

# Health-Promoting Lifestyle in Colorectal Cancer Survivors: A Qualitative Study on the Experiences and Perspectives of Colorectal Cancer Survivors and Healthcare Providers

Elahe Ramezanzade Tabriz<sup>1</sup>, Monir Ramezani<sup>2</sup>, Abbas Heydari<sup>2</sup>, Seyed Amir Aledavood<sup>3</sup>

<sup>1</sup>Department of Medical Surgical Nursing, School of Nursing and Midwifery, Mashhad University of Medical Sciences,

<sup>2</sup>Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, <sup>3</sup>Cancer Research Center, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

**Corresponding author:** Monir Ramezani, PhD. Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.  
E-mail: ramezanimn@mums.ac.ir

Received: April 22, 2021; Accepted: July 28, 2021; Published: October 04, 2021

## ABSTRACT

**Objective:** Understanding the experiences of survivors and healthcare providers about health-promoting lifestyle (HPL) in colorectal cancer (CRC) survivors is important in planning for coping with the disease, managing treatment side effects, increasing survival, and improving quality of life (QOL). This study was conducted to explore the experiences and perspectives of CRC survivors and healthcare providers about HPL in CRC survivors. **Methods:** This descriptive qualitative study was performed in 2020 at Omid and Imam Reza Hospitals in Mashhad, Iran. Participants were CRC survivors ( $n = 12$ ) and healthcare providers ( $n = 33$ ) who were selected by purposive sampling. Data were collected using in-depth semi-structured interview by face to face and then analyzed by Zhang and Wildemuth content analysis method. MaxQDA software was used to organize the data. **Results:** Following the treatment of cancer, CRC survivors seek to make changes in lifestyle and they choose a HPL that maintains or improves their health. HPL in CRC survivors includes

nutrition, activity and rest, health responsibility, interpersonal relations, spiritual growth, and psychological management. The results showed that HPL can lead to motivation, the ability to self-care and improve daily performance, reduce treatment complications, and increase the QOL. **Conclusions:** CRC survivors can help change their lifestyle patterns with healthy eating, treatment adherence, regular physical activity, and good sleep habits. Furthermore, effective personal and social relationships, spiritual growth, and management of psychological disorders develop health-promoting behaviors in them. CRC survivors also face challenges and limitations in their life after treatment; identifying the components of a HPL in CRC survivors can lead to desirable care, treatment, education, and counseling services.

**Key words:** Colorectal cancer, health-promoting lifestyle, qualitative study, survivors

## Introduction

Colorectal cancer (CRC) was the third most common cancer with 1.9 million new cases and the second leading

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

**Cite this article as:** Tabriz ER, Ramezani M, Heydari A, Aledavood SA. Health-Promoting Lifestyle in Colorectal Cancer Survivors: A Qualitative Study on the Experiences and Perspectives of Colorectal Cancer Survivors and Healthcare Providers. *Asia Pac J Oncol Nurs* 2021;8:696-710.

Access this article online

Quick Response Code:



Website: [www.apjon.org](http://www.apjon.org)

DOI:  
10.4103/apjon.apjon-2132

cause of death among cancers in 2020.<sup>[1]</sup> Although CRC has a high mortality rate, the 5-year survival rate in stage 1 is 92% and in stages 2 and 3 is about 65%–90% in survivors, and it is classified as cancer with long-term survival.<sup>[2]</sup>

CRC survivors are defined as a person diagnosed with cancer “from the time of diagnosis and for the balance of life.” The experience of meeting cancer is a break in people’s lives: changing perspectives, sense of time, relationships, values, and priorities.<sup>[3,4]</sup> There are currently about 3.5 million CRC survivors in the world,<sup>[5]</sup> and it is estimated that, by 2030, there will be 1.9 million CRC survivors living in the United States alone.<sup>[6]</sup>

In recent years, the rise in the number of long-term survivors has increased the global burden of the disease. The total annual economic cost of cancer was estimated as 1.16 trillion dollars in 2010.<sup>[7]</sup> In addition to the economic burden, the burden of physical and psychological problems is even greater in cancer survivors with long survival rates, such as CRC survivors. CRC survivors have special healthcare challenges and needs. When the side effects of the initial treatment of cancer subside, the consequences of cancer and its treatment persist perhaps for years after the treatment, such as fatigue, negative body image, depression and psychological distress, and social and physical limitations.<sup>[8,9]</sup> In addition, the risk of recurrence and secondary malignancies, cardiopulmonary diseases, diabetes, bone problems, and sensorineural dysfunction is reported to be higher in CRC survivors than in survivors of other cancers.<sup>[3,10]</sup> This increase in CRC burden can have long-term negative effects on general health, disease prognosis, and quality of life (QOL) after the end of treatment.<sup>[9]</sup> Furthermore, about one-third of disabilities and deaths associated with CRC are due to unhealthy lifestyle of the patients and survivors, including high body mass index (BMI), low consumption of fruits and vegetables, lack of regular physical activity, smoking, and alcohol consumption.<sup>[11]</sup>

Lifestyle is a combination of behavioral patterns and personal habits that develop upon individuals’ socialization process. Lifestyle has various dimensions, including physical and psychological dimensions. The physical dimension includes nutrition, physical activity, sleep, and weight management; the psychological dimension includes social relations, stress management, the feeling of independence, and the ability to adapt.<sup>[12]</sup> In lifestyle behavioral patterns, health-promoting behaviors can enhance the individual’s level of well-being, empowerment, and self-excellence. As life expectancy increases, the importance of health-promoting behaviors that help maintain individuals’ functioning and independence and increase their QOL becomes increasingly apparent.<sup>[13,14]</sup> Walker *et al.* used the Pender’s Health Promotion Model (HPM) to explain the concept of

a health-promoting lifestyle (HPL). They stated that HPL is a multidimensional pattern of perceptions, emotions, and behaviors which are started by self-motivation and help in the persistence and promotion of their health and self-improvement. By choosing this lifestyle, persons act to maintain or increase the level of well-being, self-actualization, and self-satisfaction.<sup>[15,16]</sup>

The results of the studies suggest that some components of a healthy lifestyle after the diagnosis of CRC include having a normal BMI, regular physical activity, limited consumption of alcohol and smoking.

Dietary behaviors recommendations are also mentioned, such as limited consumption of red meat, processed meats, and refined carbohydrates, daily consumption of fruits and vegetables, and restriction of refined sugars and processed foods. This lifestyle improves clinical symptoms, prevents relapses, increases long-term survival, and improves the health-related QOL (HRQoL).<sup>[17-22]</sup> Despite the known benefits of maintaining a healthy lifestyle, the majority of CRC survivors are physically inactive and overweight<sup>[23]</sup> and only 23% adhere to healthy lifestyle recommendations.<sup>[24]</sup>

Although getting diagnosed with cancer may encourage the individual to live a healthier life, having meticulous knowledge of the parameters of a healthy lifestyle and maintaining them after recovery become challenging over time. Since some of the late effects of the disease appear several years after treatment, cancer survivors may not be adequately motivated to choose a healthy lifestyle or may have difficulty implementing such lifestyle, which exacerbates their potential health problems.<sup>[23]</sup>

An accurate understanding of a HPL in CRC survivors requires understanding the experiences of CRC survivors and healthcare providers about the lifestyle of these patients. The review of the literature showed inadequate research on the application of people’s experiences about how to choose and adopt a healthy lifestyle in CRC survivors. Therefore, to better understand CRC survivors’ lifestyles, it is important to design and conduct a qualitative study. Qualitative studies lead to the emergence of in-depth information that help clarify the various dimensions of human phenomena.<sup>[25]</sup> Qualitative research on these survivors’ lifestyle can help shed light on their experiences. These perceptions and experiences can then be utilized for planning care, training, counseling, and support services. Therefore, this qualitative study was conducted to explore the experiences and perspectives of CRC survivors and healthcare providers about HPL in CRC survivors.

## Methods

The present study is a descriptive qualitative design. Qualitative description (QD) is useful to describe qualitative

studies of healthcare and nursing-related phenomena. This type of study is appropriate for gaining or discovering the events, experiences, and insights of patients about a specific topic. Data from QD can be used to develop and refine questionnaires or clinical interventions.<sup>[25,26]</sup> QD was used in this study to explore participants' perspectives and experiences of HPL in CRC survivors.

