



“To be myself again”: Perceived benefits of group-based exercise for colorectal cancer patients

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ABSTRACT

Purpose: To explore the perceived benefits of a group-based exercise program for patients with colorectal cancer (CRC) undergoing chemotherapy treatment.

Methods: In-depth semi-structured interviews were conducted with all participants ($n = 27$) at the end of the exercise program (patients, relatives and healthcare professionals). The exercise instructor in charge of the exercise program with CRC patients also collected observational field notes throughout a research diary.

Results: Three main themes related to exercise as a coping strategy were obtained: (a) physical recovery; (b) psychosocial well-being, and (c) reconnection with their embodied selves and normal lives. Physical recovery included a perceived increase in fitness and a reduction in physical side-effects. Psychosocial well-being included perceived benefits in self-confidence, sense of control, reduced fear, feeling of being useful, sense of achievement, positive thinking and avoiding depression. All the physical and psychosocial benefits helped patients reconnect with their embodied selves, engage in activities practised before the diagnoses, improve their body image, avoid stigma, and increase their social life beyond cancer diagnoses. In this sense, some patients held on to their past selves, trying to keep or recover normality in their lives, while others acknowledged that they might not be the same person anymore, with exercise being part of this new identity.

Conclusions: This study shows that exercise is a coping strategy that benefitted CRC patients in several ways related to their physical and psychosocial quality of life.

1. Introduction

Around two million new colorectal cancer (CRC) cases were diagnosed in 2020, being the third most commonly diagnosed cancer (10% of the total) and, importantly, the second most common cause of cancer death (9.4% of the total) (Sung et al., 2021). While advances in the effectiveness of early detection and treatment led to an increased survival rate, CRC is followed by short and long-term complications (Drury et al., 2017), which all have an important negative impact on the patient's quality of life (QOL). QOL can be defined as a multidimensional construct that reflects a person's subjective evaluation of their

well-being and functioning across multiple life domains such as physical, functional, psychological/emotional or social (Fayers and Machin, 2013). Complications in CRC include physical symptoms such as fatigue, peripheral neuropathy, or changes in bowel habits (Toftagen, 2010); psychological distress including depression, anxiety, fear, worry, or negative feelings about one's body image (Aminisani et al., 2017; Benedict et al., 2016; Bullen et al., 2012); and social consequences such as social isolation (Hubbard et al., 2010). Therefore, the paradigm of treatment outcome has slowly shifted over the years towards improving patients' QOL, while survival and disease-free survival remain critical (European Commission, 2021; Kocarnik et al., 2022).

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Physical exercise has been established as a relevant part of CRC treatment to achieve improvements in patients' survival, fatigue, anxiety, depression, sleep, physical function, fitness, and QOL (Courneya et al., 2003; Campbell et al., 2019; El-Shami et al., 2015; McGettigan et al., 2020; Singh et al., 2020; Song et al., 2021). In addition, there is evidence showing that exercise also decreases the risk of tumor recurrence and developing other chronic diseases such as cardiovascular disease. Thus, it reduces all-cause mortality in CRC survivors (Amirsasan et al., 2022; Oruç and Kaplan, 2019).

Most studies have focused on multicomponent exercise programs combining resistance and aerobic training, with a few studies focusing on aerobic exercise alone or other types of exercise such as yoga. The interventions' length range from one week to three years and have a frequency of one to five sessions per week in supervised programs and one to seven in unsupervised home-based programs, with sessions lasting from 15 to 90 min. Regarding intensity, most exercise programs range from 50 to 95% of the Maximum Heart Rate (HRmax) for aerobic exercises, and 60–80% of one-repetition maximum for resistance exercises, which represents a moderate to high intensity in both types of exercise. Some studies employed a combination of behavioural change techniques including goal setting, feedback, social support, behavioural information or self-monitoring. Adverse events have also been reported in the literature, such as low-severity muscle pain, stiffness or soreness, and fatigue (Amirsasan et al., 2022; Jung et al., 2021; Singh et al., 2020).

However, to our knowledge, all studies have used quantitative methods, which may provide an incomplete picture of the benefits of exercise for this population, especially in aspects related to QOL, such as psychosocial aspects, which are not easily measured, expressed, and interpreted from a quantitative perspective. For this reason, a qualitative methodology is fundamental to analyse the meaningfulness of exercise programs for CRC patients and provide a substantive comprehension of the patient's perspective that cannot solely be understood through quantitative methods. The few existing qualitative studies examining the experience of cancer patients with exercise programs have been conducted with other cancer types or mixed diagnoses (for a review, see Midtgaard et al., 2015). For example, Adamsen et al. (2017) included colon cancer patients in an explorative qualitative study. They conducted semistructured interviews at initiation of chemotherapy and after 12 weeks, to understand the transformation of behaviour among physically inactive patients with cancer. However, only eight out of 33 participants in the study were colon cancer patients, and the focus of the research was to analyse the process of shifting from being non-exercisers to exercisers. Nevertheless, they reported some perceived benefits of exercise such as building self-confidence, believing in one's own abilities and having the willpower to reach new goals.

