

## ARTICLE

## Impact of an exercise programme on sustaining physical activity for recovering cancer patients: a qualitative study

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## Abstract

**Background** Pedometers have been shown to improve adherence to exercise programmes. Evidence suggests that PA can improve physical function, wellbeing and reduce the negative impact of some cancer related side-effects. Yet, there are limited PA guidelines for cancer patients in the UK. The aim was to examine the impact of an 8-week exercise programme on sustaining physical activity (PA) at 3-month follow-up.

**Method** A qualitative study with 12 mixed site cancer patients aged 43-70 (10 women, 2 men), involved in an 8-week exercise programme. The Programme took place at a University in the South West of England, UK. Semi-structured interviews with patients took place 3 times over 6 months. A grounded theory approach was used to analyse the data.

**Results** We found that the number of patients perceived to be physically active prior to take-up of the physical activity programme were low (20%). At completion, most patients reported being physically active (84%), sustained but to a lesser extent (67%) at 3-month follow-up. Explanations for sustained PA at follow-up included application of knowledge gained from the Programme in relation to walking technique and use of pedometers and perceived health and fitness gains. Explanations for those not physically active included new diagnosis, reduced mobility following surgery and lack of clear exit route or progression to another structured opportunity.

**Conclusion** Our study has provided valuable insight into how a supervised multi-modal physical activity programme can enable recovering cancer patients to develop a physically active lifestyle.

## Keywords

Cancer patients, care pathways, counselling, exercise programmes, functional capacity, Grounded Theory, living with cancer, pedometers, person-centered healthcare, psychological domains, qualitative research, quality of life, social domains, wellbeing

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## Introduction

There are approximately 2.5 million people living with and beyond cancer in the UK [1], with this figure set to rise to 4 million by 2030 [1]. There is growing evidence to support the use of physical activity during and after treatment. Physical activity has been shown to improve physical function, psychological wellbeing and to reduce the negative impact of some cancer related side-effects [2]. However, current guidelines *on Exercise Referral Schemes to Promote Physical Activity* [3], do not include PA guidance for patients living with or beyond cancer. Therefore, the aim of our Programme was to guide patients towards building up and sustaining physical activity in the

context of the Chief Medical Officers' guidelines *Start Active, Stay Active* [4].

Cancer diagnosis has a profound impact on patients and their families [5]. Ideally, medical interventions required to treat cancer would extend beyond dealing with the physical affects of disease, to include a range of measures that attend to the whole person and thus financial [6], psychological [7] and social domains [8]. Evidence has shown exercise to be safe and effective with various cancer types that enable wide reaching benefits for the recovery of patients both before, during and after treatment [9,10]. Specifically, exercise interventions have been shown to reduce the debilitating effects of cancer-related fatigue [11], re-occurrence rates and co-morbidities [12], while increasing quality of life [13], functional capacity and

wellbeing [14]. Despite this only 22 to 50% of cancer patients are deemed physically active following diagnosis and treatment [15]. Exercise levels have been shown to reduce by a third [16] and remain low for several years following treatment [17].

Research indicates that patients would like exercise information and opportunities, to feature as part of their care pathway, yet in practice this is variable and often dependent on the clinician's personal regard for exercise [18,19]. Those clinicians that favour exercise often have no suitable programmes to which referrals can be made and clinical trials are often restricted to specific cancer types. Thus, despite the known efficacy of exercise programmes to support the rehabilitation of cancer survivors [1,12-14], the availability of community-based exercise programmes is sparse and the systematic translation of evidence into accepted practice has yet to occur at local, regional or national levels.

To date, the design of exercise interventions have tended to focus on single cancer sites [9,20] or structured exercise [21]. Programmes are often primarily focused on structured exercise to elicit improvement in components of physical fitness [22]. Inclusive physical activity programmes (rather than exercise) designed to cater for all cancer sites, all genders and programmes which adopt a multi-modal physical activity component, have not yet been reported in the literature. The prohibitive cost of providing single cancer site programmes that have stringent inclusion / exclusion criteria, could partly explain the delay in exercise programmes being widely available when competing for limited resources. Furthermore, grouping patients according to cancer site gives prominence to the cancer rather than to the individual and arguably are counterproductive to the purpose of rehabilitative programmes designed to restore the individual to a pre-diseased state.

