



Effects of supervised exercise on motivational outcomes in breast cancer survivors at 5-year follow-up



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A B S T R A C T

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Purpose: Short-term physical activity (PA) has beneficial effects on symptom management and quality of life, however, longer-term adherence is likely needed for improved disease outcomes in breast cancer survivors (BCS). This study examined the effects of a supervised group exercise program on motivational outcomes and PA among BCS at 5-year follow-up.

Methods: The original study was a two-armed, randomized controlled trial comparing a 12-week supervised group exercise program to usual care among 203 BCS. BCS for this follow-up study were contacted at 60 months postintervention and asked to complete assessments of motivational outcomes from the Theory of Planned Behavior and PA behavior using the Scottish Physical Activity Questionnaire.

Results: Overall, 87 participants provided 5-year follow-up data with no differences in participation by group. Analyses of covariance (ANCOVAs) revealed that supervised exercise had a significant positive effect on descriptive norm at 5-year follow-up (mean = +0.6; 95% CI = +0.1 to +1.1; $d = +0.48$; $p = 0.021$). Small positive effects were also noted for perceived behavioral control ($d = +0.18$), instrumental attitude ($d = +0.26$), and injunctive norm ($d = +0.35$), although they were not statistically significant. Moreover, BCS who were more active at 5-year follow-up also reported more favorable perceived behavioral control ($d = +0.16$), instrumental attitude ($d = +0.28$), injunctive norm ($d = +0.24$), and descriptive norm ($d = +0.31$), although these differences were not statistically significant.

Conclusions: This trial provides suggestive evidence that a supervised exercise program has positive effects on motivational outcomes even after 5 years. Additional intervention strategies during follow-up may further improve long-term adherence and health outcomes in BCS.

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Introduction

Surgery and adjuvant treatments can influence quality of life (QoL) among breast cancer survivors (BCS) and therefore, supportive care interventions are needed to reduce the chronic and late-appearing effects during the transition into survivorship. Physical activity (PA) is associated with significant improvements in overall QoL, cancer-specific concerns, body image/self-esteem,

emotional well-being, sleep disturbance, social functioning, anxiety, fatigue, and pain across many cancer survivor groups (Mishra et al., 2012) including BCS (Bicego et al., 2009; Mutrie et al., 2007). PA is associated with improved breast cancer outcomes such as overall survival and lower risk of recurrence (Courneya et al., 2014; Holmes et al., 2005; Irwin et al., 2011). Despite the health benefits of regular PA, the majority of cancer survivors is still not meeting public health PA guidelines (Rock et al., 2012; Schmitz et al., 2010) including BCS (Mason et al., 2013). Furthermore, there is a significant decrease in PA levels during adjuvant therapy and levels remain low even after treatment has been completed (Milne et al., 2008).

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The majority of randomized controlled trials (RCTs) in cancer survivors has included a supervised PA component, which is considered the 'gold standard' for efficacy trials (Courneya, 2010). Short-term supervised PA programs have been shown to improve health-related fitness and patient-reported outcomes in BCS (Courneya et al., 2007), but PA declines significantly after the supervised intervention has been completed (Courneya et al., 2007, 2009a). Research examining the effect of short-term supervised exercise programs on motivational outcomes and longer-term PA among cancer survivors is limited, especially theoretical approaches to identify key motivational outcomes for behavior change.

Application of behavioral theories provides a foundation to understand the mechanisms that influence behavior change (Pinto and Ciccolo, 2011). Behavior change interventions can improve effectiveness by including program elements and strategies in changing the underlying cognitive variables known to be associated PA. The Theory of Planned Behavior (TPB) has gained theoretical support to predict and explain PA motivation and behavior in cancer survivors (Pinto and Ciccolo, 2011). The TPB proposes that a person's intention to perform a behavior is the immediate proximal predictor of behavior as it reflects the level of motivation a person is willing to exert (Ajzen, 1991). Intention is facilitated by three main constructs: attitude, subjective norm, and perceived behavioral control. Attitude reflects the benefits of engaging in the behavior, and has both instrumental (e.g., harmful/beneficial) and affective (e.g., boring/enjoyable) components. Subjective norm is defined as the perceived social pressure to engage in the behavior, and includes both injunctive (e.g., what significant others think the person ought to do) and descriptive (e.g., what significant others themselves do) components. Perceived behavioral control is the ease or difficulty to engage in a behavior, and includes perceived control (e.g., personal control over the behavior) and self-efficacy (e.g., the belief that one is capable of performing a behavior) (Ajzen, 1991).