Although there might be some common outcomes for most cancer types, we should not generalise these results because each type of cancer is unique in terms of the pathology, treatment protocols, and side effects of the disease and treatment (Courneya et al., 2003). Therefore, the aim of this study was to explore the benefits in QOL experienced by CRC patients undergoing chemotherapy treatment who participated in a hospital group-based exercise program. The study's results may be of interest to the design and improvement of future exercise programs for CRC patients.

2. Methods

2.1. Design

A qualitative study design was adopted using semi-structured interviews and observations. The Critical Appraisal Skills Programme (CASP, 2018) checklist for qualitative studies was used as a guide to enhance the quality of the present research, and the study adjusted favourably to the ten items contemplated in this appraisal tool.

2.2. Participants

Patients with CRC ($n = 16$) who participated in an exercise program (described below) were recruited from the oncology unit of the Hospital Universitario Puerta de Hierro-Majadahonda (Madrid, Spain), when patients attended the first appointment with the oncologist, after surgical intervention, to regulate chemotherapy treatment. Chemotherapy treatment followed standard protocols for adjuvant treatment for colorectal cancer (FOLFOX and XELOX) (Grothey et al., 2018).

Patients had to meet the following inclusion criteria: having been diagnosed with CRC (stage II-III), treated by curative surgery for colon or rectal cancer, having to receive chemotherapy for three or six months, aged more than 18 years, being functional enough to satisfy personal necessities autonomously (values 0, 1 or 2 in ECOG scale; Oken et al., 1982), and having signed the written consent. Exclusion criteria were metastatic or incurable CRC, and limiting physical/psychiatric symptoms detected by the oncology medical team.

The sample also included six relatives, who were the participants' main caregivers, and five members of the oncology team at the hospital. The relatives' and healthcare professionals' perspectives were also included to provide a more holistic view of the phenomenon under study. Triangulation via use of different types of informants is considered a strategy to enhance trustworthiness in qualitative studies (Shenton, 2004). With this triangulation, we could check that the subjective perspective of patients, relatives and members of the oncology team was congruent and coherent.

2.3. Data collection and procedure

Two different techniques were used to collect qualitative information. First, MR (exercise specialist in charge of the exercise program with CRC patients) took chronologically organised field notes of observed conversations or situations which might be of interest to the aim of the study. MR collected this information throughout the exercise program in her research diary. Second, MR carried out an in-depth semi-structured interview with each participant at the end of the exercise program and the adjuvant treatment (patients, relatives and members of the oncology team). The interviews lasted between 90 and 120 min, were conducted by the same researcher for consistency, and were audio-recorded. The interviews included questions to know the effects experienced by CRC patients with the exercise program. The script of questions for the semi-structured interviews is shown in Table 1. Interviews were carried out at the hospital, in the participant's home or in any quiet place they preferred.

This research was approved by the Ethics Committees of the Hospital Universitario Puerta de Hierro – Majadahonda (Madrid, Spain) and the Miguel Hernández University of Elche (Alicante, Spain). All participants were informed about the research procedures and provided their written consent. As the study was focused on personal and private information or contained evaluations of other people, the participants' anonymity was protected by using numbers.

2.4. Exercise program: FIT-CANCER

The exercise program was led by MR, consisted of three 60-min sessions per week and lasted six months. Each patient began the exercise program at the start of his/her chemotherapy treatment. The first patient was recruited in January 2020, and new patients were recruited progressively to do exercise in group, although the start and the end of the exercise program was different for each one.

Initially, the exercise program took place in a fitness centre located close to the Hospital. However, due to the Covid-19 pandemic, exercise sessions continued online with the Google Meet app after 6th March 2020. Therefore, the first five patients attended in-person and online sessions, while the rest of the patients did the complete exercise program online. Phone calls were made by MR to help those patients who

Table 1
Script of questions for the semi-structured interviews.

