



## Experiences of exercise and its significance for the quality of life among patients with advanced cancer – A qualitative study

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### ABSTRACT

**Purpose:** To explore the experiences of patients with advanced cancer regarding exercise and its significance for their quality of life.

**Methods:** A total of 17 patients participated in the study and were individually interviewed using semi-structured thematic interviews between April 2023 and April 2025. The interview data were subjected to inductive content analysis.

**Results:** Most patients with advanced cancer exercised several times weekly, for several hours each week. Patients engaged actively in aerobic activities, but the number of muscle-strengthening activities and stretching was limited. Following the onset of advanced cancer, patients' ability to exercise declined, while their perceived importance of exercise increased. According to the experiences of patients with advanced cancer, exercise facilitated the preservation of health and contributed to the preservation of overall well-being.

**Conclusion:** At the onset of advanced cancer, healthcare professionals should discuss patients' exercise habits and ensure that both the quantity and type of exercise are appropriate. If necessary, patients should be offered informational and practical support for implementing healthier exercise habits. Moreover, based on the experiences of patients with advanced cancer, exercise is perceived to have exclusively beneficial consequences for quality of life.

### 1. Introduction

Cancer is a common disease worldwide (Bray et al., 2024). Advanced cancer refers to either locally advanced cancer, where the malignancy has spread to adjacent tissues, or to metastatic cancer, in which the tumour has spread to remote areas of the body through metastases (American Cancer Society, 2024). A study by Hudock et al. (2023) predicted that the likelihood of long-term survival — defined as survival beyond five years — for patients with metastatic cancer will increase 46.7 % in the United States by 2040. Despite improvement in prognosis,

advanced cancer significantly impairs patients' quality of life (van Roij et al., 2022). In this study, quality of life was defined according to the World Health Organization (WHO) (Kuyken, 1995) as an individual's personal perception of their life position. Quality of life encompasses a person's physical and psychological health; level of independence; social relationships; environment and personal beliefs (Kuyken, 1995).

Exercise refers to a planned, structured, and repetitive physical activity aimed at maintaining or improving physical fitness (Caspersen et al., 1985). The WHO guidelines (Bull et al., 2020) recommend that patients with cancer should engage in at least 150–300 min of

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moderate-intensity aerobic activity or 75–150 min of vigorous-intensity aerobic activity per week, or a combination of the two. Additionally, patients should perform whole-body muscle-strengthening activities at least twice a week, while older patients should also engage in functional balance and strength training at least three times a week (Bull et al., 2020). Even though there are no specific exercise guidelines for patients with advanced cancer, they are advised to avoid physical inactivity (Capozzi et al., 2021). However, health limitations associated with advanced cancer can restrict patients' ability to exercise (Chang et al., 2020; Liu et al., 2025; Mikkelsen et al., 2019; Sheill et al., 2018). As a result, studies (Knowlton et al., 2020; Wasley et al., 2018; Zopf et al., 2017) have shown that patients with advanced cancer frequently fail to meet the physical activity levels recommended in current guidelines (Bull et al., 2020).

Previously, systematic reviews and meta-analyses (Rodríguez-Cañamero et al., 2022; Toohey et al., 2023) have shown that exercise has a positive impact on the quality of life of patients with advanced cancer. Additionally, a meta-synthesis by Young et al. (2024) aimed to explore the experiences of exercise interventions in patients with advanced cancer. The study demonstrated that exercise interventions can support patients in enhancing their physical, psychological, social and spiritual well-being and assist them in managing the symptoms caused by advanced cancer and its treatment (Young et al., 2024). However, not all patients with advanced cancer are either willing or able to participate in exercise programs. Previously, only a few studies have explored the experiences (Chang et al., 2020; Shallwani et al., 2024) and attitudes (Mikkelsen et al., 2019; Sheill et al., 2018) of patients with advanced cancer who engage in exercise outside of structured exercise programs. These studies have demonstrated that exercise can improve patients' well-being, health and activity (Chang et al., 2020; Mikkelsen et al., 2019; Shallwani et al., 2024; Sheill et al., 2018); enhance their social connections (Mikkelsen et al., 2019; Shallwani et al., 2024) and help them sustain hope (Chang et al., 2020). Further research into how patients with advanced cancer engage in unsupervised exercise is needed. This will improve understanding of their exercise preferences and help develop better support strategies.