The use of pedometers to measure physical activity has been established for some time [23]. Evidence has emerged demonstrating their potential to increase physical activity and fitness levels [24], particularly when combined with behaviour change techniques [25]. A systematic review examined the role of pedometers in improving the daily walking activity of breast cancer survivors [26]. The review concluded that over a 12-week period, walking with the aid of pedometers can significantly improve physical activity levels if clear step goals are identified and combined with an element of counselling [26]. The review also reported mean baseline step counts for the breast cancer survivors of 6377 which increased to 1099 on completion of the interventions [26]. However, there is a dearth of studies that show the impact of pedometers to sustain independent physical activity for mixed gender and cancer site patients. In the current study, we examined the impact of an 8-week exercise programme on sustaining physical activity at 3-month follow-up in such patients.

## Method

### Design

We used a grounded theory approach to analyse the patients' experiences of sustaining physical activity following their involvement with an 8-week physical activity programme [27]. The data were collected using audio-recorded, semi-structured interviews between March and October 2014, at a University located in the South West of England, UK. The study comprised 3 data collection and analysis phases over 6 months. The research design adopted is noteworthy in that it contrasts with other studies in the exercise referral literature in 2 specific ways. Firstly, the majority of studies published in this area adopt a quantitative approach [28-33], although some studies do adopt a qualitative approach [34-37]. Through using a qualitative approach to data collection and analysis, this study was able to investigate the patients' experiences of involvement with an exercise referral scheme and its impact on sustaining physical activity levels for 3 months after completion of the programme. Secondly, the deployment of 3 data collection and analysis phases contrasts markedly with traditional data collection schedules in the literature, which tend to adhere to the life-cycle of the exercise referral scheme, that is, *pre* and *post* a 12-week intervention [34,38-40]. Some studies do include a 12-week follow-up [41,42]; however, such studies are not common. This approach therefore provides the opportunity to develop themes emerging from the first data collection phase into lines of enquiry at 2 further points in time. This approach has provided some explanations for the higher levels of adherence, changes in motivation and the sustained physical activity experienced by the patients following an 8-week programme.

### Study setting

The physical activity programme evaluated in this paper is the result of a partnership project between a University and a Macmillan Cancer Support Centre. The aim was to improve the health and wellbeing of recovering cancer patients through referral into an 8-week physical activity programme. Patients were referred to the programme by health professionals associated with the Macmillan Cancer Support Centre. The referral criteria for entry into the programme included:

- to be deemed appropriate for participation by an oncology healthcare professional
- to be a voluntary participant
- to have attended the Macmillan Cancer Support Centre
- to have attended an introductory talk about the physical activity programme

The programme was delivered by university teaching staff and supported by students. The objective of the programme was to promote independent physical activity through home-based strengthening exercise, posture awareness and walking activities. These were incorporated into activities of daily living to promote long term sustainability.

Patients attended a 2 hour session each week for a period of 8 weeks. The 2 hour session was a combination of discussion to support patients to adopt a physically active lifestyle and an introduction to a variety of physical activities with the intention of increasing and sustaining physical activity beyond the session. The programme utilised a range of behaviour change techniques such as providing theoretical support for the use of physical activity, goal-setting, self-monitoring, social support, relapse prevention and barrier identification [43].

The practical elements of the programme were designed to introduce or re-acquaint patients with a range of activities such as: walking; Nordic walking; home-based resistance exercise; swimming; badminton; table tennis; dance; Pilates; flexibility, balance and posture exercises and the use of gym-based resistance and cardiovascular equipment. Tasks were agreed on a weekly basis and patients were encouraged to wear a pedometer daily. Each week's step counts were reviewed at the start of each session and formed the basis of a discussion that identified good practice in methods of maintaining physical activity levels. This included triggers, rewards, self-monitoring and intensity.

## Participants

Having agreed to take part in the programme 16 patients volunteered to participate in the research. The patients were selected on the basis of a convenience sample, as is congruent with grounded theory research [27,44]. The patients were provided with an information letter and consented to be interviewed at 3 designated points over the 6 month data collection period (0, 3 and 6 months). The first data collection period was prior to the take-up of the programme the second period followed completion of the programme and the third period was at the 3-month follow-up. Twelve patients were interviewed on all 3 occasions over the 6 month period (36 interviews in total). All 12 patients attended the 8 week programme. Four of the 12 patients (negative cases) were unable to sustain their physical activity up to the 3-month follow-up. These 4 participants attended the final interview and were included in the analysis to provide an alternative perspective [27].