What do you think about the exercise program?
Do you think the exercise program has offered you anything interesting? What? Why?
What were the most positive/negative aspects of the exercise program?
How did you feel during the exercise program?
Do you think the exercise program has been interesting for your health and well-being? Yes/No. Why?
What were the most positive/negative aspects of the exercise program for your physical, psychological and social condition? Please, explain each one.
Did you feel any fitness improvement with the exercise program? Any improvement in strength, endurance, flexibility, agility? Please, if you felt improvements, explain each one.
Did the exercise program help you cope with the disease more optimistically? Yes/No. Why?
Did the exercise program help you in your daily-life activities? Yes/No. Why?
Did you feel fear or worry during treatment? Yes/No. Why?
Did you feel fear or worry during your participation in the exercise program? Yes/No. Why?
Do you think the exercise program could serve to better deal with those fears? Yes/No. Why? In what way?
Do you think the exercise program improved any chemotherapy side effect (fatigue, nausea, tingling or cramps in hands, etc.)? Yes/No. Why?
Did you feel able to do the activities of the exercise program?
How was your relationship with the instructor and the exercise mates?
What has meant to you training with people with the same disease?

Note: These questions were addressed to patients but were adapted to ask relatives and healthcare professionals for the same information.

experienced difficulties with technology. Patients showed a high attendance rate to the exercise sessions ($M = 94\%$, $SD = 0.04$).

The exercise program included progressive aerobic endurance, resistance, and balance exercises. Sessions consisted of a warm-up, the main part (combining resistance and endurance training) and a cool-down. An example of tasks and activities of the exercise program is shown in Table 2. The intensity of the main part of the sessions increased progressively across the six months of the exercise program. Borg's (1982) scale was used to instruct the participants about the intensity of the endurance exercise and to indicate their rate of perceived exertion.

In order to adapt the exercise program to each patient, MR was continuously in touch with their oncologist (member of the research group), who informed her about the patients' chemotherapy treatment and clinical situation. The intensity of exercises was also adapted according to the perceived fatigue reported by patients before each session (in a scale from 0, no fatigue, to 10, maximum fatigue). Patients used to receive chemotherapy every 2–3 weeks and used to be more fatigued just after chemotherapy treatment.

Several strategies were also developed to maintain the group aspect of the exercise program despite the change to an online version. The online sessions were in group and after doing the exercise they spoke in

group for 10 or 15 min. Moreover, MR and one of the oncologists did three online meetings with the patients to speak and solve doubts about CRC, exercise, and chemotherapy. Finally, MR and the oncologist did two in-person trekking excursions with the group of patients.

2.5. Data analysis

The interviews were transcribed by MR in the same language they had been conducted (Spanish). When the article was written (in English), the selected text fragments coming from the interview transcripts and MR's research diary, both written in Spanish, were translated into English and the entire article was revised by a professional translator.

Interview transcriptions and observational field notes of MR's research diary were analysed following a thematic analysis (Braun and Clarke, 2006; 2019; Clarke and Braun, 2017). Thematic analysis lets researchers identify, analyse, and interpret patterns of meaning ('themes') within qualitative data. We carried out this reflexive process from a relativist ontology and a constructionist epistemology (Sparkes and Smith, 2014), assuming that social reality is subjectively perceived and humanly constructed and that there is no theory-free or value-free generation of knowledge. The themes and subthemes were generated

Table 2
Example of tasks and activities of the exercise program.

Parts of the session	Example of tasks and activities
Warm-up	Joint mobility and light displacements.
Main part	<p><i>Resistance exercises:</i></p> <p>Bird-dog, crunches, push-ups, bicep curls and triceps extensions with dumbbells, dumbbell squats, dumbbell deadlifts, dumbbell lunges, etc.</p> <p>Exercises starting with long sets with light weight and increasing the load and intensity through speed, exercise complexity, and shorter rests. Depending on the patient's level, exercises were performed with more support (chair) or less, and were single-joint or multi-joint.</p> <p>At the advanced level, highly challenging exercises such as the "thruster" with two dumbbells were performed.</p> <p>To maximize session time, we alternated sets by muscle groups. For example, exercise 1 (arms), exercise 2 (legs), and so on.</p> <p>Sometimes, we interspersed resistance and aerobic exercises to achieve levels of vigorous physical activity and motivate the patients.</p> <p><i>Endurance exercises (to increase heart rate):</i></p> <ul style="list-style-type: none"> • Jumping jacks. • High knees. • Butt kicks. • Skater hops. • Mountain climbers. • Adapted burpees. • Squat jumps. • Side shuffles. • Punching or shadowboxing. • Running or marching in place. <p><i>Balance exercises:</i></p> <p>For example, doing stationary marching while moving arms and legs, and when the instructor says "1" patients have to stay on the right foot and when the instructor say "2" on the left foot. The difficulty can be increased by saying even or odd numbers, or doing simple additions and subtractions.</p>
Cool down	Mainly focused on muscle stretching, although during in-person sessions, games were played. For example, several balloons in the air and patients try to keep them from falling. This improves walking without looking at the ground. All exercises were adapted according to each patient's individual level and progression.

