J Int Acad Phys Ther Res 2010; 1: 79-90
ISSN 2092-8475

Strategies to Increase Exercise Compliance and Adherence for Breast Cancer Survivors: A Descriptive Review.

Breast cancer is the most frequently diagnosed cancer primarily affecting women and negatively impacting the individuals, families, and the health care system. Despite the well-known benefits of exercise for breast cancer survivors, rate of physical activity declines during adjuvant therapy and may not return to pre-diagnosis levels. In addition, low levels of adherence to exercise have been observed in this cohort. The challenge is to identify strategies that are effective in promoting exercise adherence. Several of the studies use social cognitive theory as a theoretical framework to design exercise interventions that encourage adherence. Within and without this framework, they have implemented interventions within the home and gym-based environments. Strategies used to encourage adherence to exercise programs and which are readily implemented in most situations have included distribution of print materials and pedometers, as well as recommendation from the oncologist. Other strategies that may be less feasible have included provision of trainers, gym memberships, regular phone-calls, and psychologist-lead stress management sessions.

Key words: *Exercise; Breast Cancer; Adherence; Physiotherapy*

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Received : 02 September 2010
Accepted : 21 October 2010

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INTRODUCTION

Breast cancer is the most frequently diagnosed cancer in females affecting 1 in 11 women by the age of 75(1). Comparison of the Australian 5-year survival rates between women who were diagnosed in 1982-1986 and 1998-2004, revealed that the survival rates have improved from 71.8% to 87.8%(2). However, this is only achieved through extensive medical interventions accompanied by a range of negative side-effects. Surgery, which is often the primary therapy used, may involve a wide local excision or mastectomy and is then followed up with or without radiotherapy(3, 4). Adjuvant therapy which includes chemotherapy, hormone therapy or targeted biologic therapy may also be used(5). Depending on the type of patient and the nature of the carcinoma, often a combination of treatments is utilized.

In addition to the prolonged and intensive medical interventions, women need to manage the severe side effects that can occur with adjuvant therapy. A wide variety of side effects may be experienced depending on the treatment. Radiotherapy is associated with fatigue, lymphedema, cardiac and pulmonary toxicities and brachial plexopathy(6). Chemotherapy is associated with nausea, thromboembolism, myalgias, weight gain and cardiac dysfunction(7). In addition, patients receiving radiotherapy or chemotherapy report depression and anxiety before, during and after therapy due to treatment side effects(8).

Three systematic reviews of exercise interventions for breast cancer survivors have shown that physical activity can address side effects, such as fatigue, weight gain, cardiopulmonary function, nausea, premature menopause and emotional stress(9, 10, 11). Exercise has the potential to increase functional capacity, maintain a healthy weight and improve cardiopulmonary function for women going though

breast cancer treatment(9, 12, 13). Nausea and menopausal symptoms may also be controlled through exercise(14, 15). Furthermore, the antidepressant effects of aerobic exercise have been shown in non-cancer population previously(16).

Aromatase inhibitors are commonly prescribed for women with breast cancer to decrease estrogen levels and to reduce breast cancer recurrence; however, in postmenopausal women, the aromatase inhibitors can increase bone loss and thus the risk of fractures (17). In addition, postmenopausal women are known to lose the protective effects of estrogen on bone density and serum lipid profiles putting them at an increased risk of osteoporosis and heart disease. Exercise not only contributes to prevention of osteoporosis but can also raise the levels of high density lipoproteins, offering protection against cardiovascular disease(18, 19).

The research findings clearly demonstrate that it is beneficial for women with breast cancer to exercise, however many issues exist with regards to adherence to exercise. Adherence to exercise is defined as the degree to which a person fulfils a given exercise prescription(20). Since the benefits of exercise may not persist when exercise is discontinued, adherence is a critical concern(21). Hence, strategies to increase exercise adherence among breast cancer survivors require review. The purpose of this study was to highlight strategies that may increase adherence to physical activity among breast cancer survivors.