This study was performed in 2020 at Omid and Imam Reza (PBUH) Hospitals and a teaching medical center affiliated to Mashhad University of Medical Sciences in Mashhad, Iran. Participants were selected through purposive sampling with maximum diversity in their educational level, socioeconomic status, as well as survivor's age and clinical status.<sup>[27]</sup>

The participants consisted of a CRC survivor and healthcare providers. To explore perspectives and receive experiences about HPL, first, CRC survivors were interviewed. Since some experiences and perspectives of the survivors were needed for more clarification based on the practice and experiences by healthcare providers, they were asked to share their experiences. Hence, healthcare providers who have deep experience in long-term caring and providing counseling and treatment services for these patients were interviewed. The inclusion criteria for the survivors group were: age 18–70 years, history of at least 3 years of CRC, stage 1–3 primary CRC, no history of underlying diseases such as cardiovascular diseases, hypertension, diabetes, and previous cancer, having received at least two stages of the treatment (surgery, chemotherapy, and radiotherapy), and having no intestinal ostomy. The inclusion criteria for the healthcare providers group were: having at least 5 years of experience working with CRC patients and having at least a relevant degree in a specialized field.

CRC patients who were able to express their experiences were identified by oncologists. Their medical records were reviewed and they were selected if they had the inclusion criteria. In the healthcare provider group, the key informants were introduced by nurses and oncologists, and if they had the inclusion criteria, they entered the study. After selecting the participants, arrangements were made with them over a phone call and they were also briefed on the study objectives. If they wished to cooperate, the time and place of the interview were determined as per their wishes. The interview questions were based on the dimensions of Pender's HPM including health responsibility, physical activity, nutrition, spiritual growth, stress management, and interpersonal relations,<sup>[14]</sup> and the main questions were "After diagnosis with this disease, what measures did you adopt about your lifestyle to improve your health?" and "In your experience, what activities or aspects of life can improve the health of a person with CRC?" [Table 1].

**Table 1: Topic guide for interviews**

In general, how cancer has changed your life?
After diagnosis with this disease, what measures did you adopt about your lifestyle to improve your health?
In your experience, what activities or aspects of life can improve the health of a person with CRC?"
Do you think there is something in your past behaviors, after the diagnosis of cancer, that you need to change to stay healthy? Explain if you have experience
Do you need follow-up and self-care to stay healthy? Tell me if you have experience
In your experience, can changes in daily food intake posttreatment help your health?
In your experience, how much or what kind of exercise can you do during posttreatment?
Have you ever taken herbal supplements? Tell me if you have experience.
In your experience, do complementary and alternative medicine such as homeopathy, Chinese medicine, herbs, yoga, prayer therapy, and massage therapy affect your health? Tell me if you have experience
Do you have experience in managing and gaining weight during posttreatment and its impact on your health?
In your experience, can supporting family, friends, and healthcare providers during posttreatment affect your health?
In your experience, can return to work and social activity affect your health?
Do you have experience anxiety and stress and fear of recurrence that can affect your life?
In your experience, can having spiritual and doctrinal tendencies affect your health and life?
Do you have anything else to add, any comments or any questions?
CRC: Colorectal cancer

Data were collected using in-depth and semi-structured interviews with 45 participants, including 12 CRC survivors and 33 healthcare providers. The average time of the interviews was 31 min in the healthcare provider group and 42 min in the CRC survivor group, and each participant was interviewed once. Data collection and analysis continued until data saturation was attained. It was obtained when no emergence of new subcategories, codes, or data repeat which expressed in previous interviews.<sup>[28]</sup>

The directed content analysis method of Zhang and Wildemuth<sup>[29]</sup> was used for data analysis. This method includes data preparation, defining the analysis unit, developing the categories and the coding scheme, coding a sample text, coding the whole text, checking the coding continuity, drawing conclusions from the coded data, and reporting the methodology and the findings.<sup>[29]</sup> The data were organized using the dimensions and health-promoting behaviors of Pender's HPM. Data analysis was performed from the beginning of the first interview and in parallel with the interviewing process. After coding the interviews and removing the duplicate codes, similar codes were classified and subcategories and categories were formed [Table 2]. MaxQDA software (version 2010, VERBI Software GmbH, Germany) was used to manage the data.

Lincoln and Guba's criteria including credibility, dependability, confirmability, and transferability were used

Table 2: An example of coding and classification the analysis units

Meaning unit	Codes	Subcategory	Category
I recommend regular exercise to my patients, preferably every day or three times a week, or even just walking or riding a bike, or even group exercise (oncologist 5, male, 45 years)	Regular exercise every day or three times a week Walking Riding a bike Group exercises	Physical activity	Activity and rest
I eat dairy products and 1-2 fruits every day; I eat red meat 2-3 times a week and eat beans 3-4 times a week. I generally eat more liquid foods to improve my constipation (patient 4, male, 61 years)	Daily consumption of dairy products Daily consumption of 1-2 fruits Eating red meat 2-3 times a week Eating beans 3-4 times a week Eating liquid foods Relieve constipation	Considerations related to the macronutrients group     Dietary habits and patterns	Nutrition
Family support is important; patients in the active phase of the disease come for follow-up themselves, but those who have recovered visit less often. The family can help encourage the patient to come for check-ups (psychiatrist 1, female, 44 years)	Family support during recovery Family support and reminding for treatment follow-up	Family and friends' support	Interpersonal relations

to ensure the trustworthiness and rigor of the data.<sup>[30]</sup> Data credibility was obtained through prolonged engagement with the participants and the data. The interviewer is a member of the healthcare providers, so she/he has been in contact with the participants for a long time. To build a sense of trust, close and intimate interaction was established with the participants. It was also a member check done so that the researcher's perception and coding of each interview were shared with 10 participants, and they were asked to express their analysis of the researcher's perception and approved by them. Dependability was achieved by an external reviewer doing peer review so that the texts of some interviews, along with codes and categories, were reviewed and confirmed by two experts in qualitative research and cancer care who were not on the research team. Confirmability was achieved through the audit trail. In addition, transferability was provided via a full description of the context, sampling, data collection, and analysis.

### Ethical approval

After receiving the code of ethics (Approval No. IR.MUMS.REC.1398.148) from Mashhad University of Medical Sciences, the necessary arrangements were made with the Education and Research Deputy of Omid and Imam Reza (PBUH) Hospitals and a teaching medical center affiliated to Mashhad University of Medical Sciences to visit and conduct interviews with the eligible CRC survivors and healthcare providers. At the beginning of each interview, the researcher introduced herself/himself and explained the research objectives and ethical considerations to each participant. The participants were adequately ensured of the confidentiality of the interviews and were asked to give their permission to audio record the interviews, were ensured that the audio files would be deleted after being transcribed on paper, and were also reassured that the analysis of the data would be conducted anonymously through codes. Written informed consent was

obtained from each participant. They were also assured that they could withdraw from the study at any stage of the research if they wished.

## Results

This study had 45 participants, including 12 CRC survivors and 33 healthcare providers with an average age of  $50.34 \pm 4.96$  years. In the survivor group, people had different levels of education, and in the healthcare provider group, people had at least a bachelor's degree related to their specialty [Table 3].

Based on the analysis of the data, 18 subcategories and six categories were extracted. The six categories included nutrition, activity and rest, health responsibility, interpersonal relations, spiritual growth, and psychological management [Table 4]. In the following section, the findings related to the categories and subcategories are explained based on the interviews with the participants.

1. Nutrition: Nutrition refers to considering the process of preparing and consuming nutrients and examining how food affects the body and the body's reaction to food consumption.<sup>[31]</sup> According to the participants' experience, this category includes subcategories of "dietary habits and patterns," "considerations related to the macronutrients group," and "considerations related to the micronutrients group"
  - Dietary habits and patterns: In participants' experience, education on how and when to eat food, how to properly wash and cook food, increasing the frequency of meals, and reducing the volume of each meal can help decrease the disease complications and improve the patient's physical condition. "I always make sure not to overeat. I have reduced the volume of each of my meals and increased the frequency of meals during the day. For example, between breakfast and lunch, or lunch and dinner, I eat a fruit or a small sandwich" (Patient 4, male, 61 years)

