



Determinants of exercise adherence and maintenance for cancer survivors: Implementation of a community-based group exercise program. A qualitative feasibility study

Maria Ranes^{a,*}, Tor Helge Wiestad^a, Inger Thormodsen^a, Cecilia Arving^{a,b}

^a Department of Oncology and Medical Physics, Haukeland University Hospital, Bergen, Norway

^b Department of Public Health and Caring Sciences, Uppsala University, Uppsala, Sweden

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ABSTRACT

Objective: Despite verified knowledge that physical exercise plays an important part in recovery after cancer treatment, multiple studies have shown that maintaining a physically active lifestyle after cancer is challenging. There is a need for qualitative studies to increase understanding into patient experiences and perspectives, and facilitate the design of more sustainable exercise program. This qualitative descriptive feasibility study explores experiences from the implementation of a novel four-month community-based group exercise program for cancer survivors within municipality health service after completion of rehabilitation in the specialist health care service.

Methods: Fourteen cancer survivors participated in focus group interviews after completing *Rehabilitation: Physical activity and Coping - feasibility study*. Data were analyzed using the systematic text condensation method.

Results: We identified a main category, *Determinants for exercise adherence and maintenance* and four subcategories: peer-support, environment, structure and knowledge.

Conclusion: A social and supportive exercise environment promotes exercise adherence and maintenance among cancer survivors. This knowledge can be useful for further efforts to implement high quality community-based group exercise programs for cancer survivors.

Innovation: This study adds knowledge of survivors' experience of a novel community-based group exercise program in clinical practice and can promote the implementation of sustainable community-based exercise programs for cancer survivors.

1. Introduction

Cancer survival rates have increased considerably due to better treatment and earlier diagnosis [1]. Despite improved survival, cancer survivors, i.e. individuals diagnosed with cancer, report reduced physical function and poorer mental health and well-being during the cancer trajectory, compared to persons without a cancer history [2]. Cancer treatment is known to cause late effects, defined as occurring months or years post-cancer treatment [3], such as increased risk for cardiovascular disease, diabetes, lung disease, osteoporosis and musculoskeletal conditions [4], in addition to hormonal disorders, fatigue, pain, neuropathy and impaired memory, concentration and planning ability [2]. These late effects might affect a patient's relationships, working life, finances and the ability to undertake daily activities [3,5,6]. Further, due to late effects people with cancer history use the primary health care significantly more compared to age-matched controls [6], which leads to increased economic burden on

health care systems [7,8]. A significant number of adult survivors have multiple concerns about physical issues, and the most frequent physical challenges includes lack of physical strength [9]. A growing body of research draws attention to the benefits of physical exercise (PE) among cancer survivors. During the cancer trajectory, PE contributes to increase physical and mental health, and for patients with breast, colorectal and prostate cancer, improve survival outcomes such as inverse association between amounts of physical activity after diagnosis and cancer-specific and all-cause mortality [10-17]. In addition, facilitated PE can shorten the time between recovery and return to work and optimize work performance [18-19].

Different national societies and health organization have proposed cancer-specific exercise guidelines for exercise during and following cancer treatment [11,20]. However, despite guidelines and benefits of exercise for cancer survivors, for survivors, it is difficult to stay physically active after cancer treatment [21-23]. Lack of support, information and recommendations from health care professionals, treatment side effects, lack of time

* Corresponding author at: Department of Oncology and Medical Physics, Haukeland University Hospital, Box 1400, 5021 Bergen, PO, Norway

E-mail addresses: maria.ranes@helse-bergen.no (M. Ranes), tor.helge.wiestad@helse-bergen.no (T.H. Wiestad), inger.thormodsen@helse-bergen.no (I. Thormodsen), cecilia.arving@pubcare.uu.se (C. Arving).