## Data collection methods

All data were collected by the first 4 authors. Semi-structured interviews were recorded on an Olympus Digital Voice Recorder, transcribed *verbatim* and anonymised. The interviews took place on the University campus on all 3 occasions. To describe the study all patients were asked questions relating to their socio-demographic and morbidity characteristics at the start of the first interview,

as shown in Table 1. The University of St Mark and St John Research Ethics Committee approved the study.

Table 1 Patients' socio-demographic and morbidity characteristics

Characteristics	Patients Men <sup>a</sup> n (%)	Patients Women <sup>b</sup> n (%)
Gender	2 (17)	10 (83)
Age in years [mean (SD)]	69 (7)	54 (8)
Ethnicity/Race		
White	2 (100)	10 (100)
Cancer diagnosis		
Breast	0 (100)	8 (80)
Prostate	2 (100)	0 (100)
Mouth	0 (100)	2 (20)
Kidney	0 (100)	1 (10)
Skin	0 (100)	1 (10)

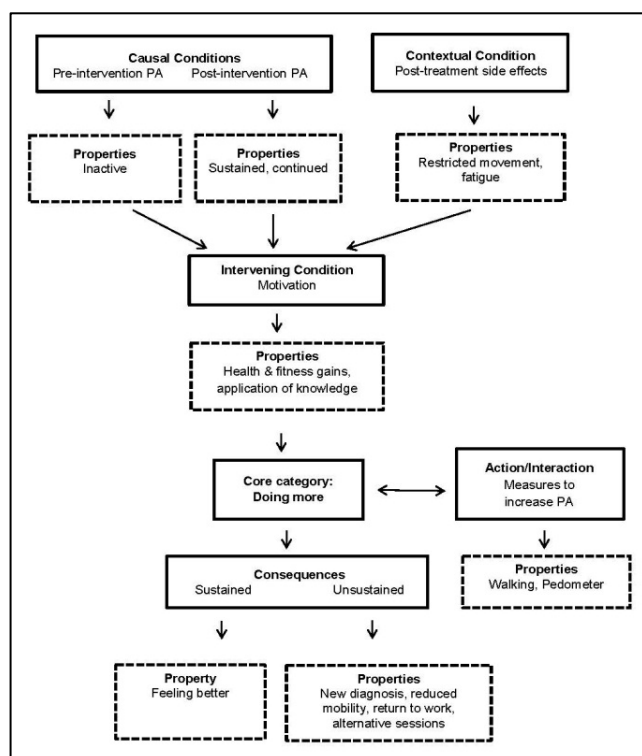
<sup>a</sup>n=2; <sup>b</sup>n=10

## Data analysis

The *memoranda* that emerged from the coding processes were used as the method for generating grounded theory. We used the *memoranda* as a means of describing and explaining the patients' experiences of sustaining physical activity from completion of the programme to follow-up [27]. We manually analysed the data in order to understand fully the richness of the data through human interpretation [45]. To ensure a robust approach to the application of grounded theory, we ensured that a number of critical characteristics were implemented throughout the data analysis. These included consecutive data collection and analysis over a 6 month time period. This enabled the analysis to cyclically inform the data collection process as is recommended in grounded theory studies [46]. Sequential analysis facilitated the development of concepts and categories from the data while at the same time allowing new possibilities to emerge from the data *via* subsequent data collection episodes. Training on open and axial coding [27] was provided by the first author to the second, third and fourth authors, to enable a consistent approach to data analysis. The first author checked the analysis for consistency and reviewed the concepts and categories from the data in order to assure the continuation of theoretical development. *Memoranda* were used to formulate questions for subsequent sets of interviews. The first author advanced theoretical development through selective coding and the application of the axial coding paradigm, the second author assisted by reviewing this process [27]. *Memoranda* were used by the first four authors to explore the different dimensions of the emergent themes from the axial coded data, the first author reviewed this process. The final analytical characteristic used to ensure a robust approach to grounded theory analysis was the construction of the end product of the research [46]. This involved the first author selectively coding the data [27] and the developing of a 'core story' from the axial

coded *memoranda*, from which a core category developed. This, in turn, led to the development of a conceptual model, as shown in Figure 1. This was followed by a descriptive account of the findings, supported by evidence from the lived experiences of the patients in the study.

