person of this age, gender, weight, and height needs **1215** calories to maintain their normal bodily functions.

(Based on Harris J, Benedict F. A biometric study of basal metabolism in man. Washington D.C. Carnegie Institute of Washington. 1919)