and motivation and feeling uncomfortable in a fitness center due to changed appearance and physical condition after treatment are common barriers due to reduced PE levels post treatment [24,25]. However, cancer survivors show a high level of interest in participating in health promoting exercise programs and exercise interventions [11,26,27], but adherence to exercise program and maintenance after interventions seems to be challenging [28,29]. Exercise adherence and maintenance is affected by multiple factors including sociodemographic, physical and medical variables [30]. Health behaviors theories can improve understanding of the dominant mechanisms behind adherence to exercise programs [31]. Social Cognitive Theory-based interventions demonstrate improved health behavior in cancer survivors, and self-efficacy appears to be the variable most strongly associated with positive behavior change for PE [32,33]. Further, social rewards, offers of encouragement and assistance in monitoring exercise progress are important aspects of social support to consider when developing exercise intervention strategies [26]. In 2006, Hewitt [34] described cancer care from specialist to community health service as *lost in transition*, and to date the transition to community services remains a problem among cancer survivors [35,36]. Community-based exercise groups for cancer survivors of mixed diagnoses, sex and ages are safe, show physiological and psychosocial benefits and it is a valid setting to improve survivor care and promote adherence to PE [37-40]. Implementation of group-based exercise interventions in a real-world setting is challenging [41], but it is imperative to translate group-based exercise program design from controlled settings and into community settings in order to truly improve the health and well-being of cancer survivors [42-45]. Therefore, we sought to develop a novel community-based group exercise program, called Rehabilitation: Physical activity and Coping – feasibility study (RPAC-FS), to implement in clinical practice within the context of municipality health service. Understanding of the contextual dimensions of group-based exercise for survivors can contribute to better integration of exercise into the health care setting. However, there is a lack of qualitative studies with insights into patient experiences from and perspectives on community-based group exercise program after completed rehabilitation in specialist health care [44,46]. Thus, the aim of this feasibility study is to explore how cancer survivors experienced a novel four-month community-based group exercise program after completed rehabilitation in the specialist health care.

2. Methods

2.1. Design

This qualitative, descriptive study with a content analysis approach, to systematically organize data into a structured format, used focus group interviews to inductive explore participants' experiences of the transition from rehabilitation within specialist health care (hospital) to a group-based exercise program in the community health service (municipality). The study was a part of the *Rehabilitation: Physical activity and Coping – feasibility study* (RPAC-FS), which assessed a four-month group-based exercise intervention for cancer survivors. RPAC-FS was a collaboration between Haukeland University Hospital, the University College of Western Norway and the municipality of Bergen. The study is registered in the [ClinicalTrials.gov](https://clinicaltrials.gov) (Identifier: NCT 01588262) and is ethically approved (REK no 2019/620).

2.2. Participants

Participants who had completed a rehabilitation program of up to six months at The Cancer Center for Education and Rehabilitation (CCER) during May and June 2019 were eligible for inclusion in RPAC-FS. The participants had to be resident in the municipality of Bergen, be able to understand and express themselves in Norwegian and have no cognitive disorders or severe emotional instability. Further, they had to be able to perform basic activities of daily living and have no comorbidity that might hamper physical exercise (e.g. unstable angina, severe heart failure,

severe chronic obstructive pulmonary disease, orthopedic conditions and/or neurological disorders). Twenty cancer survivors were informed verbally and in writing about the RPAC-FS and made an informed consent to participate. All participants received a written invitation to participate in a focus group interview. Fourteen of the participants consented to join the focus group interviews post-intervention. Six declined, due to the timing of the interviews.