Figure 1 Conceptual model demonstrating the impact of the programme on the patients' sustained physical activity levels



To further ensure interpretive credibility, the first author applied the following aspects of trustworthiness to the data collection process. Credibility, through prolonged engagement with the data, triangulation, peer debriefing, negative case analysis and member checks. Transferability, through thick description and theoretical sampling. Dependability and Confirmability, through providing a clear audit trail. Reflection, through reflecting on the self and the method [47].

## Results

The majority of the patients interviewed stated that they had found it difficult to exercise, reporting low levels of physical activity prior to starting the programme. Their difficulties related to the chronic fatigue associated with the side-effects of cancer treatment. On completion of the programme the majority of patients explained that they had become physically active. At the 3-month follow-up, most of the patients had sustained their physical activity and were able to explain how they had achieved this. Explanations included, application of knowledge gained from the programme in relation to walking technique and use of pedometers and increased motivation to continue

with physical activity due to self-perceived health and fitness gains. Contrasting evidence is presented from patients who were unable to sustain the physical activity levels achieved while participating in the programme. Explanations for this included new diagnosis, reduced mobility following surgery, lack of programme availability and an inability to sustain activity levels in an unsupported context.

In Figure 1 we present a conceptual model which is configured around the core category of 'Doing more'. The concept of 'sustained physical activity resulting from an exercise programme for recovering cancer patients' was the phenomenon investigated and 'Doing more' emerged as the core category. This category was selected as it best represented the views of the patients who initially wanted to 'do more', following periods of inactivity due to chronic fatigue as a result of the side-effects of their cancer treatment:

"I'm hoping it is going to improve my physical activity so I'm able to do more and also lift my own confidence" (Patient 1).

For Patient 2 'doing more' related to getting back into a routine that she thought would help her to become more active:

"I think if I get back into a routine of exercising it will actually make me want to do more, and because I can do it more readily and less uncomfortably I will want to keep it up".

'Doing more' was also identified by the patients as a consequence of their time spent on the programme and their resultant improvements in health and fitness. Patient 3's reason for wanting to do more was that she thought the more exercise she did the more she would be able to:

"To keep pushing myself to do more. Not having as many days off as it were".

For Patient 4, 'doing more' related to the improvements that she had experienced in her exercise self-efficacy:

"It's made me want to do more you know, it's made me sort of I know I can do it, so I should be doing it".

The core category 'Doing more' was central to all the other categories; it was regularly identified in the data and explained variation as well as the main point made by the data, which are requirements of a core category [27]. Each aspect of the conceptual model is described below.

### Causal conditions – *pre-* and *post-* intervention physical activity

Two causal conditions emerged from the data; these were *pre-* and *post-*intervention physical activity. Causal conditions relate to sets of events or happenings that influenced the phenomena [27]. The first causal condition '*pre-*intervention PA', considered the views held by the

patients about their 'inactivity' prior to their take-up of the 8-week programme. The second causal condition '*post-intervention PA*' related to how the patients had 'sustained' their physical activity following completion of the programme and 'continued' to do so up to the 3-month follow-up.

### Pre-intervention physical activity

Following their diagnosis and prior to their take-up of the programme the patients reported high levels of inactivity with only 20% of the patients being physically active. Patient 5 had been inactive following his treatment for cancer, but had just started to exercise again. However, he was uncertain as to whether he would be able to continue, as during a previous attempt chronic fatigue had prevented him from doing so:

"Not at the moment, I'm just starting to. Whether I will be able to I'm not sure because when I had the 6 months of chemo it made me very tired, very lethargic".

For Patient 13, it was her low mood state following her treatment that had prevented her from being physically active:

"After the treatment I was like down, and then I felt like everything was closed up and that I'll never get back to how I was before. I was worried and I didn't know if I could do it".

Patient 10 explained how feeling unwell following her treatment had prevented her from being as active as she had been:

"No not really, to a certain extent it's got less than it was before, obviously because I was unwell at the time".

Patient 1 said that he had not undertaken any physical activity recently, but he had tried to in the past until the classes had become too much for him:

"No not really, I did try once which was a while ago, they ran a cycle class down in the gym on those static bikes and I kept that up for a while but then it got too much".

Patient 14 explained how frustrated she had become at not being as active as she had been even though she had lost weight. For Patient 14 it was not so much the activity that made her tired but the feeling of exhaustion she experienced later in the day:

"I swam a mile every week, I would go anywhere and do anything. It's incredibly frustrating to know I've got less weight but can't do the things I normally do. I can't go swimming, it's not so much when I first do it, it's when I get home and finally sit down in the evening that it gets to me. I get very worked up very upset, incredibly frustrated".