Physical Activity Levels in Breast Cancer Survivors

Despite the evidence demonstrating the beneficial effects of exercise, there are a large proportion of breast cancer survivors who do not perform regular physical activity(22, 23). Furthermore, many breast cancer survivors decrease their physical activity level after diagnosis(24). For example, Irwin et al showed that only 28% of breast cancer survivors exercised regularly during treatment and 32% exercised at the recommended level of physical activity after treatment(25). Another study compared the physical activity levels between pre-diagnosis and post-diagnosis and observed a decrease of two hours per week after diagnosis(24).

The figures on exercise adherence are puzzling as there are a wide range of support groups and resources available, especially for breast cancer survivors. However, exercise adherence is difficult even for healthy adults(26). In fact, research has shown few differences in prevalence of physical activity between breast cancer survivors and people with no history of cancer(22, 25, 27). Therefore, identification of strategies that have successfully been used to increase compliance within research trials is needed.

Predictors of Follow-up Exercise Adherence

Many studies and reviews have investigated factors that could predict exercise adherence in healthy populations. Age and gender seem to be the two most consistent demographic factors that correlated with physical activity behaviour, while obesity was observed as a negative influence on exercise adherence(28). In terms of psychological factors, self-efficacy was considered to be the most consistent correlate to physical activity behaviour(28). Another important factor that emerged as a consistent predictor of exercise adherence was past exercise or exercise habit(29). Finally, significant positive association was also consistently found with studies that included social support(28).

A number of studies have also identified key predictors of exercise uptake among breast cancer survivors(30, Courneya, 2008 Jun #2972). However there appears to be a consensus among the literature that the strongest predictors are past exercise, physical fitness and body composition(28, 30). The more debatable predictors, where different research demonstrates varying results, include age, type of surgery, disease stage, level of fatigue, depression, motivation, education and income(25, 30, 31, 32, 33).

Comparison between the healthy population and the breast cancer survivors show similarities and differences between the two populations. Past exercise appears to be the common factor among the literature(28, 30). This can be explained as once an exercise habit is developed, physical activity becomes part of one's lifestyle. It is therefore not surprising for breast cancer patients who exercised prior to treatment to be more likely to continue with exercise after adjuvant therapy. On the other hand, while age seems to be a consistent correlate among healthy populations, research examining age and exercise adherence in breast cancer survivors have been mixed(25, 30, 31). This suggests that in some breast cancer survivor populations, older breast cancer patients adhere to physical activity to the same degree as their healthy counterparts. One explanation is that women are motivated to make dramatic lifestyle changes when cancer is diagnosed(34).

Barriers to Exercise Training

Several studies have investigated what are the unique exercise barriers for breast cancer patients. The most frequent exercise barriers reported typically include fatigue, lack of time, and treatment specific side effects(e.g. nausea or vomiting)(35, 36, 37). Motivation-related barriers which include losing interest in exercise, changing priorities and procrastinating were also identified(35, 36). The common barriers encountered among healthy populations were found to be lack of willpower, cost and social support(38, 39, 40). From all these studies it is apparent that breast cancer survivors are required to deal with additional barriers to exercise compared to healthy adults which can contribute to poor adherence.

Exercise Beliefs and Expectations of Breast Cancer Survivors

When tackling the issue of exercise adherence, the patients' beliefs and expectations need to be considered with regards to exercise. In a study involving women undergoing breast cancer treatment, the most frequent expectations of the participants were physical such as improving heart/lungs, reducing disease risk, building muscle strength and losing weight. Interestingly, the women perceived the psychological improvements more important than the physical ones(35). The most important outcomes for the women were improving state of mind, feeling less tired and avoiding injury(35). In another study, breast cancer survivors' beliefs of exercise were examined before and after participation in an exercise program(41). The participants joining the trial had positive attitudes towards exercise with over 98% perceiving it as being beneficial. In comparison, 80% of participants perceived it would be enjoyable, suggesting that less effort may be required to convince breast cancer patients that exercise is beneficial to them and more effort to convince them that it is enjoyable. Another interesting observation was that the perceived ease of completing the exercise program remained the same. Hence, exercise adherence can be considered to be an ongoing challenge that is difficult to maintain. Strategies and approaches to increase exercise adherence therefore require examining.