2.3. Exercise intervention

The intervention lasted from August 2019 to December 2019. The intervention consisted of an organized, group-based exercise program twice a week at two different physiotherapy- and training clinics in the municipality, with 10 participants in each group and supervised by a physiotherapist. Each session duration was 60 minutes, including 20 minutes endurance and 40 minutes strength exercise. The endurance exercise was performed as intervals on an optimal training apparatus: cross-trainer, bicycle, treadmill or rowing machine, and consisted of five of the following intervals: two minutes of high-intensity exercise (instructed to achieve 15 to 17 on the Borg scale) [47] and one-minute moderate-intensity (Borg scale 12 to 14). The Borg scale has a scoring range from minimum 6 to maximum 20. The strength training consisted of the following nine strength exercises; leg press, lateral pulldown, leg extension, shoulder press, chest press, glute bridge, plank, diagonal raise and sit ups. Each strength exercise was performed in three sets, with ten repetitions per set. The intensity corresponded to 7–9 on the Omni scale of resistance exercise [48]. The Omni scale range from zero (extremely easy) to 10 (extremely hard). After each exercise session, the participants registered their perceived exertion in a personal logbook.

2.4. Data collection

Post-intervention in January 2020, two focus group interviews were completed with seven participants in each group; participants of the same exercise group were placed in the same focus group. A semi-structured focus group guide included the following topics: The exercise program, instructors, work and everyday life, late effects and transition from specialist to community healthcare services. The interviews took place at CCER and lasted for 90 minutes (interviewguide, see Appendix 1). They were sound recorded and later transcribed verbatim. Two co-researchers (TW, CA) led the focus groups. Baseline characteristics of focus group participants were collected from Chalder Fatigue Questionnaire and a study-specific questionnaire, and a medical history was obtained with permission from participants' medical journals at Haukeland University hospital (Table 1).

2.5. Analysis

Systematic Text Condensation (STC) was used to analyze the transcribed data [49]. STC has been used before within the research group as a descriptive and explorative method for thematic cross-case analysis of different types of qualitative data. The method is a 4-step analysis and detailed in Table 2. The themes were developed during several group discussions between the authors. Through these, consensus regarding the categories and theme was reached between the authors. The analysis was carried out using a low level of interpretation and focused mainly on the manifest content. The group of authors consists of two nurses (CA, IT) and two health / fitness consultants (MR, TW) and the group's expertise includes experience of cancer care and rehabilitation. Within the research group, previous experience and knowledge regarding the qualitative research method is comprehensive and the authors are experienced in conducting interview studies (CA, IT).

3. Results

In the analysis of the transcriptions, we found one overall theme, «Exercise adherence and maintenance», and four subcategories

Table 1
Baseline characteristics of participants (n = 14). Data show frequencies and percentages in parenthesis unless otherwise stated.

Sex		
Females, n (%)	6 (43)	
Age yrs, mean (SD), min-max	64,9 (8.8)	50–77
Females, mean (SD)	57.3 (6.9)	
Males, mean (SD)	70.6 (4.8)	
Height cm, mean (SD), min-max	177.1 (7.0)	167–195
Weight kg, mean (SD), min-max	82.2 (10.2)	66–101.6
BMI kg/m ² , mean (SD), min-max	25.6 (4.1)	21–35.5
Diagnosis		
Breast cancer, n (%)	4 (29)	
Prostate cancer, n (%)	8 (57)	
Rectal cancer, n (%)	1(7)	
Fallopian tube cancer, n (%)	1 (7)	
Treatment		
Surgery ^b , n (%)	6 (43)	
Chemotherapy ^b , n (%)	5 (36)	
Radiation therapy ^b , n (%)	13 (93)	
Endocrine therapy ^c , n (%)	12 (86)	
Education level		
High school or less, n (%)	9 (64)	
College/university ≤ 3 yrs, n (%)	5 (36)	
College/university ≥ 3 yrs, n (%)	0 (0)	
Working status		
Working full time	2 (14)	
Working part time	5 (36)	
Retired	7 (50)	
Fatigue ^a		
Yes, n (%)	4 (29)	

^a Missing = 1

^b Treatment finished

^c Treatment ongoing

summarizing the participants' experience of the transition from rehabilitation within specialist health care (hospital) to a group-based exercise program in the community health service (municipality), see Fig. 1. The participants expressed that taking part in community-based group exercise was important in order to maintain exercise, be more self-reliant, increase their physical capacity and improve mental health after rehabilitation in the specialist healthcare service. From their statements, we identified a set of determinants affecting willingness and ability to adhere to the exercise program and maintain PE after rehabilitation in the specialist health-care service (Fig. 1).