### Post-intervention physical activity

The second causal condition that emerged from the data was '*post-intervention physical activity*'. The properties of the '*post-intervention physical activity*' causal condition, considered the views held by the patients about their 'sustained' physical activity by the end of the programme and how this had 'continued' up to the 3-month follow-up.

Having completed the 8-week programme most of the patients (84%) considered themselves to be physically active. Patient 1 and 4 communicated how they were walking further than they had been before starting the programme. Patient 1 had been increasing his physical activity as a means of relieving boredom:

"Oh it has improved a lot. My walking is a lot better and I walk further now. I get bored sat down doing nothing".

Whereas Patient 4 explained how regular walking had improved her stamina:

"I think I have more stamina, I just feel like I can do quite a lot since starting the programme, mainly walking, yeah significantly".

Patient 8 also stated that her physical activity had increased and the scheme had motivated her to do more in the gym:

"Yes I have increased my exercise. I was kind of half-heartedly going back to the gym. I think this programme gave me the motivation to do more".

At the 3-month follow-up, the majority of patients (67%) reported being physically active. These patients had been able to sustain and increase the physical activity behaviour they had developed during their time on the programme. The patients' explanations for what they had been doing to sustain their physical activity since completing the programme, revolved around walking. Patient 9 said how she was using the car less and walking more:

"I'm walking an awful lot more, whereas before I used to drive up to the shops, now I walk so I'm doing a lot more walking".

For Patient 1, his continued physical activity also related to walking:

"I do a lot more walking, I walk from my place to the supermarket which is about a mile, I do that twice, there and back. I walk more than I've done in years".

Patient 10 explained that her sustained physical activity had enabled her to walk further than she had been able to, prior to starting the programme:

"I can now walk for much longer, several miles, without too much trouble".

The majority of patients (67%) reported that their physical activity levels increased and they found this to be beneficial to their physical, psychological and social health. Consequently, most of the patients felt able to continue leading a physically active lifestyle even after the programme had concluded.

### Contextual conditions - *Post-treatment* side-effects

Contextual conditions are sets of conditions that intersect at a time and place creating a series of problems to which people respond through actions and interactions [27]. '*Post-treatment side-effects*' was the theme that emerged from the contextual conditions category. The properties of the '*post-treatment side-effects*' theme related to how 'restricted movement' and 'chronic fatigue' had caused many of the patients to become inactive before taking up the programme.

Most of the patients identified how treatment in the form of chemotherapy or radiotherapy had left them suffering from chronic fatigue. This had stopped the majority of patients from being physically active prior to their take up of the programme. Patient 2 identified how her treatment had left her feeling chronically tired:

"My treatment made me desperately tired. If I was sitting having had treatment for three or four days, I would sit there and if someone had come in saying the kitchen is on fire I'd have said 'yeah whatever'".

Patient 5 explained how despite being encouraged to do so, the feelings of lethargy as a result of his treatment had prevented him from being physically active:

"I had the six months of chemo it made me very lethargic. They kept telling me if I did a little bit of exercise I would feel a lot better from it. But, to drag yourself off your backside after you've just had God knows what poison pumped into your body is tough".

For Patient 8, her lack of physical activity since being diagnosed related more to the impact of the surgical intervention. This had initially limited her range of motion, making exercise difficult for her:

"Unfortunately I had to have a mastectomy so my range of movement wasn't as good subsequent to diagnosis, so there was a lot of things I physically couldn't do".

For Patient 7 it was a combination of low energy levels and a limited range of motion that had prevented her from being more active:

"No I stopped the keep fit as I didn't have the mobility to start with and I was going to start it up again but I didn't have the energy levels".

### Intervening condition - Motivation

Intervening conditions are conditions that alter the impact of the causal conditions on the phenomena [27]. The

emergent theme was the 'motivation' factors associated with sustaining a physically active lifestyle. The properties of the intervening condition were 'health and fitness gains' and 'knowledge'.

At the 3-month follow-up explanations for what had helped the patients to sustain their physical activity included experiencing health and fitness gains and taking ownership of their recovery through the application of knowledge gained from the programme. For Patient 10, it was feeling the benefits of the exercise that had motivated her to continue exercising:

"It motivates itself really. The more exercise you do, the better you feel and it spurs you on to continue to do more. The course actually did make a big difference to me. Purely it motivated me".