To date, the longest follow-up of motivational outcomes following a supervised exercise trial among cancer survivors is 6 months (Courneya et al., 2012; Milne et al., 2008; Vallance et al., 2010). Courneya et al. (2012) demonstrated that a 12-week supervised aerobic exercise program in lymphoma patients had beneficial effects on motivational outcomes that translated into longer-term exercise at 6-month follow-up. However, it is unknown if these positive effects are maintained beyond a 6-month follow-up period. Here, we report the effects of a supervised exercise program on motivational outcomes in BCS at 5-year follow-up, which to our knowledge is the longest follow-up of motivational outcomes to date.

The original study was an RCT designed to determine the effects of a 12-week supervised group exercise program compared with usual care on health-related fitness and QoL among 203 breast cancer patients in the United Kingdom. In the primary paper, there were significant intervention effects at 12 weeks for psychological and functional outcomes including meters walked in 12 min, moderate-intensity PA minutes, shoulder mobility, QoL, and positive mood (Mutrie et al., 2007). In addition, a 5-year follow-up was conducted to determine if these benefits were observed beyond 6 months among 87 BCS who were available to be followed-up (Mutrie et al., 2012). The study of 87 BCS demonstrated that there were lasting benefits to the original intervention for leisure time PA and mood (Mutrie et al., 2012). In this study of motivational outcomes at 5-year follow-up, we hypothesized that the supervised exercise intervention would have a positive effect on motivational outcomes. Moreover, we hypothesized that these motivational outcomes would be associated with PA behavior at 5-year follow-up.

Methods

Design and procedures

Ethical approval for the study was obtained through the West Ethics Committee of Greater Glasgow Health Board in the United Kingdom. The methods of the supervised exercise intervention have been previously reported (Mutrie et al., 2007, 2012). Briefly, the study was a two-armed, RCT comparing a supervised group exercise program to a usual care group. Participants for the follow-up study were contacted at 60 months after the intervention and invited to participate in a follow-up study. Participants in the original study were recruited during appointments at outpatient clinics for chemotherapy or radiotherapy at oncology centers in Scotland during January 2004–2005 (Mutrie et al., 2007). Inclusion criteria were women undergoing treatment for early stage breast cancer (stage 0–III). Women were excluded if they had concurrent major health problems such as uncontrolled cardiac or hypertensive disease, respiratory disease, cognitive dysfunction, or already exercising vigorously three times a week for ≥ 20 min. Randomization was stratified by hospital and treatment at baseline and used randomized permuted blocks of four and six sequences. Randomization was completed through telephone by an interactive voice response system. In exercise studies, blinding the participants to allocation is not possible, and therefore steps were taken to blind the evaluation of outcomes. Questionnaire responses were placed in sealed envelopes and outcome measures were collected by researchers who were not involved in exercise classes.

Intervention groups

Participants randomized to the exercise group were asked to complete a supervised exercise program two times per week with one additional exercise session at home for 12 weeks. The exercise sessions were led by trained exercise specialists in a group format, and took place in eight community exercise facilities. The sessions were 45 min in duration and consisted of a warm-up of 5–10 min, 20 min of exercise (i.e., walking cycling, aerobics, muscle strengthening exercises, or circuits), followed by a cool-down and relaxation period. Exercise intensity was at a moderate intensity where participants were asked to achieve 50–75% of age adjusted maximum heart rate. In addition, group discussion of exercise behavior change techniques was conducted following the exercise session. Six themes were discussed with all the women attending the classes on a rotational basis. These themes were: the health benefits of increasing PA, overcoming barriers, enhancing self-efficacy, goal setting and finding support. Participants randomized to the usual care group received usual care from the healthcare team and received public health information on exercise guidelines for cancer patients and survivors. After the 6-month follow-up, the usual care group received a one-on-one PA consultation, following standard guidelines, on integrating PA into their lifestyle (Kirk et al., 2007). Briefly, the PA consultation process involved discussion of strategies for behavior change based on the motivation levels and needs of BCS. Discussions were based on encouraging BCS to take responsibility and develop goals for the behavior change. For example, consultations would begin with an explanation of the different forms of PA and intensities, the benefits of PA, and main barriers to PA.

Measures

Demographic and medical information

Demographic variables were assessed using self-report at baseline and included age, height, weight, and employment status. Medical variables, which have been used previously in studies with

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