Strategies and Approaches to Increase Physical Activity in Breast Cancer Survivors

There are a number of strategies and approaches to increase exercise adherence among breast cancer survivors found in numerous studies. These interventions have been incorporated by some within a theoretical framework called the social cognitive theory for implementation of exercise program. The exercise interventions have been conducted in a range of exercise settings. Tables 1 and 2 provide summaries of the studies' characteristics and their strategies.

Table 1. Characteristics of the described studies

Author, Year	Sample size	Age(years) (Mean±SD)	Intervention characteristics				Adherence rate (%)
			Setting	Type	Duration	Timing in relation to adjuvant therapy	
Rogers et al. 2009	21	52±9.0	Supervised	Aerobic training	3 Months	After	99
Pinto et al. 2009	43	53±9.1	Home-based	Walking program	3 Months	After	69.8
Cadmus et al. 2009	25	55±8.2	Home-based	Exercise program	6 Months	During	72 returned all weekly logs
Irwin et al. 2008	37	57±9.5	Supervised	Exercise program	6 Months	After	Supervised: 67 Home: 96
Twiss et al. 2008	110	59±7.5	Home-based	Strength and weight training	24 Months	After	69.4
Vallance et al. 2008	266	58	Home-based	Exercise program	3 Months	After	Not reported
Milne et al. 2008	58	55±8.2	Supervised	Aerobic & resistance training	3 Months	After	61.3
Knobf et al. 2008	26	51±6.2	Supervised	Walking program	6 Months	After	88.2
Nikander et al. 2007	14	53±6.4	Supervised	Aerobic & home exercise	3 Months	During	78
Courneya et al. 2007	242	49	Supervised	Resistance & aerobic	9-24 weeks	During	70.2

Matthews et al. 2007	23	51±9.0	Home-based	Walking program	3 Months	After	74.7
Kim et al. 2006	41	51±6.7	Supervised	Aerobic exercise	2 Months	During	78.3
Demark-Wahnefried et al. 2006	89	72±5.6	Home-based	Exercise program	6 Months	After	Not reported
Campbell et al. 2005	19	48±10.0	Supervised	Resistance & aerobic	3 Months	During	70
Mock et al. 2005	119	52±9.3	Home-based	Walking program	6 Weeks	During	72
Schmitz et al. 2005	85	53±8.7	Supervised	Resistance followed by self-directed exercise	12 Months	After	92
Jones et al. 2004	450	56±12.0	Home-based	Exercise program	5 Weeks	During	Not reported
Demark-Wahnefried et al. 2003	271	57±10.8	Home-based	Exercise program	12 Months	During	Not reported
Segal et al. 2001	123	50.9±8.7	Supervised	Walking, supervised and self-directed	26 Weeks	During	72

Table 2. Strategy used to increase exercise adherence

Author	Provided tools/materials	Type	Frequency	Contact person	Description of strategies
Rogers et al. 2009	NA	Group discussion	6 sessions	Clinical psychologist	• Encouragement on Social support • Provided breast cancer survivor exercise role models covering journaling, time management, stress management, dealing with exercise barriers, and behavior modification
		Individual supervised exercise	12 sessions	Exercise specialist	
		Face-to-face counseling	3 sessions		• Tapered to a home-based program by the end of the intervention
Pinto et al. 2009	Pedometer	Mailed tip sheets		Research team	• Focused on general cancer survivorship & exercise
		Phone calls	Weekly		• Exercise counseling
	Activity Logs				• Reviewed • Progress reinforced • Problem solved • Discussed barriers to exercise • Goals set for the upcoming week Customized feedback reports on the progress at weeks 2, 4, 8, & 12
Cadmus et al. 2009	• Educational book • Handouts • Heart rate monitor • Activity Logs	Phone-based meeting(20 mins)	Weekly	Designated research member	• Taught exercise techniques and principles • Previous week's physical activity discussed • Goals set for the upcoming week • Activity Logs collected monthly