Patient 4 expressed how she had developed an understanding of her exercise capability while on the programme and that this had enabled her to continue to be physically active:

"The programme helped me to know my ability, what I could do. I was initially a bit nervous of what I could do. Doing your programme helped me to find my body and what I was really capable of again".

For most of the patients, including Patients 3, 11 and 12, it was their ability to apply the knowledge gained from the programme that had motivated them to become physically active:

"It's the knowledge, it benefits me, which was made evident on the course' (Patient 3);

"Just to keep healthier from the knowledge I have gained" (Patient 11);

"It's the knowledge that I got that motivates me to carry on trying" (Patient 12).

### Actions and interactions - measures to increase physical activity

Actions and interactions are purposeful acts undertaken to solve a problem and in doing so shape the phenomena [27]. The theme identified in the data was 'measures to increase physical activity'. The properties of theme related to 'walking' and 'pedometer', as a means of sustaining physical activity to follow-up.

The majority of patients had increased the frequency of their physical activity over the 6-month data collection period. Patient 2 highlighted that while on the programme she had learnt how to walk for health and fitness gains. As she became fitter, she was able to increase her walking intensity:

"Because I can now walk properly I walk much more... and now because I can do it, I will do it. I go for the hills and I can now get half way. I know where there is a gap in this particular hill and I can get up there without stopping".

The patients chose to continue using their pedometers to sustain physical activity to follow-up. The patients considered pedometers to be an effective means of self-monitoring their fitness gains. The pedometers gave them tangible feedback on their progress; consequently, they were able to see how they had increased their physical activity. For the majority of patients their increased physical activity related to increasing their duration or frequency of walking. Prior to her diagnosis Patient 4 only participated in one exercise class per week:

“I was going to the gym once a week, it was twice a week, you know for a while, but then it was once a week”.

Over the 6-month data collection period Patient 4 had increased her physical activity levels and had also changed the type of exercise from attending a gym to walking:

“I am doing more walking, say five out of the seven days. It’s usually about forty minutes. I think it is just less than two miles. I think I’m doing more walking, because it’s compensating for not doing the gym in a way”.

Patient 3 was also able to tell how she had increased her physical activity over the duration of the 6-month data collection period. For Patient 3 this related to how she had increased the number of times that she had used the pedometer:

“Then I was using it [pedometer] I suppose about four days a week. I’m going out walking perhaps not so far but nearly every day, five or six times a week. I’m more aware that I need to keep it up which is something that the course has got me into. It makes you aware that you can’t just let these things go, it is a key message”.

Patient 2 found that using a pedometer had helped to increase the duration and frequency of her walking since completing the programme:

“I reckon I’ve gone from 2,000 to 4,000 and some days I’ll do 6,000 steps which is massive. It does fluctuate but I’m walking for about four or five days a week now which has much improved”.

Patient 12 explained how he too had used a pedometer to help him increase his physical activity:

“When I started out, I used the pedometer 5,000 or 6,000 steps a day. I found ways of increasing that little by little and perhaps at a peak I can get 14,000 to 15,000 steps on the pedometer. But now I can keep it above 10,000 virtually all of the time”.

## Consequences - physical activity outcomes

Consequences related to the outcomes resulting from the actions and interactions identified above [27]. The consequence themes identified in the data related to 2 different outcomes. The first outcome related to those who had ‘sustained’ their physical activity. The second outcome

related to those with ‘unsustained’ physical activity. The sustained theme had one property ‘feeling better’ and the ‘unsustained’ themes properties were ‘new diagnoses’, ‘reduced mobility’, ‘returning to work’ and ‘alternative sessions’.

The themes that emerged were from 2 opposing perspectives. The first theme related to how much better most of the patients (67%) were now feeling as a result of developing a physically active lifestyle. Patient 13 put this down to having a lot more energy than she previously had:

“I am feeling much, much better. There is a lot of progress and a lot of energy building up. Before I was feeling a lot weaker, the following day I would be feeling low. But now I’m waking up every day and feeling much better”.

Patient 12 knew he was feeling better and was able to say how his increased level of fitness had enabled him to make regular walks across the moors to collect his newspaper:

“I can now do my trips across the moors to pick up my newspaper. I cancelled the delivery of my newspaper to encourage me. In myself I feel charged when I come back from it. I’m huffing and blowing a bit but by golly I’m up there you know, I really am. I feel fulfilled”.