Table 3: The demographic characteristics of the participants

CRC survivors group (n=12)		Healthcare providers group (n=33)	
Variables	Frequency	Variables	Frequency
Age		Age	
Age range (years)	26-70	Age range (years)	34-65
Mean±SD	53.91±9.10	Mean±SD	46.78±8.02
Gender, n (%)		Gender, n (%)	
Female	6 (50.0)	Female	20 (60.6)
Male	6 (50.0)	Male	13 (39.4)
Education, n (%)		Education, n (%)	
Illiterate	3 (25.0)	Bachelor's degree	12 (36.4)
Secondary school	1 (8.3)	Master's degree	4 (12.1)
High school diploma	3 (25.0)	PhD	5 (15.2)
Associate degree	1 (8.4)	Clinical specialty	10 (30.3)
Bachelor's degree	2 (16.7)	Specialist flush hip	2 (6.1)
Master's degree	2 (16.7)	Work experience	
Duration of cancer		Range (year)	
Range (month)	36-78	Range (year)	7-30
Mean±SD	49.6±5.2	Mean±SD	16.60±7.40
Treatment method, n (%)		Expertise, n (%)	
Surgery	2 (16.7)	Oncologist	8 (24.2)
Surgery and chemotherapy	5 (41.7)	Nurse	11 (33.3)
Surgery and radiotherapy	2 (16.7)	Nutritionist	3 (9.1)
Surgery and chemotherapy and radiotherapy	3 (25.0)	Social worker	3 (9.1)
Disease stage, n (%)		Psychiatrist	3 (9.1)
Stage I	3 (25.0)	Oncology surgeon	2 (6.1)
Stage II	6 (50.0)	Traditional medicine specialist	1 (3.0)
Stage III	3 (25.0)	Clergy	1 (3.0)
Occupation, n (%)		Sports medicine	1 (3.0)
Homemaker	3 (25.0)	Occupation, n (%)	
Self-employed	2 (16.7)	Faculty member	13 (39.4)
Laborer	2 (16.7)	Clinical staff	20 (60.6)
State employee	2 (16.7)		
Retired state employee	3 (25.0)		

CRC: Colorectal cancer; SD: Standard deviation

- Considerations related to the macronutrient group: The participants stated that the greater consumption of fruits and vegetables, cereals, and dairy products improves gastrointestinal function and the general health of the patients. Limited consumption of red meat, processed meat, sugar, and saturated fats prevents the relapse and complications of cardiovascular diseases and diabetes. *“A diet with less red meat prevents colorectal cancer relapse. Eating fish and a diet rich in fiber and vegetables and fruits reduces the risk of cancer relapse and helps better maintain one's health”* (Nutritionist 2, male, 50 years)
  - Considerations related to the micronutrient group: Micronutrients, which include vitamins and minerals, should be consumed under the supervision of the physician and after examining the body's deficiency by biochemical tests. *“When we prescribe too many mineral supplements, this causes the growth of carcinogenic cells in addition to the normal cells. The levels in the tests should be checked, and we should prescribe them if there is a deficiency”* (Nutritionist 2, male, 50 years)
  - Considerations related to the beverages group: Consumption of fluids, especially water, was mentioned in the experiences of the survivors. *“I tried to drink a lot of water, my constipation got better and the doctor told me that the side effects of your medication would be less. I also flavor the water most of the time, for example, I pour lemon juice, fresh lemon, or a few drops of rose water, or a few crushed pieces of fruit”* (Patient 9, female, 51 years)
2. Activity and rest: During data analysis, activity and rest represent activities that the patient performs in everyday life, including “sleep hygiene,” “avoiding prolonged inactivity,” and “physical activity”

Table 4. The Categories and Subcategories of Health-promoting lifestyle in CRC Survivors

Theme	Categories	Subcategories	Sub-subcategories	
Health-promoting lifestyle	Nutrition	Dietary habits and patterns	Considerations related to food preparation and processing Considerations related to eating habits	
		Considerations related to the macronutrients group	Legumes, cereals, and fiber group Fruits and vegetables group Milk and dairy group Meat and substitutes group Sugar, fat, and miscellaneous foods group	
		Considerations related to the beverages group		
		Considerations related to the micronutrients group	Minerals group Vitamins group	
		Activity and rest	Physical activity	Physical activity level Type of sports activity Considerations related to optimal physical activity
			Avoiding prolonged inactivity	
			Sleep hygiene	Regular sleep schedule Sleep quality
		Health responsibility	Self-management	Receiving training and information effectively Proper use of complementary and alternative medicine Weight management Quitting or reducing smoking and alcohol consumption
			Treatment adherence	Regular treatment follow-ups Considerations related to taking certain medications
			Controlling disease and treatment complications	Considerations related to resolving digestive problems Considerations related to resolving sexual dysfunction
	Interpersonal relations	Support in returning to work and workplace	Avoiding isolation and returning to work Receiving group support in the workplace	
		Family and friends' support Healthcare providers' support		
	Psychological management	Engaging in recreational activities and entertainment		
		Psychological strategies for improving adaptation to the disease Provision of psychological services by the healthcare providers		
Spiritual growth	Strengthening spiritual beliefs			
	Applying spiritual therapy strategies	Applying counseling-based spiritual therapy strategies Applying study-based spiritual therapy strategies Applying group spiritual therapy strategies Applying spiritual therapy strategies based on superhero therapy		

- Sleep hygiene: Participants' experiences showed that having a regular sleep schedule and maintaining sleep quality by following recommendations on regular exercise, not eating heavy foods, and not using electronic devices such as cell phones or watching television before going to bed are effective in maintaining sleep hygiene. *"A large part of sleep should be before midnight and with a 2-h interval from dinner; also, heavy foods should not be eaten for dinner"* (Traditional medicine specialist 1, male, 55 years)
  - Avoiding prolonged inactivity: Training and encouraging to start daily activities and getting enough exercise during the day can help prevent many of the problems and complications of the disease. *"I used to sit a lot at work because I was a driver, but now, after an hour of driving, I try to get out of the car, walk, or park the car farther away and walk the rest of it"* (Patient 3, male, 47 years)
  - Physical activity: Having regular physical activity in accordance with one's physical condition and doing light- to moderate-intensity activity were emphasized by the participants in giving recommendations to the survivors. *"I tell them, 'Walk gently until before you get tired or short of breath; [...] You should perform [physical] activity for 30 min, three times a week"* (Nurse 5, female, 36 years)
3. Health responsibility: In participants' experience, health responsibility is the ability to accept, undertake, and follow up actions that improve the health status of the patients. This item is achieved by "self-management," "treatment adherence," and "controlling disease and treatment complications"

- Self-management: This subcategory included quitting or reducing smoking and alcohol consumption, weight management, and proper use of traditional and complementary medicine.

The participants emphasized quitting or reducing smoking and alcohol consumption through effective training, gradual withdrawal with the subject's own willingness under the supervision of trained specialists and psychiatrists, and receiving family support to facilitate the quitting process. *"The patient cannot suddenly cut out smoking and alcohol. Quitting these requires a strong will, needs the support of others and certainly the family"* (Oncologist 3, female, 42 years)

The participants noted that weight management in survivors should be carried out under the expert advice of a nutritionist or trained person. Emphasis should be placed on consuming proper food and using principled methods to lose or gain weight in patient training and care programs. *"I lost a lot of weight during the treatment and my oncologist referred me to a nutritionist, a regular diet, and information on what foods to eat more, I almost gained weight. After finishing my treatment, I was changed my diet plan with a nutritionist. I also go for counseling according to the schedule"* (Patient 1, male, 36 years)

In addition, since traditional and complementary medicine are sought after by most patients during the treatment phase and afterward for achieving faster and more effective recovery, the participants argued that these types of medicine should be utilized under the supervision of a traditional and complementary medicine specialist and after consultation with the patient's physician and only on the side of the main treatment. *"After my chemotherapy treatment was over, my legs were still tingling and numb. I started massage therapy and acupuncture in consultation with my oncologist"* (Patient 10, female, 53 years)

*"For nausea and vomiting after chemotherapy, I went to the specialist of traditional medicine, I showed the medication he gave me to my oncologist and she approved it, I do not accept traditional medicine that has no academic education [...]"* (Patient 8, female, 48 years)

- Treatment adherence: Treatment adherence is achieved by the patients' regular follow-up of their treatment. Survivors should have regular treatment follow-ups based on the treatment protocols at specific intervals after the completion of their treatment and under the supervision of their physician. *"In the case of colorectal cancer, those recurrences that are curable and allow for surgery are important for us, which is why we recommend a regular follow-up program. We emphasize the importance of serial check-ups according to the instructions and explain how crucial they are"* (Oncologist 7, female, 53 years)

- Controlling disease and treatment complications: Gastrointestinal problems, urinary problems, and neurological dysfunction are observed in CRC survivors due to treatment complications and require timely control. The participants recommended timely referrals in case of problems and providing appropriate solutions for improving treatment complications. *"Hand and foot neuropathies are due to taking oxaliplatin, which gets better over time; they should wear socks and gloves and do not use a pumice stone in the bath and also not use very cold and very hot water, which worsen their condition"* (Oncologist 4, male, 54 years).