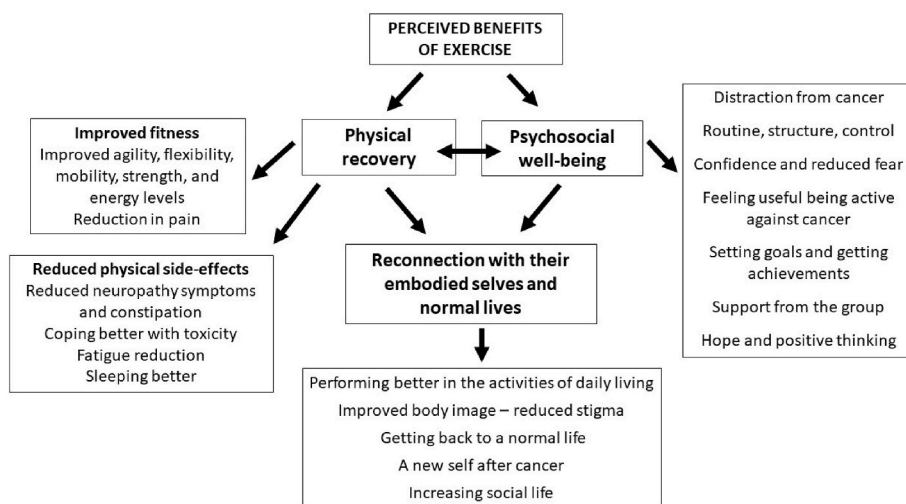


Fig. 1. Map of themes and subthemes generated in data analysis.

Table 3
Patients' characteristics.

ID	Sex	Age	Diagnosis	Stoma
1	Man	58	Colon	No
2	Woman	80	Colon	No
3	Man	69	Colon	No
4	Man	70	Colon	No
5	Woman	60	Colon	No
6	Man	76	Colon	No
7	Woman	56	Colon	No
8	Man	41	Colon	No
9	Man	77	Colon	No
10	Woman	73	Rectum	No
11	Man	56	Colon	No
12	Woman	59	Colon	No
13	Woman	71	Colon	Yes
14	Man	45	Colon	Yes
15	Man	75	Rectum	Yes
16	Woman	58	Colon	No

Note: ID = identification number.

inductively. However, a complete inductive thematic analysis is not possible from our perspective, because researchers, especially those with a long experience, always analyse data influenced by previous knowledge, even when addressing an inductive analysis not restricted by specific theoretical commitments. JT (first author of the article) led the analysis while the rest of co-authors played the role of ‘critical friends’ (Smith and McGannon, 2018) in two meetings focused on reviewing themes and the text fragments classified in each theme/subtheme. The critical friends helped JT to refine themes, enhance the quality of reflections, and improve the coherence and rigour of the data analysis. The final map of themes and subthemes, which determined the structure of results presented in the next section, is shown in Fig. 1. As an important part of data analysis, the critical friends also helped to improve the drafting of the initial article written by JT, until arriving at a final version.

3. Results

The main participants of this study were 16 CRC patients (nine men and seven women: $M_{age} = 64$, $SD = 11.58$). Patients' characteristics are shown in Table 3. The sample also included six relatives ($M_{age} = 55.00$, $SD = 15.09$) and five members of the oncology team at the hospital ($M_{age} = 40.40$, $SD = 9.66$; M_{years} of professional experience = 13.20, $SD = 9.03$). The relatives were five women (three patients' wives and two daughters) and one man (a patient's husband), while the healthcare

professionals were three oncologists (two women and one man) and two nurses (both were women).

Thematic analysis of the interviews revealed three themes with subthemes (Fig. 1), showing several perceived benefits of exercise related to the patients' physical recovery and psychosocial well-being, as these aspects are interconnected, and probably helping patients to reconnect with their embodied selves and normal lives.

3.1. Theme 1. Physical recovery

Theme 1 was divided into two subthemes: improved fitness and reduced physical side-effects of treatment.

3.1.1. Improved fitness

Participants unanimously reported perceiving benefits in the patients' fitness, such as improved agility, flexibility, mobility, strength, and energy levels.

It may seem just words, but my agility has really doubled, it's awesome. When I was doing the exercises, I felt like a different person, as if I was floating up, and I weigh 130 kg. You helped me, not only with physical agility but also with vitality, much more energy ... (Patient 8).

It helped me a great deal (exercise). I got down to 54 kg, and now I weigh 65. It's great, I feel stronger (Patient 11).