Patient 8’s perspective was that she was feeling more energetic as a result of her increased levels of fitness, to the extent that she had returned to work:

“I’m feeling good. Energy levels are starting to come back a bit... I think the fact that I had been doing exercise helped to increase my stamina, so I was more able to face going back to work. But yeah, I’m feeling good”.

Patient 2 believed that it was her attendance on the Programme that had enabled her to continue getting fitter and feeling better:

“I am fitter, I am better... and because of your course, I have accepted another course. It is not as sophisticated, neither is the equipment, but what the lady does is almost one to one. Your course encouraged me to say yes to hers and now I’m getting better and better”.

The second dimension of the outcomes theme related to the patients (33%) who were unable to continue being physically active. Explanations for decreases in physical activity included: new diagnosis; a limited range of motion following surgery; returning to work and alternative sessions. For Patient 11 her lack of progress related to further medical complications:

“There is a slight problem that I have got lymphedema now and that’s stopping me from doing a few things. Yes, so movement can be difficult and sometimes I am in quite a lot of pain”.

The development of a new cancer had made it difficult for Patient 9 to continue being physically active:

“I initially had a peak and felt really positive and driven again but since then another cancer has been diagnosed, it has been cut out but it just was another blow”.

Patient 8 had not been able to do as much as she would have liked to due to her limited range of motion following surgery:

“My levels of physical activity have been a little bit complicated by the fact that I’ve had my reconstructive surgery, I’ve not been able to do as much as I wanted to”.

For the majority of patients, gym-type activities had decreased. The main explanation given for this was not finding a suitable time to attend. Patient 8 identified that if the Programme had continued to run at different times she would have been able to benefit from it:

“It would definitely have been beneficial if they had a late afternoon, evening kind of thing as well, so people could continue with their exercise”.

Patient 10 stated how she would have liked the programme to have continued and that it had enabled her to see a way forward following her recovery from cancer:

“It would have been nice if it had been longer but obviously I appreciate there is a cost to it and there are a lot of us out there who can benefit from it. It was good fun, the trainers are lovely and I would recommend that people do it because it really does give you that first jolt. You realise that there is life ahead and there’s good life ahead, it’s not just plodding along”.

Patient 13 also felt that the programme was too short and appeared to be at a loss now that it was over:

“The course seems so short after finishing the 8 weeks. It felt short and then when it’s finished you get a bit stuck. We just dispersed; maybe we should have made a plan together before we left. We used to share jokes, that really had an impact and made a difference, we all had a special understanding”.

Despite a reduction in the amount of gym-type activities that were reported by the majority of patients, it appears that the patients’ experiences of physical activity, along with the knowledge and skills that they had developed while on the programme, were enough to motivate them to develop physically active lifestyles. The patients thought that their newly developed lifestyles had helped them with their recovery from cancer.

## Discussion

The low levels of physical activity in cancer patients are of concern given the benefits that have been demonstrated pertaining to: patients’ health and wellbeing; quality of life [13] immune function [48]; fitness [14]; fatigue levels and enhanced survival rates [11]. However, opportunities for

cancer patients to engage in physical activity are sparse given the lack of availability of community physical activity programmes [49]. Clinician support is inconsistent due to lack of referral options, lack of specific physical activity knowledge and longstanding fears that physical activity could be damaging or cause lymphedema [50,51]. Furthermore, debilitating fatigue caused by cancer and its treatment can be a potent barrier to patients leading a physically active lifestyle.

Although numerous studies have reported the benefits of physical activity for cancer survivors [11,13,14], sustained improvements in physical activity levels *post*-programme are less clear. A physical activity intervention for breast cancer patients [26] demonstrated improvements in accelerometer levels following 12 weeks of multidisciplinary, supervised and home-based exercise. Despite noting improvements in fitness levels these were deemed non-significant and follow-up data were not reported. Thus, the approach used in the intervention in our study that included less structured (e.g., formal) but more relevant and lifestyle integrated physical activities, is justified due to the high level of adherence to the programme (84%) and sustained physical activity at follow-up (67%). Consequently, the 8-week intervention would appear to be cost-effective compared to others as it consisted of one session per week compared to 3-5 sessions per week reported elsewhere [26]. A cost-benefit analysis would need to be conducted to substantiate this.