The purpose of this study was to explore the experiences of patients with advanced cancer regarding exercise and its significance for their quality of life. The research questions for this study were: (1) How do patients with advanced cancer describe their exercise? (2) How do patients with advanced cancer describe the significance of cancer for their exercise? (3) How do patients with advanced cancer describe the significance of exercise for their quality of life?

## 2. Methods

### 2.1. Study design

This study employed a descriptive qualitative study design, and it is part of a broader interdisciplinary research project (EU Clinical Trials Register EU CT: 2024-515109-24-00), which aims to determine whether supervised physical exercise during first-line medical treatment enhances the efficacy of treatment in patients with metastatic prostate, ovarian, kidney or breast cancer, compared to unsupervised exercise. These cancer types were selected for the research project because their tumour sites are often characterised by hypoxia, which can potentially be alleviated by physical exercise. To secure the quality of the research, the study adhered to the Standards for Reporting Qualitative Research (SRQR) checklist (O'Brien et al., 2014).

### 2.2. Participants and setting

Patients were eligible for the study if they: (1) had histologically and imaging-confirmed prostate cancer, ovarian cancer, kidney cancer or breast cancer and were to initiate first-line medical treatment, (2) were over 18 years of age, (3) were able to exercise, (4) could communicate in

Finnish and (5) were willing to take part in the study.

### 2.3. Data collection

Participant recruitment was conducted in the urology, oncology and gynaecology outpatient clinics of a Finnish university hospital. At the initiation of treatment, the attending physicians invited eligible patients to a baseline visit during which the research physician and the research nurse provided information about the study and the potential benefits of exercise during cancer treatment. During this visit, patients were also provided with a written patient information leaflet and had a possibility to ask questions about the study. Patients willing to participate in the study (n = 17) signed informed consent. To gain an in-depth understanding of the participants' experiences, perceptions, thoughts, and feelings, thematic semi-structured interviews were chosen as the data collection method (Kim et al., 2017; Moser and Korstjens, 2018). Focusing on exercise and quality of life, the themes of the interviews were developed by four authors (EN, EHar, AH and EHaa). The sub-themes included forms and types of exercise; exercise frequency, duration and companions; physical and psychological health; level of independence; social relationships; environment and personal beliefs (Kuyken, 1995).

The interviews were conducted by two authors (AH and EN), who had no therapeutic relationship with the participants. After recruitment, the interviewers contacted the participants directly by phone to arrange a suitable time for the interview. The interviews were conducted between April 2023 and April 2025 either by phone (n = 10), face-to-face (n = 5) or via video call (n = 2). The interviews ranged from 28 to 90 min. The interviews were conducted in a quiet environment, ensuring that the interviewer and participant could converse without interruptions. Participants were encouraged to speak freely about their experiences and feelings. During the interviews, the interviewers frequently asked clarifying and follow-up questions to ensure the accuracy of the information and to verify the participants' perspectives. The interviews were electronically recorded and transcribed into text using a transcription service. A total of 159 pages of transcribed interview data were obtained.

### 2.4. Data analysis

The data were analysed with inductive content analysis. One author (EN) was responsible for conducting the analysis, while two other authors (EHar and EHaa) provided frequent feedback on the resulting subcategories and categories throughout the data analysis process. Initially, an overall understanding of the material was developed by reading the interviews several times. Subsequently, the research questions were analysed separately. The units of analysis included words, phrases, and sentences describing the experiences of patients with advanced cancer. Relevant original expressions related to the research questions were extracted from the interviews and reduced to open codes. Following this, open codes were grouped into subcategories based on content similarities and named descriptively. Finally, subcategories with similar content were organized into categories and labeled descriptively. The interview data were reviewed multiple times throughout the analysis to prevent incorrect subjective interpretations. (Kynge, 2020) An example of data analysis is presented in Table 1.