Irwin et al. 2008	• Pedometer • Heart rate monitor • Activity Logs	In-person instruction	Baseline	Research team	• Personalized feedback on baseline data • Individualized exercise program • Taught self-monitoring via pedometer, monitor, and logs • Instructed the exercise concepts and techniques
			Weekly and/or monthly		• Counseling, observing exercise, & group support • Facilitate overcoming barriers • Answer questions
	• Newsletters		Quarterly		• Focused on the benefits of physical activity • Upcoming events(e.g., fun runs and walks) • Issues related to breast cancer survivorship
Twiss et al. 2008		Phone calls 45 mins home or fitness centre visits	Fortnightly	Exercise trainer Research nurse	• Education, feedback, & coaching • Fortnightly visits during home-based & fitness centre exercises • Once every 2 months visits (remainder of 24-month study) • Monthly phone conference to discuss the progress
Vallance et al. 2008	• Printed exercise instructions • Print material • Pedometer	Standard recommendation via phone call (once) to all 3 groups			• Instructed to perform 30 mins of moderate to vigorous physical activity 5 days /week) • SR group: standard public health recommendation • PM group: breast cancer specific print materials, a copy of Exercise for Health: An Exercise Guide for Breast Cancer Survivors • PED group: Digi-Walker SW-200 PED and a 3-month step calendar • COM group: both PM and PED.
Milne et al. 2008		One-on-one supervision			• Personalized exercise programs • Interaction with other patients in a friendly, non-threatening fitness centre
Knobf et al. 2008			Week 1		Trained to use: • Treadmill • Heart rate monitor • Weight belts and backpacks with 1 lb weights • Familiarization with walking intervention
Nikander et al. 2007					No specific strategies specified
Courneya et al. 2007					No specific strategies specified

Matthews et al. 2007		• Home visit	1		• 30 mins in-person counseling · Goal setting · Physical activity safety(i.e., proper shoes, monitoring exercise intensity, warm-up/cool-down)
		Phone calls	5(weeks 1, 2, 4, 7 & 10)		• 5 counseling calls(10-15 mins) following randomization · Monitor participant safety · Enhance adherence through structured behavioral counseling
	Pedometers				• Self-monitoring of physical activity levels
	Activity logs		Weekly		• Daily activity/walking • Number of steps • Ratings of perceived exertion
Kim et al. 2006		Stress management	Weekly (8 weeks)		• 90 mins of closed group sessions • Focused on: · Relaxation training to manage psychological stress · Cognitive behavioral modifications to deal with irrational thoughts about cancer diagnosis and treatment · Sharing of cancer-related information and issues · Boosting peer support by sharing the same experiences and developing friendship
Demark-Wahnefried et al. 2006	• Booklet • Video		Baseline	Oncology nurses	• Individualized exercise program taught and monitored
	• Daily diaries		Collected weekly		• Pulse rates • Perceived exertion rates • Fatigue levels
		Phone calls	Fortnightly		• To evaluate the prescription and participant progress
Schmitz et al. 2005	Activity logs	Supervise exercise	13 weeks	Certified fitness professional	• Small groups of 4 participants • Activity logs kept in the recreation centre during the first 6 months
		Home-based exercise	11 weeks	Self-training	• Encouraged to train with other survivors, to foster the friendships formed during the first 13 weeks
Jones et al. 2004	• Recommendation			Exercise physiologist	• Recommendation-only group · 30 seconds oncologist exercise recommendation • Recommendation-plus-referral group · Oncologist exercise recommendation · Contact information(i.e., a business card) for a fitness consultation • Usual care group · Conventional treatment consultation · No exercise recommendation or referral

Demark-Wahnefried et al. 2003	• Printed material • Update cards		Baseline interview		• Newsletters • Tailored workbook based on the baseline interview • Updated workbooks based on update cards submitted by participants periodically throughout the intervention period
Segal et al. 2001		Phone calls	Fortnightly	Exercise specialist	• Progress checked • Exercise barriers overcame

NA: not applicable; SR: standard recommendation; PM: printed material; PED: pedometer; COM: combined

Social Cognitive Theory

The social cognitive theory is well recognized as a theoretical framework for the design of exercise interventions involving breast cancer survivors(42, 43, 44, 45). According to Bandura, the theory is based on a dynamic and reciprocal model of the interactions among behaviour, personal factors and environmental factors(46). One of its key constructs that is frequently described in the literature to increase exercise adherence is self-efficacy(a person's confidence in his/her ability to perform certain behaviour). Examples of the social cognitive theory being applied practically include: customized tailored print materials, telephone counselling and behaviour change interventions involving clinical psychologists and exercise specialists(42, 43, 44, 45).