Research has reported significant improvements in physical activity, aerobic fitness, strength and markers of psychological health compared to usual care in 214 cancer survivors over a 12-month period [21]. The exercise component of the research consisted of supervised high intensity exercise, including both aerobic and resistance components and a counselling component that occurred 3 times a month, incorporating group and individual sessions [21]. However, improvements in health and fitness gains only emerged after 12 months when compared to usual care [21]. In comparison, the exercise prescription for the programme in our study was less intense (low and moderate intensity physical activities) than that reported [21] and the counselling component was integrated.

The programme sessions focused more on movement patterns experienced in activities that can be easily incorporated into daily routines, compared to traditional cardiovascular and resistance exercises [21]. Although differences in study design and approach preclude detailed comparisons, it is noteworthy that our study reported patient improvements after just 8 weeks which were sustained 3 months later. This finding is of increasing importance given the need to explore cost effective conservative treatment modalities that are value for money for healthcare providers and service commissioners. Our study has shown that significant improvements in patients’ physical activity levels are possible over a comparatively short time period. Perhaps integration of counselling, social and exercise components, in a non-medical setting, helped patients to adopt physical activity behaviour more quickly. Further exploration comparing programme design and implementation should be explored.



The findings from research [23-25] are consistent with our study, as the patients were encouraged to increase their step target weekly and all sessions included aspects of counselling. Where our study contributes to literature in this area is that in many instances patients reported *post*-programme increases in pedometer steps far in excess of the 1099 identified [25]. This finding is welcome given that the programme in our study was only 8 weeks in duration and included a more diverse group of cancer patients. This is likely to reflect on the successful programme design and support from the instructors that established the importance of pedometer use as a means of monitoring and sustaining physical activity. This was achieved by weekly evaluations of the pedometer data and setting weekly targets. At the end of the 8-week programme the patients were able to effectively use the pedometers to sustain their physical activity to the 3-month follow-up.

A desire to be fit and healthy has been highlighted by other studies [26,51] as well as patients wanting to take ownership and some personal responsibility for the recovery process [19]. By design, physical activity programmes necessitate patients being an active part of the treatment process rather than passive recipients. Determining whether patients take ownership can be shown by their continued involvement in physical activity after the programme has finished. In our 3-month follow-up, patients had remained physically active. This was attributed to having gained knowledge and understanding about exercise during the programme that could apply to their personal circumstances. In addition to what they had learned the patients had also experienced the physical benefits first hand and realised they were capable of achieving these without specialist support. Thus, the motivation patients had to start the programme, had been re-enforced through increased experience, knowledge and capability by the time the programme had finished, enabling sustained physical activity to the 3-month follow-up.

## Conclusion

Our intention within this paper has been to consider the experiences of a group of 12 mixed site cancer patients in sustaining physical activity after completing an 8-week physical activity programme. We have examined the impact factors that have enabled the cancer patients to sustain physical activity to 3-month follow-up. Our findings demonstrate that physical activity levels for recovering cancer patients can significantly improve following an 8-week programme and be sustained at 3-month follow-up. Our findings identify that perceived health and fitness gains following an 8-week programme can motivate cancer patients to continue being physically active. Findings suggest that knowledge gained from the programme in relation to walking technique and correct use of pedometers, when applied to daily lifestyle behaviour, can be a motivational tool to sustain physical activity.

This study acknowledges that pedometers have been shown to enhance adherence to exercise programmes for patients with chronic diseases [23-26]. However, the key point here is that pedometers can also be an effective method for cancer patients to independently sustain physical activity. This study provides further explanation as to how recovering cancer patients can increase physical activity levels which have been shown to be low following diagnosis [15]. Our findings suggest that there is a need for more programmes that focus on developing physical activity related lifestyle skills that can be applied following the completion of a programme, supported by specialist cancer support organisations.

In summary, this study has produced evidence for physical activity programme design that can help recovering cancer patients sustain independent physical activity. Strengths include the transferability of the findings to similar settings and the robust approach to data analysis that is commensurate with grounded theory methodology and qualitative research more generally [27,47,52]. However, limitations have been identified in light of which the results should be viewed. These include the fact that the patients selected for the study were based on a convenience sample, drawn by the Macmillan Cancer Support Centre. This may have resulted in only those patients who were more likely to adhere to the programme being included in the study, which may have given a limited perspective. Furthermore, the sample size ( $n=12$ ) and the common referral protocol of exercise referral schemes generally, ensure that many of the findings are transferable to similar exercise programmes based in the community, accessed through a health professional referral.

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