This improvement in fitness was also accompanied by a reduction in pain caused by previous injuries:

I had tendonitis in this arm and I say that it's healed with the weight lifting. I've also gained flexibility ... (Patient 3).

Now I feel stronger, and my back has not been hurting all this time [...] If I hadn't participated in this program, I would have had back pain, for sure (Patient 5).

3.1.2. Reduced physical side-effects

After exercise, many patients experienced relief in neuropathy symptoms: "... I started feeling very cold and ended up being warm inside, that very annoying sense of tingling disappeared for a while" (Patient 7). Another benefit attributed to the exercise program was improvements in bowel habits, especially in constipation.

It also helped me a lot at a digestive level. I had constipation with the medication, and I felt that the moment I moved to do the exercises was very positive. I felt it immediately (Patient 7).

The interviewed clinicians and relatives also believed that exercise

was helping to cope with toxicity:

... it seems that those participating in the program (exercise) have less toxicity after the treatment; I have this feeling ... (Oncologist 2).

... it's important for blood flow and sweating (exercise). Some people sweat more and some sweat less, but it's good for flushing chemicals out of the body (Relative 7).

Exercise was acknowledged by health professionals, patients and relatives to reduce fatigue. Some patients noted that fatigue increased during exercise, but after a while, it decreased. Some others mentioned that the reduction in fatigue was more evident after finishing the treatment.

... when I did it (exercise), I was more tired but after a while, I would feel better. I mean, when we were done, uff, I would sit down and drink a glass of water because I was exhausted. But then I recovered over the day and felt better (Patient 2).

In addition, patients reported recovering better from treatment in general, including sleeping better.

Exercise is helping me to recover much better. When I can't do any exercise, I have a bad time. Because I feel everything gets worse, I have poor digestion, I sleep worse ... (Patient 11).

3.2. Theme 2. Psychosocial well-being

Participants reported that this supervised activity helped patients to cope with the psychosocial consequences of cancer and its treatment in several ways. The exercise program started right after the diagnosis, becoming a distraction from thinking about cancer and its consequences from the beginning.

Feeling that nearness, the first day ... all of the sudden, they tell you that you have cancer [...] but they give you the option of counting on you to collaborate on a project [...] you don't have the time to think about the bad side of what you've been just told. [...] You think you are going to die and you will have to go through an awful process ... but suddenly, you (exercise instructor) entered the room and did all the exercise part, and we had no time to think about bad things. I believe that on that day, a very important bond was developed (Relative 3).

This distraction component was present throughout the program: "the exercise program has helped me to cope with the fears because it has often helped me to forget about it" (Patient 6). It also became a routine, providing structure and a sense of control, contributing to the distraction component: "I think it (exercise) was very important because my father had something to do so it helped him to inhibit the initial problem" (Relative 3).

Patients started to feel that their body could do the exercise sessions and the treatment, enhancing their confidence in the constant battle of thinking about whether "I am beating it or it is beating me" (Patient 6).

The positive side of exercise is that it gives you confidence, you can do it. I can do exercise, my body can take it, and I'm doing better and better [...] It gives you self-confidence because your body responds. Because if you let yourself go and you see that medication is kicking you big time and you see that the body does not respond [...] I imagine any patient would definitely sink. They wouldn't be able to handle it anymore. However, the supplement of exercise, keeping your body strong ... the endurance gives you great confidence to keep going (Patient 12).

This enhanced confidence also decreased the fear of recurrence: "I mean, while I was training with all of you, I felt like I was not going to have another cancer [...] because it gave me security" (Patient 5).

Most participants reported that one of the most important benefits of exercise was the sense of being useful, being capable of performing an activity without anyone's help:

... When we go through this (cancer), everybody loves you so much and wants to help you. They take all the tasks away from you. This (exercise) is the only thing I had to do by myself, and just by myself [...] Then this gives you strength; it also gives you the feeling of being useful (Patient 7).

The possibility of setting goals as well as the sense of achievement and outperforming was highlighted by patients:

Excelling myself, having an objective, a final goal [...] The personal achievement helped me a lot. It helped me feel much better about myself and surpassed my expectations (Patient 6).

The group-based exercise program brought some positive psychological outcomes related to the social relationships established between the patients and also with the instructor. On the one hand, it was like a support group: "The phrase is I felt loved, I'm telling you, I've felt really loved" (Patient 6).

Above all is the companionship. The fact of having peers going through the same thing or similar, and you can share your experiences. But the most important is having you (the instructor) because I can tell you anything that happens to me and you talk to the oncologist or the nurse (Patient 5).