One of the interventions used to promote lifestyle changes among early breast and prostate cancer patients is customized tailored print materials delivered in serialized mailings(45). The purpose was for participants' self-efficacy to be reinforced as they achieved small incremental goals that they have set themselves. Participants first rated their self-efficacy on a range of lifestyle behaviours. The behaviours were ranked from those in which the participant reported that they were most confident that they could change to that which they were least confident. Participants were then assigned to make changes to the behavioural domain with the highest self-efficacy score, and behaviours with lower scores were presented subsequently. The rationale was that after a successful behaviour change was achieved in the first area, the participant would then generalize success for next health domain. Implementation comprised print materials(a workbook and newsletters) that were tailored to the individual and based on information collected during baseline interview. Subsequent materials were then tailored using information update cards submitted by participants periodically throughout the intervention period. Meanwhile, the control group received serialized mailings of non-tailored, health promotion print materials. The results showed significant improvements in lifestyle behaviour with significantly greater gains occurring in the intervention group with regards to exercise minutes per week(+59.3 v +39.2 minutes, p = .02)(45).

Structured behavioural counselling, which was grounded in social cognitive theory, was used to enhance participant adherence for a 12-week home-based walking intervention(42). Initially, a single in-person counselling visit(30 min) occurred, which was then followed by up to 5 short telephone counselling calls in week 1, 2, 4, 7, 10(10-15 min/call). The preliminary counselling emphasized goal setting and physical activity safety. A semi structured script was used in subsequent telephone calls by counsellors to initiate discussion with participants about their experience in meeting walking goals. After taking cues from the information provided by the participant, intervention messages was then delivered by the staff. Individualized positive reinforcement was provided when goals were reached while emphasis was placed on personal motivations that may aid the individual. If the participant did not attain their walking goal, problem solving strategies were used to help overcome patient's barriers. Participants were also encouraged to elicit social support from family and friends. Calls ended with a recap of the conversation and the agreed upon goal for the following week was reviewed. By the end of the study, an adherence rate of 94% was reported according to participants' walking logs.

An effective behaviour change intervention was used by Rogers and colleagues(44). The program consisted of group and individual sessions with a clinical psychologist and an exercise specialist. Group discussion sessions with the clinical psychologist encouraged social support and covered topics such as journaling, time management, stress management, dealing with exercise barriers and behaviour

modification. Participants also received individual supervised exercise and individual "face-to-face" update counselling sessions with an exercise specialist discussing exercise barriers and flexibility exercises. In addition, women were also asked to perform home based exercise. The study reported an adherence rate of 99% to all possible intervention sessions.

Weekly exercise counselling sessions from research staff via telephone were used to increase exercise adherence in Pinto's 12-week walking program(43). Based also upon the social cognitive theory, each telephone session involved a review of the participant's activity over the past week, reinforcement of progress, discussion of barriers, before setting an attainable goal for the following week. Participants also received 2 weekly tip sheets in the mail, with one focused on a general cancer survivorship topic and the other on an exercise topic. Customized feedback reports were also given after week 2, 4, 8 and 12. An adherence rate of 69.8% was reported at the end of the study.

In conclusion, social cognitive strategies have shown to be effective on increasing exercise adherence rates. However, implementation of social cognitive strategies into clinical practice may not be feasible in a financially strapped health care system. First, the use of a clinical psychologist and an exercise specialist produced the best adherence rate(42-44), yet such a strategy is not possible as the cost for a patient population would be significant. Secondly, the use of telephone counselling showed encouraging adherence rates(42, 43), however, it would also not be plausible to regularly provide this service to all women with breast cancer. On the other hand, the use of customized tailored print materials may be the most suitable(45). The method is not only cost effective but has also shown a sustainability of at least one year. From all these studies that formulated their exercise adherence strategy upon the social cognitive theory, customized tailored print materials seem to be the most feasible.