4. Interpersonal relations: Interpersonal relationships in the participants' experience include the exchange of information, feelings, and social support in the personal, occupational, and social environment of CRC patients. Interpersonal relations are achieved through "family and friends' support," "healthcare providers' support," and "supporting the patient for returning to work"

- Family and friends' support: Having social support, including support from family and friends, increases the ability for self-care, increases overall performance, and improves the QOL of the survivors. *"When I found out I had cancer, I was very upset and depressed, my family and especially my wife persuaded me to continue the treatment, my wife accompanied me to every chemotherapy session. At home, she is very careful about my diet and that the atmosphere in the house keeps calm and stress-free."* (Patient 1, male, 36 years)

- Healthcare providers' support: Ongoing treatment follow-up of survivors requires effective communication and guidance from the treatment team, which leads to improved motivation, empathy, and trust in the patients and increases their participation in self-care. *"My oncologist supports me like a brother, we talk to each other, he asks about my work, about my studies and my relationship with my colleagues; it is very good if you can interact and communicate with your doctor. I come to the follow-ups to see him more than anything else"* (Patient 5, female, 48 years)

- Supporting the survivors for returning to work: Having a job is an important part of people's social life. The participants emphasized the need to return to work after completing their treatment and the impact of the disease on their social, economic, and psychological life. *"After I returned to work, my employer reduced my working hours and I became part-time, as well as improving my health insurance coverage so that I could pay for my treatment. But, there was another patient who was my roommate in the hospital, his boss fired him and did not give him legal salary."* (Patient 3, male, 47 years)

5. Spiritual growth: In participants' experience, spiritual growth indicates the ability for the growth and development of one's spiritual capacity, which is achieved in CRC survivors through "strengthening spiritual beliefs" and "applying spiritual therapy strategies"
- Strengthening spiritual beliefs: The existence and strengthening of spiritual beliefs in patients and getting help from a superior existence in life after cancer diagnosis were some of the issues discussed by the participants. *"At first, I fought a lot with my cancer and I did not believe that I had it, then I surrendered to God and trusted in him. I asked God to provide the best conditions for me, and now give me the ability to follow up on time."* (Patient 9, female, 51 years)
  - Applying spiritual therapy strategies: The participants recommended the use of a variety of spiritual therapy methods: *"Book therapy, and the Quran is the best source of life inspiration for these people; [...] prayer therapy, whether by themselves or by others praying for them and [...] superhero therapy, where having a great hero in life whose patience has helped him can also help the patient endure the sufferings of his illness"* (Clergy 1, male, 36 years)
6. Psychological management: Participants' experiences showed that psychological management includes the use of strategies to reduce the psychological complications of the disease and promote the patients' mental and psychological well-being. This matter is achieved by "engaging in recreational activities and entertainment," "psychological strategies for improving adaptation to the disease," and "provision of psychological services by the treatment team" in CRC survivors
- Engaging in recreational activities and entertainment: The participants emphasized the crucial need for engaging in recreational activities and entertainment as part of any survivor's lifestyle to acquire better social skills and communication and improve their activities of daily living. *"Having daily habits and hobbies such as reading books or watching TV or playing any fun game distracts the patients from their illness, and makes them think they are a completely normal and natural person"* (Nurse 2, male, 54 years)
- The patients' experiences of having daily fun and entertainment were also interesting. *"I read books and watch TV a lot. Sometimes, we play chess with my wife. I try to entertain myself and go to the park to see trees, flowers, and plants. I have not been unemployed for an hour since I retired"* (Patient 2, male, 63 years)
- "[...] After my illness, I went to a recreational class, weaving, cooking and confectionery, it was a very happy and good environment, and I learned something [...]"* (Patient 9, female, 51 years)
- Psychological strategies for improving adaptation to the disease: Strategies such as group therapy, meeting similar patients who have been successful in their personal and social life, recreational therapy, behavioral therapy, occupational therapy, and fun activities such as yoga and therapeutic laughter program (TLP) were some of the topics discussed by the participants. *"We had group therapy and acquaintance with other successful patients in our program; I hang medals of patients who have been successful on the wall; we have a national swimming champion, and I tell them that if this patient has made it, you can too"* (Social worker 2, female, 53 years)
  - Provision of psychological services by the healthcare providers: The participants emphasized having a psychiatric and psychological team along with the main treatment team and the timely referral of survivors to them. *"If the patients feel that they're OK, that they're a normal person now, they can make a lot of progress. If they can communicate well with their doctor, nurse, and psychotherapist, they can change their life, return to society, and do the same activities they did before the illness"* (Psychiatrist 3, female, 35 years).

## Discussion

According to the results of this study, a HPL in CRC survivors has the following dimensions: nutrition, activity and rest, health responsibility, interpersonal relations, spiritual growth, and psychological management. Meraviglia and Stuijbergen reported that health-promoting behaviors of low-income cancer survivors were predominately walking, maintaining a positive mental attitude, and eating a healthy, balanced diet with low fat and sodium.<sup>[32]</sup> The behaviors used for health promotion in patients with chronic and disabling conditions include physical activity, stress management, healthy eating, and cultivation of supportive interpersonal relationships.<sup>[33]</sup> In addition, health behaviors in endometrial cancer survivors include referral and advice from oncologists, provision of monitoring, promotion of planning and self-control, healthy eating, and physical activity.<sup>[34]</sup> As a result, it was found that a HPL consists of the main components of nutrition, physical activity, interpersonal relationships, and follow-up care. In this study, spiritual growth and psychological management were also identified. The majority of studies to identify HPL in cancer patients or survivors used defining the dimensions of HPL based on the Pender's HPM. HPL is also measured through the Health Promoting Lifestyle Profile II, which was inspired



by the Pender's model.<sup>[35-38]</sup> The dimensions of this study are also taken from this model.

Nutrition was one of the dimensions of a HPL in CRC survivors in this study. The dietary habits and patterns of survivors should take account of the recommendations on how to prepare food and eat nutritious foods and observe correct timing for daily meals such as breakfast, lunch, and dinner, in addition to snacking habits. Adherence to a regular diet, ensuring that all meals are taken, consuming foods with high nutritional values, and the limited consumption of unhealthy foods prevent the recurrence of the disease and reduce survivors' mortality rates.<sup>[39]</sup>

Attention to a healthy diet, including consuming more fruits and vegetables, whole grains, white meat, such as chicken and fish, and dairy products, was emphasized by the participants. The Healthy Eating Index, the Mediterranean Diet, or the Dietary Approaches to Stop Hypertension are recommended to CRC survivors. Adhering to these diets and consuming more fiber, such as whole grains, vegetables and fruits, and more dairy products, for their high calcium levels, reduce the recurrence of colon adenomas and mortality in CRC patients.<sup>[40,41]</sup> In addition, in CRC survivors without an intestinal ostomy, such as participants in this study, fiber consumption increases the volume of fecal mass, accelerates peristalsis, and thus reduces the time of exposure to carcinogens in the intestines. Calcium also binds to bile and fatty acids, reduces their toxicity, and has direct effects on the proliferation, differentiation, apoptosis of colonocytes, and reduced K-ras variations.<sup>[42]</sup>

Participants stated that limitation on the consumption of red and processed meats plays a role in maintaining health and reducing recurrence and complications of secondary cardiovascular disease and diabetes. The studies also showed that consumption of fewer than 100 g of red meat or less than 50 g of processed meat per day reduces the risk of recurrence in CRC patients by 15%–20%.<sup>[43]</sup> The consumption of red meat and its digestion in the gastrointestinal tract increases the level of nitrosamines. The decomposition of hemoglobin causes the release of aromatic amines, which causes the overproduction of epithelial tissue and more cytotoxicity with the presence of fecal matter in the intestines.<sup>[44,45]</sup> Consumption of 1 g of processed meat increases the risk of recurrence of CRC by 2–11 times as much as consumption of 1 g of fresh red meat.<sup>[46]</sup> However, Carr *et al.* expressed that consumption of red and processed meats did not affect 5-year survival, cardiovascular disease, and recurrence in CRC survivors.<sup>[47]</sup> This contradiction is due to the effects of the quality and the quantity of red meat intake during the day/week and the freshness and type of cooking on its outcomes.

This study emphasized the prescription of vitamins and minerals based on the results of laboratory tests and their deficiency levels in the patient. The consumption of Vitamin D and calcium reduced cancer-specific mortality and all-cause mortality by 12%–16% and improved the QOL.<sup>[48]</sup> The results of studies on the consumption of vitamins and minerals are contradictory. The consumption of calcium, Vitamin D, and folic acid (B9) is effective in reducing the spread of intestinal polyps and improving the side effects of treatment.<sup>[49]</sup> Nonetheless, the consumption of Vitamin C, calcium, and multivitamins is not associated with the prevention of recurrence of colon adenomas.<sup>[50]</sup> These contradictory findings of the consumption of vitamins and minerals mandate a more careful consideration of the effect of each dietary supplement separately. It is also necessary to prescribe each supplement in amounts proportionate to the nutritional deficiencies of each patient and the results of their biochemical tests.