It generates a mental distraction, not focusing only on the disease, that vicious circle that sick people sometimes get into. I think finding yourself in a group where the 'why me?' turns into a 'why me and all these people?' and going through it together somehow makes you share the experience and distracts you (Patient 12).

On the other hand, for some patients, seeing that others were in a worse condition (social comparison), and that they were still fighting to get through it, put things into perspective and motivated the patients to continue with the treatment: "seeing other people worse off than you and still giving their best, you carry on and realise that you need to keep on fighting" (Patient 6).

Patients and relatives reported that exercise helped them to face the disease and treatment with enhanced hope and positive thinking while avoiding depression:

It clears up your mind [...] Physically, you get more oxygen in your head, making you more rational. Positive thoughts come when you feel better (Patient 6).

Giving us hope about getting rid of this (cancer) and likely not having any more incidences. This positivity, well, we had it (Relative 6).

You feel your body is out of your control and somehow out of your hands. And you don't know if you are going to overcome many things [...] And whenever it's more difficult and you feel more negative, you can get more depressed. If you clear your mind, even if it's because of the exercise, it helps you to see things differently (Patient 6).

3.3. Theme 3. Reconnection with their embodied selves and normal lives

With the increase in fitness and reduction of the physical side-effects, patients gained physical confidence and performed activities of daily living (ADL) better:

... It helps in activities of daily living [...] You feel much lighter, about everything, your head, everything. You cheer up because you feel good ... it's like when somebody starts walking 20 minutes and because he feels fine, then, the next day, he walks 25 minutes; and your body keeps on asking for more and more (Patient 4).

While they were increasing their fitness, they were recovering muscle mass and improving their body image, which helped patients to reconnect with their embodied selves, while avoiding stigma through the positive connotations associated with a person who is doing exercise:

Feeling better physically day by day and improving your physical appearance [...] Physically, you gain weight and can wear your clothes. I feel like myself again... (Patient 11).

Going out, even their physical appearance improves. People doing exercise look better. When the neighbours see him, they do not see an oncology patient in chemotherapy ..., no, no. He is receiving chemo, but he puts on his exercise outfit and goes out every day (Oncologist 3).

In this reconnecting process, most patients valued greatly the fact that exercise was making them feel as if they were getting their life back, maintaining some degree of normality.

[...] having something that the more I do it, the better I am going to get in my situation. And getting back to where you were before ... it's a little bit like a parenthesis in my life. This (exercise) is aimed at getting you back to where you were before, physically and mentally (Patient 11).

I can't think of the word but it's as if I could continue with my normal life, maintain normality in my life, with good and bad times (Patient 12).

However, others acknowledged that although they would not be the same person anymore, exercise could play a role in this new self.

I remember the words of the doctor who operated on me the first time; before the surgery, she told me, 'I am going to tell you that you are not going to be the same person you were before'. Those words ..., I recall her very often because she was so right. Who I was before and who I am now ... but well, little by little, I feel stronger (Patient 10).

I did it (exercise) exclusively for cancer, exclusively. And now I see that, in general, it has given me much more. Elasticity, agility, strength, and overall psychologically. Because it's as though I were a completely different person now (Patient 8).

In any case, in this reconnection process, exercise was useful for increasing patients' social life, beyond the interactions in the exercise program.

Thanks to the exercise, I've started to go out more, much more. Socially, it has opened many doors, and people say 'My goodness, you look good, having gone through cancer but you look awesome!'. And things like that, you know [...] You can't stay at home and be blindfolded saying, 'I don't want to know anything about the world' because ... There are only two ways, either you go up or you go down. Well, I chose to go up (Patient 8).

4. Discussion

The purpose of this study was to analyse in depth the benefits of an exercise program for the QOL of CRC patients undergoing chemotherapy treatment. The patients struggled through a process that involved a tremendous initial shock after the diagnosis and a long period of physical and psychosocial challenges over the rehabilitation process. The results of the present study show that CRC patients perceived exercise as a coping strategy with several benefits related to their physical and psychosocial QOL.

CRC treatment has a considerable physical impact, affecting activities of daily living (Toftagen, 2010). In this regard, the results of the present study highlight that patients participating in the study perceived several fitness improvements, such as in agility, flexibility, endurance, mobility and strength. A meta-analysis reported improved aerobic fitness and upper body strength following aerobic and resistance training interventions in CRC patients (Singh et al., 2020).

In parallel, participants reported several perceived physical benefits related to common side effects of CRC treatment, such as a reduction in peripheral neuropathy, constipation, perceived toxicity, and fatigue, as well as improved sleep quality. Quantitative studies have shown that exercise palliates side effects such as fatigue or insomnia (Singh et al., 2020).