### 2.5. Ethical considerations

The entire research process was carried out following the fundamental principles of good scientific practice, including reliability, honesty, respect and accountability (Finnish National Board on Research Integrity, 2023). For this study, research approval was obtained from the relevant organization. The study was approved by an ethics committee in a wellbeing services county in Finland (R21020M) and carried out in accordance with the Declaration of Helsinki. All

**Table 1**  
An example of data analysis.

Original expression	Open code	The subcategory	The category
"Then, movement restrictions emerged. For example, washing my face in the sink became impossible—my back wouldn't bend. Getting out of bed and moving around became practically unbearably difficult." (Patient 4)	Due to cancer-related movement restrictions in the back, moving around became unbearably difficult. (Patient 4)	The symptoms of advanced cancer prevent exercise	The ability to exercise declines
"I couldn't, for example, ride a bike at all because my back, just the vibration from cycling was so unbearable that I had to stop. I picked things up off the floor using a long shoehorn. I couldn't put on pants. It took 15 min just to put on one sock because my back wouldn't bend. It was so painful." (Patient 4)	Due to cancer-related back pain, cycling and daily activities became impossible. (Patient 4)		
"I felt so unwell and was so tired that I just couldn't manage or wasn't able to go [to the gym]." (Patient 11)	Cancer-related discomfort sometimes prevented engagement in gym workouts altogether. (Patient 11) Cancer-related fatigue sometimes prevented engagement in gym workouts altogether. (Patient 11)		

participants signed a written informed consent before their interview. Participation in the study was completely voluntary and did not affect the cancer treatment received by the patients. Participants were allowed to withdraw from the study at any point without having to provide a reason for their decision. The data collection and analysis were conducted systematically and in an ethically sound manner. The interview data were processed so that individual participants could not be identified. The research data were stored in a hospital district's research database, which was secured with user credentials, access control and usage logging. Study results were reported in a manner that accurately reflected the participants' perspectives. (Finnish National Board on Research Integrity, 2023)

### 3. Results

#### 3.1. Participant characteristics

A total of 11 men and 6 women with advanced cancer participated in the study. The participants' mean age was 65.7 years (range: 42–82), and they were diagnosed with prostate cancer (n = 11), ovarian cancer (n = 5) or kidney cancer (n = 1). The mean duration since their initial cancer diagnosis was 1.8 years (range: 0.2–10.4). All patients were about to initiate medical treatment (n = 17). Additionally, patients had undergone previous cancer treatments earlier in the course of their disease, including hormonal therapy (n = 11), chemotherapy (n = 6), surgical treatment (n = 5), radiation therapy (n = 3), second-generation antiandrogen therapy (n = 3) and antibody therapy (n = 2).

#### 3.2. Exercise in patients with advanced cancer

All patients engaged in aerobic activities (n = 17). Instead, only a small subset of the patients engaged in muscle-strengthening activities (n = 4) or stretching (n = 3). The most popular types of exercise were walking (n = 14) and yard maintenance (n = 8). Patients' exercise levels were relatively high. Most patients exercised daily (n = 10), and an even larger proportion of patients had a weekly exercise duration of several hours (n = 12). All patients exercised alone (n = 17) and in addition, some patients engaged in physical training with their partner (n = 7), friends (n = 6) or children (n = 2) (Table 2).

#### 3.3. The significance of cancer for the exercise of patients with advanced cancer

According to the experiences of patients, after the onset of advanced cancer **the ability to exercise declines and the perceived importance of exercise increases** (Table 3).

##### 3.3.1. The ability to exercise declines

*The symptoms of advanced cancer prevented exercise*, manifesting as discomfort and fatigue. A patient experienced severe advanced cancer-related movement restrictions in the back, making mobility unbearably hard. The same patient also reported that cycling and daily activities were impossible due to severe back pain caused by the advanced cancer:

*"I couldn't, for example, ride a bike at all because of my back, just the vibration from cycling was so unbearable that I had to stop. I picked things up off the floor using a long shoehorn. I couldn't put on pants. It took 15 minutes just to put on one sock because my back wouldn't bend. It was so painful."* (Patient 4)

*The symptoms of advanced cancer restricted exercise*, presenting in various ways. Advanced cancer diminished patients' physical fitness and

**Table 2**

Exercise in patients (n = 17) with advanced cancer.