As for activity and rest, which were another dimension obtained in the present study, sleep hygiene, avoidance of sedentary behaviors, and physical activity were emphasized. According to the participants' experience, having a regular bedtime and wake-time everyday routine and educating general recommendations about the management of sleep disorders is effective in maintaining sleep hygiene. Not having regular sleep patterns and taking naps more than 2 h per day and sleeping less than 5 h in 24 h double the risk of cardiovascular diseases and all-cause mortality.<sup>[51,52]</sup> Moreover, regular physical activity, avoiding intense heavy exercises, reducing exposure to artificial light, avoiding heavy meals, and limited intake of fluids, alcohol, nicotine, and caffeine before bedtime are other recommended measures. In addition, sleeping in a quiet and dark place with a suitable temperature, avoiding looking at the clock when waking up during the night, and switching off electronic devices and cell phones will help improve sleep quality.<sup>[53]</sup>

Participants noted that having sedentary behaviors can increase gastrointestinal problems and cardiovascular complications. The results of studies showed that sedentary behaviors, such as sitting and lying down, watching TV, and working at a computer or with digital devices for prolonged periods can increase mortality rates and decrease QOL in CRC survivors.<sup>[51,54]</sup> Sedentary behaviors increase the recurrence of colorectal adenoma by 47% in men.<sup>[55]</sup>

Also, sedentary behavior increases adiposity, hormonal disorders (increased androgen and estrogen levels), metabolic dysfunction (increased glucose and insulin), and inflammatory responses and decreases absorption of Vitamin D and calcium.<sup>[54,56]</sup> Participants stated that having physical activity according to survivor's abilities and

preferences and engage in physical activity daily of light- to moderate-intensity activity is one of the main components of a HPL. The type, time of onset, and intensity of physical activity contribute to survival, disease prognosis, and QOL in CRC survivors. Light physical activity and moderate-to-vigorous physical activity, daily aerobic activity, such as walking, 150 min of physical activity per week, and starting physical activity 6 months after the end of treatment are recommended measures.<sup>[57,58]</sup>

Health responsibility was another aspect of HPL in CRC survivors in the present study. This dimension consisted of self-management, treatment adherence, and controlling the treatment complications. The participants also emphasized the need to reduce and quit smoking. CRC patients who are smokers have a lower survival chance because nicotine causes mutations in BRAF and increased levels of microsatellite instability and CpG island methylator phenotype. These factors make tumors become metastatic and more invasive, reduce the therapeutic response, and accelerate the recurrence of colorectal tumors.<sup>[59]</sup> Smoking before and after the diagnosis of CRC increases the risk of cardiovascular disease, respiratory disease, lung cancer, CRC-specific mortality, and all-cause mortality among persons with nonmetastatic CRC.<sup>[60]</sup> Further, the study of Walter *et al.* showed that the increase in all-cause mortality is evident in smoker CRC patients after diagnosis. Compared to nonsmokers, 26% and 11% increase in mortality was observed in smokers and former smokers, respectively.<sup>[59]</sup> In smoking cessation, guideline stated that it should take place gradually and under the supervision of a psychiatrist through behavioral therapy and pharmacological therapy over 12 weeks.<sup>[61]</sup> Phone follow-ups and sending motivational text messages, introducing and referring the patients to others with similar conditions who have successfully quit smoking, and re-evaluating the person every 6–12 months are some of the recommendations made in this regard to treatment teams.<sup>[61,62]</sup>

CRC survivors sought weight management to improve their overall survival and well-being after completing their treatment. In weight management, having principled methods and receiving education from a trained person or nutritionist on weight loss or weight gain were one of the important points in the participants' interviews. There is a higher risk of disease recurrence, less disease-free survival, and increased all-cause mortality in obese and underweight patients.<sup>[63,64]</sup> Some possible hypotheses explaining the lower prognosis of the disease in overweight and obese individuals include the more advanced stage of the disease at the time of diagnosis, the decreased therapeutic response, and the increased biochemical changes associated with obesity (increased insulin-like growth factors and cortisol

secretion), leading to poorer immune system function and corroborating the theory of a defective immune system contributing to the spread of tumor cells.<sup>[64]</sup>

According to the results of various studies, 75%–87% of CRC patients used at least one complementary and alternative medicine (CAM) treatment.<sup>[65,66]</sup> CAM treatment approaches increase the level of physical and emotional well-being and general health in individuals and can lead to improved complications, less cancer treatment-associated morbidity and mortality, and increased QOL.<sup>[66,67]</sup> More importantly, 33%–53% of patients discontinued their main treatment, i.e., chemotherapy, radiotherapy, and hormone therapy, after using complementary medicine, resulting in a nearly-doubled mortality rate.<sup>[65]</sup> In the experience of the healthcare providers participating in the present study, the treatment team should talk to their patients about the use of other medicines, their effectiveness, side effects, and adherence to their conventional pharmacological treatment. The treatment team's conversation with patients about whether or not to use CAM helps the patients make informed decisions by conveying accurate and safe information and improves the trust between the treatment team and the patients.

Participants emphasized that follow-up programs under the supervision of oncologists would increase the prognosis and make it easier to identify and treat recurrences of cancer. The study of Carpentier *et al.* showed that overall adherence ranged from 12% to 87% within the initial 12–18 months posttreatment which has gradually decreased in the following years.<sup>[68]</sup> Oncologist's follow-up in survivorship year 1 is intensifying over time. Survivors not being followed up by both PCPs and oncology specialists were less likely to receive preventive care.<sup>[69]</sup> Follow-up programs for CRC survivors are meant to diagnose the early stages of disease recurrence, especially recurrences removable with surgery. Therefore, follow-up programs should be planned for patients with the ability to tolerate invasive treatments such as surgery and chemotherapy. In line with the results of this study, regular visits based on therapeutic protocols, providing recommendations for a healthy lifestyle, such as diet modification, weight management, reduced inactivity, evaluation of psychosocial and family support, and encouraging to resume social life and work should be considered more strictly in these follow-up programs.<sup>[70,71]</sup>

Interpersonal relations comprised the fourth dimension obtained in the present study, which was discussed as family and friends' support, healthcare providers' support, and supporting the patient in returning to work.

The reactions of friends and family affect how patients adapt to the diagnosis and treatment of cancer. Good support, especially from the spouse, partner, and close

family members, can improve family ties, reduce tensions, and reduce the disease burden.<sup>[72]</sup> Having support is also effective in making lifestyle changes. Family support is more helpful for nutrition compliance and friends' support for exercising. Physical activity in the company of friends increases the motivation to follow an exercise program. Friendly companionship makes the patients feel calm and happy, reduces their illness anxiety, improves their mood, increases their acceptance, and helps maintain healthy behaviors. Nonetheless, when it comes to changing eating habits and monitoring the patient's diet, the family has a more important supportive role, because the family can more easily discuss buying healthy food items, cooking meals, and dietary restrictions.<sup>[73]</sup>

The results of the present study indicated the importance of a good relationship between the treatment team and the patients and their family caregivers and creating a sense of commitment in the family to provide care to their ill member. Face-to-face, telephone, and online meetings with the patients and their families and identifying those who had difficulty adapting to the disease and referring them to specialists can be supportive strategies provided by healthcare providers to patients.<sup>[74]</sup> Receiving emotional support from the healthcare providers to pursue medical care has a positive effect on the symptoms of the disease and improves psychological distress. During cancer treatment and recovery, healthcare providers should provide social support to the family members and friends of the patients as well and encourage them to help their patients in achieving self-direction and self-care.

The participants further stated that support for survivors in returning to their work leads to the formation of social identity and improvement of the physical, economic, and psychological status of the patients and their families. The encouragement given by families and healthcare providers to start work activities at the earliest possible opportunity, the specialists' and psychologists' assessment of the patient's ability to start working again, the patient having a flexible work schedule with reduced daily work hours and lighter workload, and the emotional support given by colleagues and employers are solutions that can be used to improve the conditions for the survivors and create an appropriate work environment for them.<sup>[75]</sup>

In the present study, the fifth dimension of HPL in CRC survivors was spiritual growth. The existence of spiritual beliefs in patients and seeking help from a superior existence in life after getting the cancer diagnosis led to better acceptance of treatment, management of the disease and its complications, and interaction with the treatment team.