3.1. Determinants of exercise adherence and maintenance

Peer-support promoted a sense of belonging and fellowship. The social aspect of group-based exercise with knowledgeable instructors fostered a favorable environment for the survivors. *Structure* and *knowledge* resulted in perceived benefit such as safety and self-efficacy. Together, these

determinants gave the participants *encouragement* to persist. They looked forward to each session, and the analysis did not identify any barriers of a community-based exercise program for cancer survivors.

Even though I think it's a long distance, and silly to go to xx when I don't live in the direction, with rush traffic and all, I still think it's worth prioritizing, because I think those four months have lifted me further with regards to how I feel and now I can stand on my own two feet. (Gr.1, 58)

3.1.1. Peer-support

The prospect of exercise with other survivors, encouraged the participants to join the exercise program. The sense of fellowship provided accountability for participation and effort. They described that being in similar situations, with a common goal to increase physical capacity post cancer treatment, was an advantage. They discussed how they would sometimes feel different to people who do not have a cancer history. Together with peers, they experienced a shift of focus from disease to health promotion. Disease was rarely mentioned during the exercise sessions, although they did feel comfortable talking to each other about cancer related issues. Peers promote a caring environment, where participants motivated and supported each other, especially when a member had a bad day in terms of side effects and ailments. Humor was frequently used to cope with late effects. According to the participants, a group size of ten was perfect. A higher number of participants could have led to poorer exercise quality and group dynamics, due to less encouragement and a lesser sense of group belonging and unity.

(..) It's one thing that we're pushing each other, but another thing is that we have gotten to know each other well enough to see if the other person is having an off day. It's not just about being considerate, but about looking after the other (...) (Gr.2, 60)

3.1.2. Social environment

The participants agreed that social aspects were of great value. They mentioned that the physical aspect was a part of the motivation for being physically active; the social environment of exercise was equally, if not more, important. The group discussed the psychosocial perspective in terms of sharing a cup of coffee and a chat, and expressed that they would have liked a common place to sit for talk to each other before or after exercise. They remembered the conversations around the coffee table during previous rehabilitation sessions at CCER as positive and useful. The social environment led to a sense of belonging and community, which filled a void and improved their mental well-being, and they felt better prepared to tackle the bad days.

You found a community. I was worried about going because I didn't want to be reminded... You know, I hated my cancer. But then I found this amazing

Table 2
Performance of 4-step analysis.

Steps	Performance	Example
Total impression	The transcribed data were read repeatedly to obtain a general impression and look for preliminary themes.	
Identifying and sorting meaning units	The first author used different colors to identify meaning units, and further coded and sorted the units into themes. After discussion with the researcher group, some themes were redefined and reorganized.	Meaning units: <i>It's a great motivation to have a group. I'm not keen on exercising alone, so if it hadn't been for the group, I'm sure it would have been too hard to go through with it (gr.1, 50).</i>
Condensation	Separate meaning units were further sorted within each theme into subcategories, and the first author continually discussed codes and subcategories with the researcher group. This was a dynamic process, where codes and subcategories were redefined and renamed as new understanding emerged.	The meaning unit quoted in step 2 was first sorted into subcategory <i>Group dynamics</i> , which was later redefined as subcategory <i>Social environment</i> . Further, the meaning units within each subcategory were condensed into an analytical text
Synthesizing	Finally, the analytical text was synthesized and re-conceptualized to illustrate the content of the subcategories and encapsulate the cancer survivors' experiences from participating in the community-based exercise program.	