Exercise habits	n
Exercise includes aerobic activities	17
Exercise includes muscle-strengthening activities	4
Exercise includes stretching	3
Type of exercise	
Walking	14
Yard maintenance	8
Cross-country skiing	5
Cycling	4
Swimming	3
Group fitness class	3
Gym	2
Aqua jogging	2
Tennis	2
Ice skating	1
Agility	1
Ice hockey	1
Badminton	1
Group water aerobics	1
Weekly exercise frequency	
Daily	10
Several times	2
A few times	3
Less than a few times	2
Weekly exercise duration	
Several hours	12
A few hours	3
Less than a few hours	2
Exercise companions	
Alone	17
With a partner	7
With friends	6
With children	2

**Table 3**  
The significance of cancer for the exercise of patients with advanced cancer.

The category	The subcategory
The ability to exercise declines	The symptoms of advanced cancer prevent exercise
	The symptoms of advanced cancer restrict exercise
	The symptoms of the treatment of advanced cancer prevent exercise
	The symptoms of the treatment of advanced cancer restrict exercise
The perceived importance of exercise increases	More time is devoted to exercise Motivation for exercise enhances

muscular strength. Advanced cancer also caused patients mobility limitations and restricted the functional capacity of the core. Some patients reported that their lower back became easily strained during movement, and they sought to avoid motions that felt uncomfortable in the back. Furthermore, because of advanced cancer, the patients' agility diminished, and stiffness increased. A patient shared that following the onset of advanced cancer, they had to reduce the weights used in their resistance training:

*"I haven't really been a big fitness enthusiast before, but you can definitely notice it. And I've had to reduce the weights I use in the pump class."* (Patient 1)

In the wake of advanced cancer, patients also experienced increased breathlessness and a reduction in movement speed. In addition, patients reported having trouble running, keeping up in group fitness classes or engaging in activities such as berry picking, mushroom picking or performing daily chores as effectively as before. Furthermore, patients could no longer play badminton for as long as they had previously or keep up with others' pace during exercise. In addition, they felt more fatigued while exercising compared to before. A patient mentioned that advanced cancer forced them to choose walking routes that provided easy access back home in case of fatigue:

*"I choose my walking routes so that I can make it back home if I get completely exhausted. It doesn't happen every time, but it happens often."* (Patient 10)

*The symptoms of the treatment of advanced cancer prevented exercise*, as demonstrated by the outcomes of medical treatment and surgery. Medical treatment weakened the patients' strength and caused symptoms such as fluctuating blood pressure, which prevented exercise for a few weeks following treatment. A patient reported developing bowel paralysis from cancer surgery, which compromised their physical condition to the extent that they were unable to engage in any exercise for some time afterward:

*"When these treatments started and all the surgeries and everything, I really haven't been moving much at all. Actually, just this week, for the first time, I've properly gone out, well, not really proper walks, just a few short walks. I mean, it's really been at zero, because I've been in such poor condition that I simply haven't been able to."* (Patient 8)

*The symptoms of the treatment of advanced cancer restricted exercise*, as evidenced by the consequences of medical treatment, post-chemotherapy white blood cell booster, cancer surgery, hormone therapy and antibody therapy. The severe fatigue and poor sleep caused by medical treatment impaired the patients' ability to exercise. The post-chemotherapy white blood cell booster caused discomfort, which limited the patients' ability to exercise and made their legs feel heavy. Furthermore, a patient had a misconception that it was not allowed to engage in water-based exercise during chemotherapy:

*"When I was on chemotherapy, I didn't go aqua jogging. I did go for walks, but I didn't go aqua jogging because I somehow had this idea that you're not supposed to go to the swimming pool at all during that time. I*

*don't know where I got the idea that you're not allowed to go to the swimming pool."* (Patient 13)

Cancer surgery diminished all forms of exercise among patients. Surgery also triggered menopause in a patient with ovarian cancer, which caused joint pain that limited exercise. A patient mentioned that the joint and muscle pain associated with antibody therapy hindered their ability to exercise. Furthermore, a patient stated that hormone therapy lowered testosterone levels, resulting in loss of strength and muscle mass, which reduced their exercise capacity.