Cancer patients defined spirituality as believing in the divine destiny, believing in God, accepting illness as a

blessing from God, and engaging in religious activities. The positive impact of spiritual and religious beliefs in cancer patients includes reduced disappointment and less desire to die quickly. Spiritual therapy has positive effects on the QOL, adaptation, the burden of symptoms, adherence to treatment, and general well-being of the patients.<sup>[76,77]</sup> By trusting in God or relying on him and praying, patients establish a closer relationship with God in difficult times during illness and take action to improve their emotional and psychological conditions.<sup>[78]</sup>

In the present study, the participants noted the use of spiritual therapy methods, including methods based on studying and counseling, group methods, and superhero therapy. Other studies have also suggested spiritual therapy strategies such as the compassionate presence of the treatment team, listening to the patient's life story, open-ended questions to express unpleasant feelings, referral to a trained spiritual caregiver, relaxation techniques, logotherapy, attending spiritual support groups, meditation, prayer therapy, massage, yoga, tai chi, exercise, art therapy (music, art, and dance), and journalism (writing).<sup>[76-79]</sup> Therefore, regardless of their own beliefs, treatment teams should take note of spiritual and religious beliefs in their clinical practice. Patients tend to share their thoughts, sufferings, and sorrows, and the treatment team members need to be able to listen to what they have to say and use specific strategies to strengthen their faith.

In the present study, the last dimension of HPL in CRC survivors was psychological management. Psychological management consisted of engaging in recreational activities and entertainment, using psychological strategies for improving adaptation to the disease, and receiving psychological services from healthcare providers.

In participants' experience, entertainment and recreation, whether individually or with family and friends, can lift the spirit of patients with cancer and distract them from illness, frustrating thoughts, and the future for a little while. Recreational travel, learning personal skills and arts, music and entertaining movies, reading books, and writing can be recommended as some available entertaining activities for these people.<sup>[75]</sup> Engaging in fun activities and entertainment help maintain one's mood and improve psychological issues. Music therapy has positive effects on anxiety and depression, reduces the use of painkillers, and improves the QOL and spiritual well-being.<sup>[80]</sup>

In the present study, group therapy, acquaintance with similar patients who have been successful in their personal and social life, and recreational therapy were among the psychological strategies for improving adaptation to the disease. Group therapy improves anxiety, depression, and

distress in CRC patients, and individuals learn in a group to distance themselves from negative thoughts, better accept the existing conditions, and seek optimism. By receiving social support, recognizing their positive behaviors, and learning mechanisms to deal with denial in group therapy, survivors strengthen their sense of empathy and normalcy in society.<sup>[81]</sup>

In participants' experience, having a psychotherapeutic team alongside the main treatment team can help provide effective psychological services to patients. Other studies have also reported occupational therapy, cognitive therapy, and TLP as effective strategies to improve the psychological status of CRC patients. Occupational therapy along with lifestyle counseling has improved the QOL and negative feelings in CRC survivors. Further, cognitive therapy has an effect on self-efficacy, adaptation to cancer and complications, and having a positive attitude.<sup>[82,83]</sup> TLP can decrease levels of stress hormones such as cortisol and epinephrine; It also increases the secretion of serotonin and endorphins in the body that makes a person feel happy and cheerful.<sup>[84-86]</sup> Laughter yoga can relax the muscles and reduce psychosomatic disorders and pain.<sup>[87,88]</sup> Therefore, educational–psychological interventions aimed at modifying behavior, changing lifestyle, and adapting to limitations and challenges of the disease have a significant impact on all the aspects of the patients' life. These interventions improve physical, psychological, and social well-being by improving interpersonal relations, especially with the treatment team.

The results of this study showed that CRC survivors had experiences of adherence to healthy behaviors to improve QOL and reduce disease recurrence. The results of studies also showed that CRC survivors' adherence to multiple health behaviors leads to prevent disease recurrence, improve QOL, and increase survival. Tollosa *et al.* reported healthy lifestyle behaviors based on the World Cancer Research Fund/American Institute for Cancer Research recommendations that can improve survival and QOL among cancer survivors. However, there is insufficient evidence of the prevalence of cancer survivors adhering to lifestyle recommendations, particularly for multiple health behaviors.<sup>[17]</sup> Demark-Wahnefried and Jones stated that healthy lifestyle behaviors including weight management, healthful diet, regular exercise, and smoking cessation have the potential to significantly reduce comorbid conditions, side effects, and mortality in cancer survivors.<sup>[10]</sup> In addition, it was found that reduce adherence to healthy lifestyle behaviors is associated with lower HRQoL in long-term CRC survivors. These behaviors include BMI <30 kg/m<sup>2</sup>, intake of fruits, vegetables, and whole-grain bread, and low consumption of red and processed meat, recreational

physical activity, and not smoking.<sup>[24]</sup> Dennis *et al.* reported that CRC survivors had made more lifestyle changes than people without cancer. The most change was dietary changes (39.3%) and increased physical activity was the change most frequently desired in the future (39.1%).<sup>[18]</sup> Overall lifestyle (including body weight, physical activity, diet, and alcohol intake) after diagnosis was not associated with CRC recurrence, while it was inversely associated with all-cause mortality.<sup>[89]</sup>

### Limitations

Strength of this study was using a qualitative approach to explore the experiences, perspectives, and perceptions about the concept of HPL in CRC survivors. In addition to CRC survivors, a wide range of experienced professionals involved in examining the lifestyle of CRC patients also participated in the study. The findings also suggest the need to do further studies to explore all family members' experiences and caregivers of implementation of a HPL in CRC survivors. It is also suggesting that the factors affecting the improvement of HPL be explore based on the experiences of CRC survivors and healthcare providers. Behavior-specific cognitions and concepts of HPM including benefits of action, barriers to action, self-efficacy, activity-related effect, and interpersonal influences in CRC survivors can also be explore to better understand the process of adoption of HPL. A limitation of the study was that, due to the nature of qualitative studies, the results of the study should be generalized to other societies only after considering the environmental and cultural variables at play. Also, this study was not designed to identify differences between the experiences of CRC survivors and health care providers about HPL.

### Conclusions

A HPL in CRC survivors is multidimensional and includes nutrition, activity and rest, health responsibility, interpersonal relations, spiritual growth, and psychological management. Adopting a healthy lifestyle after treatment improves the survival and prognosis of the disease and physical and psychological well-being and improves the QOL of CRC survivors. Therefore, medical team members' full knowledge about the dimensions and components of HPL in CRC survivors, especially nurses, who have the greatest caregiving commitment to CRC survivors, can be of tremendous help in designing and providing targeted and optimal care, treatment, training, and support services. The development and growth of health responsibility and personal skills among the patients, creating supportive spaces and environments, strengthening the patients' social functions, and the reorientation of training, care, treatment, and counseling

services based on the dimensions of the concept of HPL can help CRC survivors modify their lifestyle patterns and develop health-promoting behaviors.

### Acknowledgments

This article was extracted from the findings of the first author's PhD dissertation in nursing and has been approved by the Research Council of Mashhad University of Medical Sciences. The authors wish to express their gratitude to the Research and Technology Deputy of Mashhad University of Medical Sciences for their financial support as well as all the participants who shared their experiences in this study.

### Financial support and sponsorship

This work was supported by a grant from Mashhad University of Medical Science (Grant No. IR.MUMS.REC.1398.148).

### Conflicts of interest

There are no conflicts of interest.