Home Based vs. Supervised Exercise

Home based and supervised(resistance and/or aerobic) exercise interventions are the most commonly used settings for randomised controlled trials involving breast cancer survivors(9, 42, 43, 45-56). Resistance training programs are usually supervised by certified fitness professional with small groups of participants while aerobic exercise interventions can either be gym or home based. Some studies had both components in their study design(51, 52). Although there is no clear indication which exercise setting are superior, strengths and weaknesses can be found for each. However, comparison of the practicalities of implementation demonstrates clearly that home based exercise programs are more applicable to breast cancer survivors.

Home based exercise programs often consist of a graded walking program with a variety of strategies to increase exercise adherence. Jones and Courneya showed patients had a clear preference for walking (81%) and for exercising at home or outdoors (56%)(57). On the other hand, Schmitz et al. reported a high adherence rate and significant gains in muscle mass emphasizing the capability of this cohort to successfully complete a resistance based training program(55). Whether this would occur in the absence of provision of a gym membership and personal trainers is unknown.

Home based exercise interventions typically began with each participant being taught how to exercise safely, monitoring performance and setting goals(49). The participants are usually asked to keep daily diaries of exercise periods including pulse rates, perceived exertion rates and fatigue levels(42-48, 58). Pedometers, heart rate monitors, printed materials or videos were also provided in some of the studies(42, 48, 50). Telephone counselling is often utilised to help participants to develop a strategy to achieve behavioural goals, answer questions and monitor progress(47). The exercise adherence rate for home based exercise interventions were approximately 70%(43, 48, 49).

An increased flexibility in the means of exercising is particularly important for women undergoing adjuvant therapy as they are more likely to miss supervised exercise sessions because of symptoms of nausea, vomiting and fatigue(9). Home based exercise interventions allows women to schedule their own exercise sessions and are also cost-effective, easier to implement and are translatable into the health care system. However, it would be difficult to monitor a patient's exercise habits and technique and provide direct feedback.

Supervised exercise interventions(aerobic and resistance training regimens) used a number of adherence strategies(9, 54, 55) and were initiated by an in-person instruction session to teach concepts and techniques(53). Participants were usually supervised by certified trainers 2-3 times per week(55), and psychologist lead counselling sessions(group or individual) were used to facilitate overcoming barriers and goal setting(54). One study held weekly stress management sessions with the major contents focusing

on relaxation training to manage psychological stress(9). Hence, the focus on patients' psychosocial aspects may have contributed to the higher than average exercise adherence rate(78.3%). The exercise adherence reported by supervised exercise interventions range from 70% to 99%.

Structured group exercise interventions may seem advantageous as they are regarded to provide emotional and social support and enhance women's confidence in their ability to exercise(51). Resistance exercise programs require proper technique and form, and adequate supervision from trained exercise professionals is particularly essential at the beginning of an exercise program. One clear weakness is the cost associated with hiring equipment, venue and trainers. Some women may not even be able to attend supervised exercise classes due to logistical reasons such as transport and availability of time. To minimise the cost of expensive gym equipment or memberships, resistance training could be home based as demonstrated by Twiss et al(49). Similarly, it would be recommended to initially supervise participants within an aerobic exercise program followed by a home based program. Ideally to achieve maximum health benefits, both exercise settings could be used in combination with the exercise adherence rate possibly unaffected.

In terms of the practicalities of widespread implementation, prescribing home based exercise interventions to all breast cancer survivors may be more feasible. Although the adherence rates for supervised exercise interventions are reported to be slightly higher, the design of their exercise interventions may be inapplicable to a financially strapped health care system. Even though group exercises are more cost effective than individual training, to equally provide such services to this cohort may also not be possible. On the other hand, home based exercise interventions not only allows flexibility to women but is cheaper to implement.