**3.3.2. The perceived importance of exercise increases**

Following the onset of advanced cancer, *more time was devoted to exercise*, as being on medical leave provided more time to engage in exercise during everyday life. A patient mentioned that since developing advanced cancer, life has become less hectic, allowing more time to go outside for walks:

*"... work and children kept me busy before, and well, there's been a change in that sense because I do go outside more now, yes. There has been a positive change, yes. I go out for fresh air and take walks, so actually, it has changed ...."* (Patient 9)

*Motivation for exercise enhanced*, as patients believed that exercise could contribute to cancer treatment and enhance the effects of cancer treatments. Additionally, patients hoped that exercise could aid in their recovery from the illness and enable them to live longer. A patient shared that she always takes the stairs because the research doctor has told them about the importance of exercise for patients with advanced cancer:

*"Somehow, I've thought about it, that with small actions, because exercise does have an effect. Some doctor there, a research doctor, said that ... exercise has the effect of one medication. So maybe that sentence stuck with me, that the more blood circulates, the more ... just always stairs."* (Patient 9)

**3.4. The significance of exercise for the quality of life of patients with advanced cancer**

From the perspective of patients with advanced cancer, **exercise facilitates the preservation of health and contributes to the preservation of overall well-being** (Table 4).

**3.4.1. Exercise facilitates the preservation of health**

*Exercise supported the maintenance of general health* as evidenced by the preservation of mental health and good physical condition. Mental health preservation was reflected in the prevention of depression and the alleviation of anxiety during a challenging life situation. Maintaining and improving physical condition, physical performance and muscular

**Table 4**  
The significance of exercise for the quality of life of patients with advanced cancer.

The category	The subcategory
Exercise facilitates the preservation of health	Exercise supports the maintenance of general health
	Exercise enhances the adoption of other healthy lifestyle behaviours
	Exercise relieves the symptoms associated with cancer treatment
	Exercise cultivates a sense of satisfaction
Exercise contributes to the preservation of overall well-being	Exercise improves the state of mind
	Exercise promotes vitality
	Exercise facilitates the maintenance of social relationships
	Exercise fosters a deeper connection with nature

strength made living with advanced cancer more manageable. A patient also felt that exercise helped preserve muscle mass during hormone therapy. Additionally, patients anticipated that exercise would help maintain their physical condition as they age. Furthermore, a patient noted that maintaining exercise helps prevent sudden deterioration in physical condition and difficulties with walking:

*“If you can keep your muscle condition up ... and then of course, the fact that you can walk properly ... it has a big impact ... You probably won't go into a weak condition so quickly, that walking gets harder and like that, so by keeping up with exercise all the time, it helps then.”* (Patient 12)

Exercise enhanced the adoption of other healthy lifestyle behaviours, as reflected in improvements in weight management and quality of sleep. A patient stated that exercise helped with weight management during hormone therapy. In addition, a patient believed that exercise alleviated insomnia caused by work-related stress. Furthermore, a patient stated that even a small amount of exercise helped them fall asleep at night:

*“I take a small walk, go from the street next to me and then a little bit of a forest path back, and then it's a whole different story when going to bed at night ... Even if you only walk half a kilometre, it still has an effect.”* (Patient 10)

Exercise relieved the symptoms associated with cancer treatment, as demonstrated by improved endurance and overall health during cancer treatment. Patients thought that exercise also alleviated the pain and tingling in the fingers caused by cancer treatments. A patient observed that chemotherapy did not cause the same level of discomfort when they immediately exercised after the treatment:

*“... after I had received the second round of chemotherapy, the next day I still went ... to work out. So, I don't know if that had anything to do with the fact that ... I didn't feel as bad from these.”* (Patient 11)

#### 3.4.2. Exercise contributes to the preservation of overall well-being

Exercise cultivated a sense of satisfaction, which was manifested as physical comfort and a feeling of pleasantness during and after exercise. Being in good physical condition also provided patients with a sense of fulfilment. Additionally, patients assessed that insufficient exercise caused physical discomfort, made them feel lazier and caused guilt. Exercise improved the state of mind, which was reflected in the improvement of mood and mental well-being. Some patients mentioned that exercise stimulated thoughts, enabling reflection on various matters. Patients also believed that exercise helped reduce worry and promoted a sense of good conscience. Additionally, a patient stated that exercise helped them divert their thoughts from unpleasant matters:

*“The thing is, when you exercise, you don't think about any unpleasant things at the same time, as you focus on the exercise and fitness.”* (Patient 12)

Exercise promoted vitality in several ways. Exercise made patients more energetic and cheerful and facilitated their ability to cope with the illness. Furthermore, exercise offered patients an engaging activity; helped them stay active and provided a sense of accomplishment and capability. A patient mentioned that there is a sense of achievement in exercise and in everyday activities, such as performing household chores:

*“Yeah, I exercise, and then I also do things at home, so you can always see the results. If you do something at home, you see that you've done it again ... If you don't do anything, nothing's going to come of it, nothing at all.”* (Patient 14)

Exercise facilitated the maintenance of social relationships strengthening them and enhancing patients' satisfaction with their social connections. Patients reported that exercising provided opportunities to talk with their partners about everyday matters, to meet with their friends more frequently and to interact with new people. Patients made new

acquaintances at the gym, during aqua jogging, on dog walks and in agility classes. In addition, while exercising, patients could converse, share updates and thoughts and receive encouragement from their friends. A patient stated that making exercise plans with a friend increased their motivation to exercise:

*“Once a week, the aqua jogging ... when I had a friend I had made plans with, it motivated me to go.”* (Patient 12)

Exercise fostered a deeper connection with nature, which manifested in various forms. Patients perceived outdoor activities as enjoyable and appreciated the opportunity to get fresh air, enjoy the landscapes and observe the changing seasons. A patient reported that breathing with lung metastases felt easier outside:

*“Staying indoors all the time wouldn't be nice either. Outside, you get to ... breathe fresh air. Even now, after the surgery, it feels like it's easier to breathe outside. Since I have those metastases in my lungs, sometimes it feels like I can't quite catch my breath indoors. But when I'm outside, it somehow feels much easier.”* (Patient 12)

Being in the forest was described as particularly pleasant and calming. A patient described that they prefer to combine exercising with enjoying nature:

*“If I, for example, go for a walk, I don't like it to be just about exercise. I want it to offer more than just that ... enjoying nature combined with it is, in my opinion, the best way.”* (Patient 13)

## 4. Discussion

The purpose of this study was to explore the experiences of patients with advanced cancer regarding exercise and its significance for their quality of life. In this study, most patients with advanced cancer exercised several times weekly, for several hours each week. Instead, previous studies (Knowlton et al., 2020; Wasley et al., 2018; Zopf et al., 2017) have estimated that physical activity levels among patients with advanced cancer are low. A key result of this study was that although almost all patients with advanced cancer highlighted their engagement in aerobic activities, only a small proportion mentioned muscle-strengthening activities, which does not fully align with the exercise guidelines set for patients with cancer (Bull et al., 2020). This indicates that healthcare professionals should assess the exercise habits of patients with advanced cancer and provide them with information on the importance of muscle-strengthening activities. Where appropriate, patients should be offered the opportunity to participate in a tailored muscle-strengthening exercise program. In addition, exercise should be integrated into supportive care plans for patients with advanced cancer, even outside of structured exercise programs.

Within this study, the onset of advanced cancer was associated with a reduced ability to exercise, while the perceived importance of exercise increased. One of the main results of this study was that when patients with advanced cancer were aware of the importance of exercise, their motivation for exercise increased. The hope of recovery and the possibility of living longer with the disease acted as major drivers for exercise. In addition, a study by Sheill et al. (2018) found that patients with metastatic prostate cancer were unaware of the effects of exercise following disease onset and that low motivation for physical activity constituted a significant barrier to physical training. Furthermore, this study showed that the symptoms of advanced cancer and its treatment both prevented and limited patients' exercise, an observation that has also been reported in previous studies (Chang et al., 2020; Liu et al., 2025; Mikkelsen et al., 2019; Sheill et al., 2018). Therefore, it can be stated that to support patients' engagement in exercise, providing information about its benefits, effects and guidelines should be incorporated into the standard care of patients with advanced cancer, along with the effective management of cancer- and cancer treatment-related symptoms.