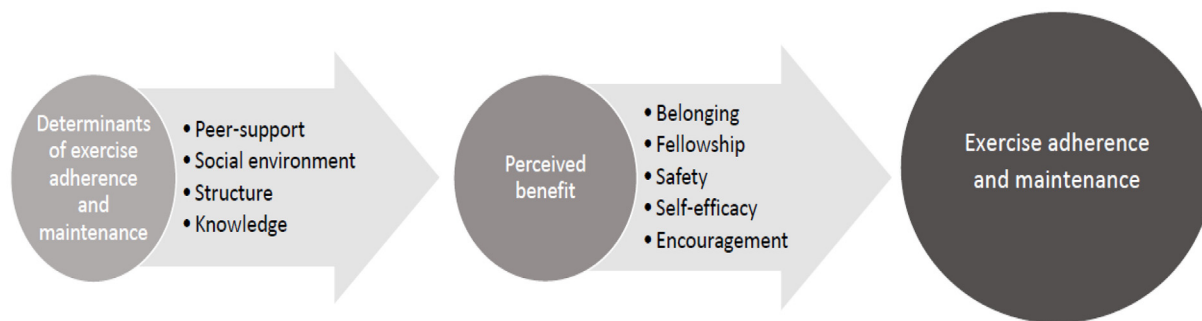


Fig. 1. Four identified determinants promoted perceived benefit, and resulted in exercise adherence and maintenance for cancer survivors.

group! With you, and the coffee table, and it became the highlight of the week! (Gr.1, 51)

Before the start of intervention, the instructor had an assessment interview with each participant. This background knowledge made it possible to individualize the content and intensity of the exercise program, based on individual fitness level. The group trusted the instructions they were given, and that their workload was suitable for them, and highlighted the importance of individually tailored exercise to feel safe and recognized for their physical challenges after treatment. All participants had completed their physical rehabilitation at CCER and acquired knowledge and experience about exercise benefits during and after treatment. All of them expressed appreciation for the opportunity to participate in RPAC-FS, as they did not feel ready to exercise on their own. Generally, the participants were negative about joining a fitness center, due to insufficient hygiene at public gyms, absence of group dynamics and/or the lack of an instructor. Furthermore, they described fitness centers as an impersonal and lonely environment, and the exercise too generic for their needs after cancer treatment. However, participants imagined that fitness centers may still be an option, provided they had one or more exercise partners and an instructor during the first sessions.

3.1.3. Structure

The transition to the community-based exercise program immediately after completing rehabilitation at CCER and continuation of fixed exercise days and time was a highlighted factor for exercise maintenance and adherence after cancer treatment. They appreciated the opportunity to continue established exercise habits, without interruption. Group-based exercise appointments promoted commitment to another person and increased the participants' sense of responsibility for adherence to the program. Fixed exercise sessions also enabled them to move any conflicting appointments to prioritize the exercise sessions and provide a structure for their daily life. This also meant more predictability for family members and employers. Structure was important in order to return to normal routines, implement daily activity and reduce inactivity, and increased self-efficacy for the cancer survivors.

It affects us mentally that we have a set appointment Tuesday and Thursday. It's not a fitness center... a gym where we can just say: "I can't really be bothered today". Because we're a group (...) And being made to go because you have appointment with someone. (Gr.2, 56)

Participants who were in full or part time employment found the days when they combined work and exercise, hard. They experienced cognitive deficits, impaired concentration and reduced ability to multitask, caused by the cancer treatment. Some of the survivors who work full or part time described an understanding support from their employer including agreements to facilitate exercise during working hours. Others, whose employers did not offer such support, reported that they were more tired. Survivors who had return to work were unsure how much the exercise had affected their ability to return to work.

3.1.4. Knowledge

According to the participants, basic knowledge concerning effects and benefits from PE during and after cancer treatment, which the participants had previously acquired at CCER, was an essential factor for exercise adherence and maintenance. Additionally, the instructors' exercise knowhow and their knowledge about the survivors' cancer diagnose and their need for facilitation resulted in a safe exercise environment. During the intervention, they improved their knowledge about exercise mechanisms and benefits from exercise. They were now confident enough to adjust and increase the intensity to fit their capacity. They were grateful for the new knowledge they had acquired through explanations, instructions and their own experiences. According to the participants, generally low activity levels among cancer survivors could be explained by reduced knowledge concerning PE and the benefits of exercise in their particular situation.