Printed Materials, Pedometers and Newsletters

Printed materials, pedometers and newsletters were also used to encourage exercise adherence(43, 45, 48, 50, 53, 58). The printed materials used by different studies could be categorized as either a standard public health recommendation, breast cancer specific print materials or individualised material(50). For home based walking programs, women were asked to use pedometers while exercising and were also instructed to log their progress(43). Some studies also sent regular newsletters to participants, which not only provided the benefits of physical activity but also advertised upcoming events(e.g. fun runs and walks) and discussed issues related to breast cancer survivorship(53).

While it is difficult to specifically compare the effectiveness of using printed materials, pedometers and newsletters, evidence suggests that a combination of the strategies may be effective. A study by Vallance et al. examined the long-term effects of pedometers and print materials on changes in physical activity in a 3-month behaviour change intervention(50). Participants were split into four groups so the breast cancer survivors either received a standard public health recommendation, breast cancer specific print materials, a pedometer with a 3-month step calendar or a combination of both the breast cancer specific print materials and the pedometer. The study reported the greatest increase in physical activity with the pedometer and the combination group, followed by the breast cancer specific print materials group and the standard public health recommendation group(50). Hence, the study demonstrated the effectiveness of the use of a pedometer and the importance of ensuring relevancy in print materials.

Print materials and pedometers could be recommended to encourage exercise adherence in breast cancer survivors. Both strategies would not only be cost effective but also relatively simple to implement. Participants could be briefly shown how to use a pedometer and be instructed on how to log their progress. As evidence of have shown, print materials need to be relevant to the participants to be most effective. Regular newsletters may be even more effective as it could provide the breast cancer specific content while also promoting social events for breast cancer survivors.

Oncologist's Recommendation

The literature also suggests that an oncologist's recommendation may increase exercise behaviour in newly diagnosed breast cancer survivors(59). Several randomised controlled trials have demonstrated the persuasive role of physicians and primary care providers in promoting exercise among previously sedentary adults(60, 61). The oncologist Recom mendation to Exercise(ONCORE) trial was the first to examine if oncologists could have similar effects on promoting exercise behaviour in women with breast cancer(59). Participants were randomly assigned to receive an oncologist exercise recommendation only, an oncologist exercise recommendation plus referral

to an exercise specialist or usual care. It was reported that there was a significant difference in total exercise in favour of the recommendation only over the usual care group.

An oncologist's recommendation could be an exercise adherence strategy that could be easily implemented among newly diagnosed breast cancer patients. In terms of cost and ease of implementation, this exercise adherence strategy is highly feasible. In another study, the oncologists merely attended three meetings to become familiar with the study protocol and increase their knowledge regarding the benefits of exercise for breast cancer during adjuvant therapy(59). A similar initiative could also be started by increasing the awareness of the benefits of exercise for breast cancer patients at medical conferences and functions. An oncologist's recommendation is cheap and should be widely implemented as an exercise adherence strategy.

CONCLUSION

From the current literature, a number of strategies to increase exercise adherence with breast cancer survivors are identified. The effectiveness of these exercise adherence strategies is not only considered, but also the feasibility of implementing these strategies is examined. A theoretical framework, such as the social cognitive theory, was commonly found to be the foundation of many study designs. From all the strategies that were based on the social cognitive theory, customized tailored print materials may be the most suitable due to its low cost and proven sustainability(45). On comparison of different exercise settings, home based exercise programs with a combination of aerobic and resistance training program is recommended. Another cost effective strategy would be the distribution of breast cancer related print materials and pedometers. Lastly, a simple yet effective strategy would be for oncologist to recommend exercise to newly diagnosed breast cancer patients.

Future research into more effective exercise adherence strategies would be recommended. For the purpose of practicality, the design of these strategies should be implementable to a financially strapped health care system. The cost benefit of each strategy should be thoroughly explored and reported. Success in increasing exercise adherence among breast cancer patients may then be extrapolated to other cancer populations.

Conflict of Interest

No part of the following work has been published anywhere else and there is no commercial relationship related to this work. This study was conducted under no conflict of interest.

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