However, adaptation to a health threat like cancer cannot be fully

explained by physical sequelae alone (Bullen et al., 2012). All CRC patients experience some level of psychological distress during their illness, with a potential significant compromise of QOL (Han et al., 2020). Such distress is accompanied by a change in social life, facing stigma and isolation (Phelan et al., 2013; Stuhlfauth et al., 2018). The results of the present study show how exercise could potentially help patients to cope with this socio-emotional breakdown in several ways, contributing to their psychosocial well-being.

Psychological distress experienced by cancer patients may include fear, worries, negative thoughts, anxiety or depression, as they must face the possibility of death, recurrence, and the severity of the treatment's side-effects (Aminisani et al., 2017). In this regard, the exercise program was used as a distraction, from the beginning of treatment, with patients reporting how it helped them to forget about their illness and possible consequences, at least momentarily. Subsequently, the program became a routine, and this likely provided participants with structure and a sense of control. These results are consistent with those reported by Midtgaard et al. (2015) in a synthesis of qualitative studies analysing the benefits of exercise programs for patients with other types of cancer. The authors concluded that exercise was used to take patients' mind off the diagnosis, avoiding thoughts of worst-case scenarios, as well as to have something to look forward to, providing a sense of control over their life and cancer (Bulmer et al., 2012; Midtgaard et al., 2007).

Psychological distress could have also been reduced when they felt their body could do the exercise sessions and tolerate the physical side effects, which patients reported that increased their confidence in overcoming cancer and reduced the fear of recurrence (Bulmer et al., 2012; Midtgaard et al., 2012). It was also important for participants to feel useful, to have a sense of achievement and see that they could excel by setting reachable goals, pushing their limits further. As a consequence, they likely experienced a sense of autonomy, empowerment, and self-confidence, consistent with previous qualitative studies of cancer patients (Adamsen et al., 2017; Bulmer et al., 2012; McGrath et al., 2011; Midtgaard et al., 2015). In addition, many patients might feel guilty about a cancer diagnosis because they blame themselves for past behaviours they think may have caused cancer, or because of the burden this process is putting on their family's shoulders (Phelan et al., 2013). Exercise allowed patients to do something to recover by themselves, turning them into active agents of their recovery (Bulmer et al., 2012), thus possibly reducing guilty feelings.

The social component of exercise was probably also a relevant factor contributing to the patients' psychosocial well-being. It seems that the program became a support group where patients felt as if they were somehow sharing the burden of cancer, finding empathy and affection in their peers as well as companionship in the instructor. In addition, some patients reported that seeing others in a worse condition and with the strength to fight and keep going made them relativise their cancer and motivated them. However, we note that social comparison can be a double-edged sword, as one may see people in better condition than oneself or see people in a worse condition, making one realise the potential underlying threat. The importance of group-based exercise as a support group (Luoma et al., 2014; McGrath et al., 2011; Paltiel et al., 2009) has been highlighted in previous qualitative studies with other cancer types, but the effect of social comparison in these groups deserves further research.

All the psychosocial benefits most likely contributed to generate positive thinking and hope, reducing psychological distress. It should be noted that psychological distress, such as depression, not only reduces QOL but also significantly increases mortality rates and worsens clinical outcomes, possibly because emotional health positively affects the immune response. Further, emotion regulation has been identified as a potential regulator of NK cells in CRC patients (Brioso et al., 2020).

The link between physical and psychosocial health seems evident. All the physical and psychosocial benefits could have played a role in reconnecting patients with their embodied selves and identity. In this sense, cancer diagnosis and treatment can lead to an identity crisis

because patients' self-concept is threatened by the traumatic experience of a severe illness, which affects their body image as well as their daily activities and role in society (Erikson, 1968; Mathieson and Stam, 1995).

How cancer patients view their bodies while experiencing unwanted changes may impact the psychological well-being of cancer survivors (Benedict et al., 2016). For example, body image disturbances have been associated with higher levels of post-treatment depression and anxiety in CRC survivors (Sharpe et al., 2011). Exercise seemed to have a positive effect by helping patients to recover weight and muscle mass, allowing them to wear the clothes they used to wear before having cancer, evoking a feeling of 'being myself again'. However, it should be noted that in the present study, three patients had a stoma, which may cause a poorer psychosocial adjustment because of how patients view their bodies and how this affects their identity (Bullen et al., 2012). Further research should be conducted to examine the different ways in which people with and without stoma may benefit from exercise regarding their self-concept and identity, but this was beyond the scope of the present study.