In this study, exercise facilitated the preservation of health and contributed to the preservation of overall well-being. One of the notable results of this study was that when patients with advanced cancer engaged in unsupervised exercise, their quality of life improved. In addition, they sought benefits that extended beyond the physical, mental, and social consequences of exercise. A novel finding of this study was that exercise provided patients with advanced cancer an opportunity to draw strength through their connection with nature. Additionally, exercise provided patients a sense of fulfilment, capability, and accomplishment. Most patients with advanced cancer preferred to exercise alone, which allowed them to reflect on and process their thoughts. The positive consequences of exercise on the quality of life as well as the physical, mental, and social health and well-being of patients with advanced cancer have also been recognised in previous studies (Chang et al., 2020; Mikkelsen et al., 2019; Rodríguez-Cañamero et al., 2022; Shallwani et al., 2024; Sheill et al., 2018; Toohey et al., 2023; Young et al., 2024). It can be argued that, in addition to offering exercise programs, healthcare professionals should encourage patients with advanced cancer to exercise independently as well, as it fosters a sense of empowerment, personal growth and enjoyment during a challenging life situation.

#### 4.1. Strengths and limitations

The trustworthiness of this qualitative study was assessed according to the criteria of credibility, dependability, confirmability, authenticity, and transferability (Kyngäs et al., 2020). To enhance credibility, the study was carefully planned, and its different stages, along with its strengths and limitations, were evaluated in detail. However, although the participants in the study were purposefully selected to best represent the phenomenon, those who agreed to take part may have been more receptive to exercise and less severely limited than those who declined, introducing a potential selection bias. Dependability was established through a careful description of the study methods and analysis. (Kyngäs et al., 2020)

The authors involved in conducting the study have previously carried out research related to physical activity among patients with cancer, which may have led to certain assumptions that could have influenced both the collection and interpretation of the data. To strengthen confirmability, the potential influence of researchers' biases on the study findings was minimized by taking notes during the interviews and discussing the analysis multiple times throughout the process within the research team. However, the author responsible for the analysis (EN) did not interview all participants, which could have affected the interpretation of the data. The relationship between the interview data and the results was illustrated using authentic quotes from several patients, thereby enhancing the study's authenticity. Transferability was reinforced by carefully describing the inclusion criteria and participants' characteristics. However, no participants with breast cancer were successfully recruited for the study, though breast cancer is the most common cancer among women (Bray et al., 2024), which affected the gender distribution of the study. Participants were also required to be able to communicate in Finnish, which may have limited the cultural heterogeneity and transferability of the sample. (Kyngäs et al., 2020)

#### 5. Conclusion

Based on the results of this study, it can be concluded that at the onset of advanced cancer, healthcare professionals should discuss patients' exercise habits and ensure that both the quantity and type of exercise are appropriate. If necessary, patients should be offered informational and practical support, as their intrinsic positive attitude toward exercise creates favourable conditions for implementing healthier exercise habits. Moreover, based on the experiences of patients with advanced cancer, exercise is perceived to have exclusively beneficial

consequences for quality of life. In the future, engagement in exercise outside of structured exercise programs among patients with advanced cancer should be examined qualitatively in studies involving more diverse populations. Also, the significance of structured versus unstructured exercise among patients with advanced cancer should be investigated through longitudinal studies. In addition, qualitative research should be conducted to explore patients' experiences regarding whether participation in an exercise program offers additional benefits to the quality of life of patients with advanced cancer who are already actively engaging in unsupervised exercise on their own.

#### CRedit authorship contribution statement

**Essi Nikkinen:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Eeva Harju:** Writing – review & editing, Supervision, Methodology, Formal analysis, Conceptualization. **Annastiina Hakulinen:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Teemu J. Murtola:** Writing – review & editing, Methodology, Conceptualization. **Jorma Sormunen:** Writing – review & editing, Methodology, Conceptualization. **Elina Haavisto:** Writing – review & editing, Supervision, Methodology, Formal analysis, Conceptualization.

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#### Declaration of competing interest

The authors have no relevant financial or non-financial interests to disclose.

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