We know that exercise is good for us in the long run. As far as I am concerned, this exercise had been essential for how I feel today. And I just have to keep going whether I want to or not. I see others who can't get started and have a negative attitude towards exercise. (Gr.2, 58)

4. Discussion and Conclusion

4.1. Discussion

The present, qualitative feasibility study explored how cancer survivors experienced a four-month community-based group exercise program after completing rehabilitation in specialist health care. Taking part in community-based group exercise was important in order for the survivors to maintain exercise routines. The analysis shows factors affecting willingness and ability to adhere to the exercise program and maintain PE after rehabilitation in the specialist health-care service. Peer-support and knowledgeable instructors, as well as the social and structural aspect of group exercise were essential determinants for exercise adherence and maintenance. However, they missed a place to get together either before or after exercise sessions, e.g. a coffee table; this could bring the group closer together and improved exercise adherence and mental wellbeing.

Generally, cancer survivors report maintenance of exercise after treatment as challenging. There is a need to determine how health care professionals and institutions can be proactive in identifying and addressing the needs of survivors [10], and implement exercise programs in community settings for this population [29,41,46]. The design of an exercise program can be essential for a successful implementation of exercise among cancer survivors. As indicated by our results, peer support may be a potential, favorable facilitator for the maintenance of exercise after rehabilitation. Peer support provided by groups assists transition to independent exercise from hospital-based rehabilitation [50,51]. Exercise with peers can help preserve a normal identity and escape the otherwise dominating patient role, change survivors' mindset, promote a more positive outlook on life and gain psychosocial support [29,52]. Participants in the present study stressed that the group size must not be too large to enable appropriate

monitoring and promote friendship and solidarity. They felt that a small group size prevented dropouts. A potential drawback when interacting with other cancer survivors is the risk of feeling overwhelmed by the reminder of your own cancer disease and mortality. However, the participant in this study rarely mentioned their cancer diagnosis or illness during exercise sessions; they focused on opportunities and not limitations. This strategy can be viewed in relation with a meta-study that recognized the importance of replacing disease-focused follow-up care with wellness-focused survivorship care [26]. Given the sense of peer fellowship and mutual understanding, the participants experienced that peer support during training sessions encouraged and motivated them to achieve higher intensity and maximize their benefit. They also helped regulate each other's intensity when an exercise partner had a bad day and/or lack of energy, and described a sense of recognition how the other is feeling, based on mutual experiences. People with a history of cancer may experience more barriers to participation in PE than the general population; a social environment and a sense of affinity with peers, as well as attractive and easily accessible exercise opportunities may be determinants that are more important for cancer survivors compared to the general population [53].

The participants in this study wished for a place to sit down after exercise, to have a cup of coffee and converse with their peers. Thus, the social environment played a significant role for a sense of belonging. Similarly, other survivors have expressed that more time to debrief after classes would help overcome emotional challenges [52]. At this stage of fellowship, we believe an environment that attends to both physical and psychological factors is a central element when implementing exercise for survivors, the social aspect can involve improved exercise behavior. According to health behaviors theories may social rewards, offers of encouragement and assistance in monitoring exercise progress be important aspects of social support to consider when developing exercise intervention strategies [26,31].