Patients also reported that exercise helped them to reinforce their confidence about re-engaging in pre-cancer activities (Bulmer et al., 2012), and 'getting back to where I was before', physically and mentally. One patient even mentioned that cancer only represented a parenthesis in his life. Thus, this could be interpreted as if patients were trying to reconnect to themselves and get their lives back, looking for a sense of safety and control (Midtgaard et al., 2015). In parallel, patients remarked how their social life was rebuilt beyond the exercise group's interactions at a time when their sense of self was compromised, with a high risk of social isolation (Hubbard et al., 2010).

However, some patients realised they might not be the same person anymore. Being a cancer patient (Zebrack, 2000) and belonging to a cancer patients' exercise program may initially be part of this new identity. Comparing themselves to the rest of the participants in the program could also contribute to this. In any case, exercise could have been used for relieving stigma, avoiding the role as a patient through participating in an activity synonymous with health, and perhaps trying to transition from being a cancer patient to being a cancer survivor (Cheung and Delfabbro, 2016; Zebrack, 2000) or even a healthy individual again (Luoma et al., 2014; Midtgaard et al., 2007). In this sense, being an active person or a fit person could become part of their new self (Bulmer et al., 2012).

The dichotomy between holding on to their past self and embracing a new identity could be interpreted from Bury's conceptualisation of biographical disruption (Bury, 1982). Hubbard and Forbat (2012) illustrated how this concept might be useful for explaining the way cancer patients formulate their biographical trajectory from the past (known) to the future (anticipated), as disrupted by cancer, which destabilises their anticipated life course and identity. The results of our study fit this model, as there seem to be some patients who experienced cancer as a biographical continuity and normality (cancer as a parenthesis in their lives) where exercise was a tool for keeping or recovering that normality. However, others acknowledged that they might experience cancer but would not return to where they were before the diagnosis (I am not the same person anymore), with exercise contributing to this new identity.

The results of the present study could also be interpreted from the perspective of the transactional model of stress and coping developed by Lazarus and Folkman (1984). These authors proposed that everyone assesses a situation differently, and hence, also the stress and threat arising from it. According to this theory, there are two categories of stressors: challenging and threatening. Challenging stressors are caused by a specific situation perceived as manageable with the available resources. On the other hand, threatening stressors are perceived as potentially harmful or involving loss, for which one does not have the necessary coping resources and, thus, uncontrollable. In this sense, it seems that the physical and psychosocial benefits of the exercise program helped participants to consider their situation as less threatening

because of a reduction in fears and worries and an increased sense of empowerment, self-confidence and control, leading to hope and positive thinking about the outcome of cancer and its treatment. Therefore, the exercise program could be considered an active stress coping style in this case, where patients use behavioural or emotional strategies to deal effectively with their cancer (Parelkar et al., 2013). Thus, it probably represents a more adequate psychosocial adaptation, where patients can be more capable of accepting their illness and tending to deal with it in an active, constructive, task-related manner (Heim et al., 1997).

There are some limitations to the study. The sample size, the nature of the study, and the fact that it was conducted in a single centre do not allow us to generalise the results. In addition, although patients had relatively homogeneous characteristics, three of them had a stoma. Future research should analyse the possible different experiences with exercise programs between CRC patients with and without stoma. Nevertheless, some strong points of the study should also be highlighted. On the one hand, we carried out an exercise program of three sessions per week during the patients' chemotherapy treatment and the Covid-19 pandemic, and six of the patients were older than 70 years. The involvement of patients with this profile during this challenging phase of their lives was an achievement from our perspective. Moreover, we collected qualitative data with different techniques (interviews, observation) and participants (patients, relatives, and healthcare professionals) to enhance the trustworthiness of this study.

5. Conclusion

The group-based exercise program contributed to the QOL of CRC patients during the chemotherapy treatment, providing remarkable physical and psychosocial perceived benefits, and helping patients to reconnect with their identity. This identity could be associated with their past life and self or with a new one. The findings of this qualitative study add to the existing knowledge about the meaningfulness of exercise in CRC survivorship care, facilitating research translation into practice and reinforcing the idea of exercise as an important component of a holistic recovery process in this population.

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Clinical trial registration

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CRediT authorship contribution statement

Juan Tortosa-Martínez: Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft. **Vicente J. Beltrán-Carrillo:** Conceptualization, Formal analysis, Methodology, Writing – review & editing. **María Romero-Elías:** Conceptualization, Investigation, Formal analysis, Resources, Writing – original draft. **Ana Ruiz-Casado:** Resources, Supervision, Writing – review & editing. **Alejandro Jiménez-Loaisa:** Visualization, Writing – review & editing. **David González-Cutre:** Project administration, Funding acquisition, Conceptualization, Formal analysis, Writing – review & editing.

Declaration of competing interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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