## References

- Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, *et al.* Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021;71:209-49.
- Rawla P, Sunkara T, Barsouk A. Epidemiology of colorectal cancer: Incidence, mortality, survival, and risk factors. *Prz Gastroenterol* 2019;14:89-103.
- Vijayvergia N, Denlinger CS. Lifestyle factors in cancer survivorship: Where we are and where we are headed. *J Pers Med* 2015;5:243-63.
- Marzorati C, Riva S, Pravettoni G. Who is a cancer survivor? A systematic review of published definitions. *J Cancer Educ* 2017;32:228-37.
- Gordon LG, Patrao T, Kularatna S, Hawkes AL. A telephone-delivered multiple health behaviour change intervention for colorectal cancer survivors: Making the case for cost-effective healthcare. *Eur J Cancer Care* 2015;24:854-61.
- Miller KD, Nogueira L, Mariotto AB, Rowland JH, Yabroff KR, Alfano CM, *et al.* Cancer treatment and survivorship statistics, 2019. *CA Cancer J Clin* 2019;69:363-85.
- Gordon LG, Merollini KM, Lowe A, Chan RJ. A systematic review of financial toxicity among cancer survivors: We can't pay the co-pay. *Patient* 2017;10:295-309.
- Han CJ, Yang GS, Syrjala K. Symptom experiences in colorectal cancer survivors after cancer treatments: A systematic review and meta-analysis. *Cancer Nurs* 2020;43:E132-58.
- Tantoy IY, Cataldo JK, Aouizerat BE, Dhruva A, Miasowski C. A review of the literature on multiple co-occurring symptoms in patients with colorectal cancer who received chemotherapy alone or chemotherapy with targeted therapies. *Cancer Nurs* 2016;39:437-45.
- Demark-Wahnefried W, Jones LW. Promoting a healthy lifestyle among cancer survivors. *Hematol Oncol Clin North Am* 2008;22:319-42, viii.
- Rezende LF, Murata E, Giannichi B, Tomita LY, Wagner GA, Sanchez ZM, *et al.* Cancer cases and deaths attributable to lifestyle risk factors in Chile. *BMC Cancer* 2020;20:693.
- Ghanei M, Ahmady K, Babaei M, Tavana AM, Bahadori M, Ebadi A, *et al.* Knowledge of healthy lifestyle in Iran: A systematic review. *Electron Physician* 2016;8:2199-207.
- Allgood R. *Nursing Theorists and Their Work*. 8<sup>th</sup> ed. St. Louis, Missouri: Mosby, An Imprint of Elsevier Inc.; 2014.
- Pender NJ, Murdaugh CL, Parsons MA. *Health Promotion in Nursing Practice*. 7<sup>th</sup> ed. Upper Saddle River, NJ: Pearson; 2014. p. 1-20.
- Walker SN, Sechrist KR, Pender NJ. The Health-Promoting Lifestyle Profile: Development and psychometric characteristics. *Nurs Res* 1987;36:76-81.
- Walker SN, Kerr MJ, Pender NJ, Sechrist KR. A Spanish language version of the Health-Promoting Lifestyle Profile. *Nurs Res* 1990;39:268-73.
- Tollosa DN, Tavener M, Hure A, James EL. Adherence to multiple health behaviours in cancer survivors: A systematic review and meta-analysis. *J Cancer Surviv* 2019;13:327-43.
- Dennis DL, Waring JL, Payeur N, Cosby C, Daudt HM. Making lifestyle changes after colorectal cancer: Insights for program development. *Curr Oncol* 2013;20:e493-511.
- Sweeney-Magee M, Moustaqim-Barrette A, Gotay C, Dummer T. A systematic mixed study review of health behaviour change interventions in colorectal cancer survivors. *J Adv Nurs* 2020;76:1936-48.
- Van Blarigan EL, Meyerhardt JA. Role of physical activity and diet after colorectal cancer diagnosis. *J Clin Oncol* 2015;33:1825-34.
- van Zutphen M, Boshuizen HC, Kok DE, van Baar H, Geijsen AJ, Wesselink E, *et al.* Colorectal cancer survivors only marginally change their overall lifestyle in the first 2 years following diagnosis. *J Cancer Surviv* 2019;13:956-67.
- Breedveld-Peters JJ, Koole JL, Müller-Schulte E, van der Linden BW, Windhausen C, Bours MJ, *et al.* Colorectal cancers survivors' adherence to lifestyle recommendations and cross-sectional associations with health-related quality of life. *Br J Nutr* 2018;120:188-97.
- Bøhn SH, Lie HC, Reinertsen KV, Fosså SD, Haugnes HS, Kiserud CE, *et al.* Lifestyle among long-term survivors of cancers in young adulthood. *Support Care Cancer* 2021;29:289-300.
- Schlesinger S, Walter J, Hampe J, von Schönfels W, Hinz S, Küchler T, *et al.* Lifestyle factors and health-related quality of life in colorectal cancer survivors. *Cancer Causes Control* 2014;25:99-110.
- Polit DF, Beck C. *Nursing Research: Generating and Assessing Evidence for Nursing Practice*. 9<sup>th</sup> ed. Philadelphia: LWW; 2012.
- Kim H, Sefcik JS, Bradway C. Characteristics of qualitative descriptive studies: A systematic review. *Res Nurs Health* 2017;40:23-42.
- Polit DF, Beck CT. *Essentials of Nursing Research: Appraising Evidence for Nursing Practice*. 9<sup>th</sup> ed. Philadelphia: Wolters Kluwer; 2018.
- Saunders B, Sim J, Kingstone T, Baker S, Waterfield J, Bartlam B, *et al.* Saturation in qualitative research: Exploring its conceptualization and operationalization. *Qual Quant* 2018;52:1893-907.
- Zhang Y, Wildemuth BM. Qualitative analysis of content. In: Wildemuth BM, editor. *Applications of Social Research Methods to Questions in Information and Library Science*. West Port, Connecticut: Libraries Unlimited; 2009. p. 308.

30. Guba EG, Lincoln YS. Competing paradigms in qualitative research. In: Denzin NK, Lincoln YS, editors. *Handbook of Qualitative Research*. London: Sage; 1994. p. 105-17.
31. Dudek SG. *Nutrition Essentials for Nursing Practice*. 7<sup>th</sup> ed. Philadelphia: LWW; 2013.
32. Meraviglia MG, Stuijbergen A. Health-promoting behaviors of low-income cancer survivors. *Clin Nurse Spec* 2011;25:118-24.
33. Lin CC. Health promotion for cancer patients: Opportunities and challenges in cancer nursing. *Cancer Nurs* 2016;39:339-40.
34. Hardcastle SJ, Glassey R, Salfinger S, Tan J, Cohen P. Factors influencing participation in health behaviors in endometrial cancer survivors. *Psychooncology* 2017;26:1099-104.
35. Reilley MJ, Jacobs LA, Vaughn DJ, Palmer SC. Health behaviors among testicular cancer survivors. *J Community Support Oncol* 2014;12:121-8.
36. Chung MH, Chao TY, Chou KR, Lee HL. Health-promoting lifestyle factors of cancer survivors in Taiwan. *Cancer Nurs* 2009;32:E8-14.
37. Liebergall-Wischnitzer M, Buyum M, DeKeyser Ganz F. Health promoting lifestyle among Israeli adult survivors of childhood cancer. *J Pediatr Oncol Nurs* 2016;33:146-54.
38. Huang YJ, Lee SL, Wu LM. Health-promoting lifestyle and its predictors in adolescent survivors of childhood cancer. *J Pediatr Oncol Nurs* 2021;38:233-41.
39. Jochems SH, Van Osch FH, Bryan RT, Wesselius A, van Schooten FJ, Cheng KK, *et al.* Impact of dietary patterns and the main food groups on mortality and recurrence in cancer survivors: A systematic review of current epidemiological literature. *BMJ Open* 2018;8:e014530.
40. Fernández-Villa T, Álvarez-Álvarez L, Rubín-García M, Obón-Santacana M, Moreno V. The role of dietary patterns in colorectal cancer: A 2019 update. *Expert Rev Gastroenterol Hepatol* 2020;14:281-90.
41. Yao Y, Suo T, Andersson R, Cao Y, Wang C, Lu J, *et al.* Dietary fibre for the prevention of recurrent colorectal adenomas and carcinomas. *Cochrane Database Syst Rev* 2017;1:CD003430.
42. Yang B, McCullough ML, Gapstur SM, Jacobs EJ, Bostick RM, Fedirko V, *et al.* Calcium, vitamin D, dairy products, and mortality among colorectal cancer survivors: The Cancer Prevention Study-II Nutrition Cohort. *J Clin Oncol* 2014;32:2335-43.
43. Kushi LH, Doyle C, McCullough M, Rock CL, Demark-Wahnefried W, Bandera EV, *et al.* American Cancer Society Guidelines on nutrition and physical activity for cancer prevention: Reducing the risk of cancer with healthy food choices and physical activity. *CA Cancer J Clin* 2012;62:30-67.
44. Lunn JC, Kuhnle G, Mai V, Frankenfeld C, Shuker DE, Glen RC, *et al.* The effect of haem in red and processed meat on the endogenous formation of N-nitroso compounds in the upper gastrointestinal tract. *Carcinogenesis* 2007;28:685-90.
45. Sugimura T, Wakabayashi K, Nakagama H, Nagao M. Heterocyclic amines: Mutagens/carcinogens produced during cooking of meat and fish. *Cancer Sci* 2004;95:290-9.
46. Lofano K, Principi M, Scavo MP, Pricci M, Ierardi E, Di Leo A. Dietary lifestyle and colorectal cancer onset, recurrence, and survival: Myth or reality? *J Gastrointest Cancer* 2013;44:1-11.
47. Carr PR, Jansen L, Walter V, Kloor M, Roth W, Bläker H, *et al.* Associations of red and processed meat with survival after colorectal cancer and differences according to timing of dietary assessment. *Am J Clin Nutr* 2016;103:192-200.
48. Kanellopoulou A, Riza E, Samoli E, Benetou V. Dietary supplement use after cancer diagnosis in relation to total mortality, cancer mortality and recurrence: A systematic review and meta-analysis. *Nutr Cancer* 2021;73:16-30.
49. Pericleous M, Mandair D, Caplin ME. Diet and supplements and their impact on colorectal cancer. *J Gastrointest Oncol* 2013;4:409-23.
50. Heine-Bröring RC, Winkels RM, Botma A, Wahab PJ, Tan AC, Nagengast FM, *et al.* Dietary supplement use is not associated with recurrence of colorectal adenomas: A prospective cohort study. *Int J Cancer* 2013;132:666-75.
51. Ratjen I, Schafmayer C, di Giuseppe R, Waniek S, Plachta-Danielzik S, Koch M, *et al.* Postdiagnostic physical activity, sleep duration, and TV watching and all-cause mortality among long-term colorectal cancer survivors: A prospective cohort study. *BMC Cancer* 2017;17:701.
52. Xiao Q, Arem H, Pfeiffer R, Matthews C. Prediagnosis sleep duration, napping, and mortality among colorectal cancer survivors in a large US Cohort. *Sleep* 2017;40:zsx010.
53. National Comprehensive Cancer Network. *NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines)*. Plymouth Meeting, Pennsylvania: Survivorship Version; 2020. p. 52-6.
54. Lynch BM, Cerin E, Owen N, Hawkes AL, Aitken JF. Television viewing time of colorectal cancer survivors is associated prospectively with quality of life. *Cancer Causes Control* 2011;22:1111-20.
55. Molmenti CL, Hibler EA, Ashbeck EL, Thomson CA, Garcia DO, Roe D, *et al.* Sedentary behavior is associated with colorectal adenoma recurrence in men. *Cancer Causes Control* 2014;25:1387-95.
56. Lynch BM. Sedentary behavior and cancer: A systematic review of the literature and proposed biological mechanisms. *Cancer Epidemiol Biomarkers Prev* 2010;19:2691-709.
57. Eyl RE, Xie K, Koch-Gallenkamp L, Brenner H, Arndt V. Quality of life and physical activity in long-term ( $\geq 5$  years post-diagnosis) colorectal cancer survivors - systematic review. *Health Qual Life Outcomes* 2018;16:112.
58. Otto SJ, Korfage IJ, Polinder S, van der Heide A, de Vries E, Rietjens JA, *et al.* Association of change in physical activity and body weight with quality of life and mortality in colorectal cancer: A systematic review and meta-analysis. *Support Care Cancer* 2015;23:1237-50.
59. Walter V, Jansen L, Hoffmeister M, Brenner H. Smoking and survival of colorectal cancer patients: Systematic review and meta-analysis. *Ann Oncol* 2014;25:1517-25.
60. Yang B, Jacobs EJ, Gapstur SM, Stevens V, Campbell PT. Active smoking and mortality among colorectal cancer survivors: The Cancer Prevention Study II nutrition cohort. *J Clin Oncol* 2015;33:885-93.
61. National Comprehensive Cancer Network. *NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines)*. Plymouth Meeting, Pennsylvania: Smoking Cessation Version; 2020. p. 4-9.
62. Tao L, Wang R, Gao YT, Yuan JM. Impact of postdiagnosis smoking on long-term survival of cancer patients: The Shanghai cohort study. *Cancer Epidemiol Biomarkers Prev* 2013;22:2404-11.
63. Maskarinec G, Harmon BE, Little MA, Ollberding NJ, Kolonel LN, Henderson BE, *et al.* Excess body weight and colorectal cancer survival: The multiethnic cohort. *Cancer Causes Control* 2015;26:1709-18.
64. Park J, Kim JH, Lee HJ, Park SJ, Hong SP, Cheon JH, *et al.* The