The participants in this study described a flexible program where the instructors offered alternative exercises that allowed all participants to complete the workout within the group format. Patient concerns about their health (e.g., pain, fatigue, breathlessness, stomas, peripheral neuropathy) are reported as a significant reason for non-attendance to exercise post cancer treatment [23]. Survivors have different PE needs after cancer treatment, depending on factors like age, diagnosis and comorbidity, and as such require flexibility in the exercise program. Untailored exercise programs may contribute a reason for patients with cancer to reject exercise [25]. For these populations, supervised exercise program may be most appropriate [46,54]. The participants experienced that the instructors provided a high level of safety, gave exercise options, motivation and support. Instructors with knowledge about cancer treatment and exercise competence can provide individually tailored exercise programs. Before intervention, the instructors performed an individual interview with each participant to get background knowledge about cancer history, physical fitness level, possible late effects and/or comorbidities. This gave survivors a sense of confidence in the instructors, which increased their willingness to push their limits under instruction. The sense of empowerment, self-efficacy and increased confidence resulted in a positive and motivational attitude to exercise, which is known to strengthen exercise adherence [55]. The group appreciated the instructors' ability to communicate their knowledge concerning exercise, techniques, benefits and effects. Other studies have reported similar result among breast cancer patients, but to our knowledge not in mixed groups [56,57]. However, supervising a group-based exercise for patient diagnosed with cancer during cancer treatment may be a challenging task, as reported in a previous focus-group interview study [58]. The instructors had to deal with their own emotional stress when facing severe illness among the participants and the impact of group dynamics, as well as the participants' barriers to exercise and contradictory information about exercise from the health care services [58]. Increased knowledge among participants in the present study fostered autonomy, competence and relatedness, and participants found their own motivation and experienced empowerment. In addition, knowledge can influence current beliefs and attitudes, such as a change in attitude to enjoy and wish to maintain

exercise habits [33]. Other studies demonstrate that reduced knowledge and lack of information about exercise is a barrier to being physically active [24,25]. Survivors are concerned about overdoing PE, and breast cancer survivors experienced conflicting information concerning exercise from health care professionals. Additionally, an overload of information on the internet, myths and misconceptions were barriers to performing exercise [24]. This emphasizes the importance of conveying information in an understandable and appropriate way. Survivors can struggle with establishing balance between building capacity and participation in various areas of life after treatment [59].

Exercise sessions at regular times gave the participants potential to restore structure to everyday life after a long time in the "cancer bubble". Planned group exercise provided a sense of commitment, influence and self-worth, and motivated them to get out of the house. Similarly, Midtgaard [60] found that fixed appointments for exercise sessions and programs help survivors rebuild structure in everyday life and create a normal context, and enable the survivors to re-establish confidence in their own body and physical potential. We believe exercise routines can provide the survivors with a focus on constructive action to improve their health and a sense of competence and increased confidence at a time when life offers a variety of challenges (eg. return to work, socialization, late effects). Survivors have reported a need to enroll in an exercise program immediately post-treatment due to concerns that if they wait, they will end up not taking part in a program at all [61]. For many people, exercise maintenance requires a change of behavior. According to Social cognitive theory, human behavior, personal and environmental factors influence each other in the outcome of health behavior [33]. The participants reported that the group-based exercise program generated positive encouragement to be more physically active in everyday life, profit to do daily task at home and improved their self-efficacy. Other studies have reported that self-efficacy is associated with positive behavior change for PE [32,33]. Performing PE and work on the same day was assessed as too energy consuming for some of the survivors. Groeneveld [18] recommends that the employers to have a close collaboration with health personal. Communication with employers is beneficial if it is regular, positive, respectful, personal, compassionate and helpful [62].

The findings of this study are limited by a small sample size. On the other hand, this study represents a diverse population of participants across sex, age, physical fitness, education, working status, cancer diagnosis and received treatment. Two of the six participants who declined participation in the interviews, were the youngest people participating in the exercise program (39–44 years). They would have brought the study useful information of their experiences as young cancer survivors and parents to young children. Performing analyses in collaboration with another researcher can create an analytical space with several nuances [49]. The researcher group consisted of two nurses and two health / fitness consultants, all with expertise and experience in cancer care and rehabilitation. The nurses had previous experience and knowledge regarding the qualitative research method. The fact that the research-group had different education, experience, knowledge and perspectives within the main theme of cancer care and rehabilitation, adds strength to the study. A general limitation of qualitative research is the inability to generalize results to a larger population, as people may experience their own situation differently depending on their context. However, this feasibility study reveals determinants, such as peer-support and social environment, that promoted exercise adherence and maintenance in a diverse group of cancer survivors, and it feasible that these determinants will also prove relevant to a more general population of cancer survivors.

Although there are several studies showing that PE provides helpful strategies to assist survivors in restoring their physical function, strength and mental health, and recommended exercise guidelines are established, are survivors struggling with exercise adherence and maintenance after cancer treatment [21-23]. Even after completing up to six months of physical rehabilitation in the specialist health care service, maintenance of exercise is reported as challenging. Patients are dealing with late effects from cancer treatment for a long time, and survivors say they are not comfortable

with doing exercise on their own. Today there is a gap between the cancer care offered by the specialist and the community health services. Our results show implementation of the group-based exercise program in the community health service for cancer survivors generates a social, supportive and encouraging environment and a sense of obligation to perform exercise sessions. Systematic reviews evidence support greater consistent benefit of exercise for quality of life and muscular and aerobic fitness when the intervention was offered in a group or supervised setting compared with a home-based or unsupervised setting [24,54]. Physically active survivors can achieve improved health and daily function, and thus a reduced reliance on the health care system and earlier return to work and everyday life. We believe supervised group-based structured exercise program with peers may inspire the cancer survivors to adhere to a long-term active lifestyle. Further, our results can contribute directly into the implementation to the national program by the Norwegian Directorate of Health; The pathway home for patients with cancer 2022–2023 [63], which aims to improve quality of care and offer more predictable health care through increased collaboration between health care services. To bring us a step further towards implementing sustainable community-based exercise programs for cancer survivors, further research should develop a multifaceted implementation strategy package based on theory and previous research in collaboration with stakeholders such as cancer survivors, health professionals and the care and welfare administration, for development and successful and sustainable delivery of community-based exercise programs.

4.2. Innovation

The study contributes to innovation in health care by presenting a model for effective translation of cancer survivors from rehabilitation in the specialist to community health care service in a real-world setting. Addressing cancer survivors' experiences from a novel community-based group exercise program is necessary to bring us a step further successful implementation of exercise program for this population, which has proven to be a challenge. Presenting determinants to success exercise adherence and maintenance after treatment is essential for strengthening patient participation in exercise. The results demonstrate the importance of exercise delivered through an arranged group format. Due to exposure of social factors, which have an enhancement in the exercise experience and have improved long-term adherence. The participants demanded a place to sit down to take a cup of coffee and talk with peers either before or after the scheduled exercise. Social interaction with peers may be extra important to this population, due to common experience with illness and longtime treatment, which may have entailed different late effects. The authors recommended adding the social environment to the physical exercise, as it would support the exercise adherence and maintenance. This innovative model lays the foundation for further work to strengthen the cancer care and build a sustainable bridge between health organizations with aim to motivate and facilitate the cancer survivors to adhere to a long-term active lifestyle through implementation of a sustainable exercise program in everyday cancer care. We encourage further research to develop a multifaceted implementation strategy package based on theory and previous research in collaboration with cancer survivors, health professionals and management to address barriers and facilitators for exercise adherence and maintenance for cancer survivors.

4.3. Conclusion

The study adds knowledge of determinants for exercise adherence and maintenance in a group-based community exercise program for cancer survivors after completed rehabilitation in the specialist health care. These results can assist in the design of qualified and cost-effective exercise programs for cancer survivors in clinical practice. Further, specialist and community health service, management of the hospital and the care and welfare administration need to strengthen collaborations and improve implementation strategies in order to

develop and deliver successful and sustainable community-based group exercise programs for cancer survivors.

Declaration of Competing Interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pecinn.2022.100088>.

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