- effects of physical activity and body fat mass on colorectal polyp recurrence in patients with previous colorectal cancer. *Cancer Prev Res (Phila)* 2017;10:478-84.
65. Johnson SB, Park HS, Gross CP, Yu JB. Complementary medicine, refusal of conventional cancer therapy, and survival among patients with curable cancers. *JAMA Oncol* 2018;4:1375-81.
  66. Sewitch MJ, Yaffe M, Maisonneuve J, Prchal J, Ciampi A. Use of complementary and alternative medicine by cancer patients at a Montreal hospital. *Integr Cancer Ther* 2011;10:305-11.
  67. Molassiotis A, Fernandez-Ortega P, Pud D, Ozden G, Platin N, Hummerston S, *et al.* Complementary and alternative medicine use in colorectal cancer patients in seven European countries. *Complement Ther Med* 2005;13:251-7.
  68. Carpentier MY, Vernon SW, Bartholomew LK, Murphy CC, Bluethmann SM. Receipt of recommended surveillance among colorectal cancer survivors: A systematic review. *J Cancer Surviv* 2013;7:464-83.
  69. Snyder CF, Earle CC, Herbert RJ, Neville BA, Blackford AL, Frick KD. Trends in follow-up and preventive care for colorectal cancer survivors. *J Gen Intern Med* 2008;23:254-9.
  70. Vera R, Aparicio J, Carballo F, Esteva M, González-Flores E, Santianes J, *et al.* Recommendations for follow-up of colorectal cancer survivors. *Clin Transl Oncol* 2019;21:1302-11.
  71. National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines). NCCN Guidelines for Colorectal Patients. Plymouth Meeting, Pennsylvania: National Comprehensive Cancer Network (NCCN); 2020. p. 52-6.
  72. Hall S, Gray N, Browne S, Ziebland S, Campbell NC. A qualitative exploration of the role of primary care in supporting colorectal cancer patients. *Support Care Cancer* 2012;20:3071-8.
  73. Lee MK, Park SY, Choi GS. Association of support from family and friends with self-leadership for making long-term lifestyle changes in patients with colorectal cancer. *Eur J Cancer Care (Engl)* 2018;27:e12846.
  74. Taylor C. Supporting the carers of individuals affected by colorectal cancer. *Br J Nurs* 2008;17:226-30.
  75. Yarbro CH, Wujcik D, Gobel BH. *Cancer Nursing: Principles and Practice*. Sudbury, Massachusetts: Jones and Bartlett Publishers; 2010.
  76. Puchalski CM, Sbrana A, Ferrell B, Jafari N, King S, Balboni T, *et al.* Interprofessional spiritual care in oncology: A literature review. *ESMO Open* 2019;4:e000465.
  77. Ripamonti CI, Giuntoli F, Gonella S, Miccinesi G. Spiritual care in cancer patients: A need or an option? *Curr Opin Oncol* 2018;30:212-8.
  78. Nejat N, Whitehead L, Crowe M. The use of spirituality and religiosity in coping with colorectal cancer. *Contemp Nurse* 2017;53:48-59.
  79. Ghorbani M, Mohammadi E, Aghabozorgi R, Ramezani M. Spiritual care interventions in nursing: An integrative literature review. *Support Care Cancer* 2021;29:1165-81.
  80. Köhler F, Martin ZS, Hertrampf RS, Gäbel C, Kessler J, Ditzel B, *et al.* Music therapy in the psychosocial treatment of adult cancer patients: A systematic review and meta-analysis. *Front Psychol* 2020;11:651.
  81. Oberoi D, Martopullo C, Bultz BD, Carlson LE. The effectiveness of a men-only supportive expressive group therapy intervention for psychosocial health outcomes in gastrointestinal cancer patients: A 6-month longitudinal study. *Health Qual Life Outcomes* 2021;19:47.
  82. Yang SY, Wang JD, Chang JH. Occupational therapy to improve quality of life for colorectal cancer survivors: A randomized clinical trial. *Support Care Cancer* 2020;28:1503-11.
  83. Teo I, Tan YP, Finkelstein EA, Yang GM, Pan FT, Lew HY, *et al.* The feasibility and acceptability of a cognitive behavioral therapy-based intervention for patients with advanced colorectal cancer. *J Pain Symptom Manage* 2020;60:1200-7.
  84. Fujisawa A, Ota A, Matsunaga M, Li Y, Kakizaki M, Naito H, *et al.* Effect of laughter yoga on salivary cortisol and dehydroepiandrosterone among healthy university students: A randomized controlled trial. *Complement Ther Clin Pract* 2018;32:6-11.
  85. Farifteh S, Mohammadi-Aria A, Kiamanesh A, Mofid B. The impact of laughter yoga on the stress of cancer patients before chemotherapy. *Iran J Cancer Prev* 2014;7:179-83.
  86. Berk LS, Tan SA, Fry WF, Napier BJ, Lee JW, Hubbard RW, *et al.* Neuroendocrine and stress hormone changes during mirthful laughter. *Am J Med Sci* 1989;298:390-6.
  87. Namazi Nia M, Mohajer S, Ghahramanzadeh M, Mazlom S. The impact of laughter yoga on mental well-being of cancer patients under chemotherapy. *Evid Based Care* 2019;9:7-14.
  88. Kim SH, Kim YH, Kim HJ. Laughter and stress relief in cancer patients: A pilot study. *Evid Based Complement Alternat Med* 2015;2015:864739.
  89. van Zutphen M, Boshuizen HC, Kenkhuis MF, Wesselink E, Geijssen AJ, de Wilt JH, *et al.* Lifestyle after colorectal cancer diagnosis in relation to recurrence and all-cause mortality. *Am J Clin Nutr* 2021;113:1447-57.