



# Beyond basic psychological needs: The hope construct during adjuvant treatment in colorectal cancer patients

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## Abstract

This study explored basic psychological needs (BPN) experiences, motivation to continue living, and psychological well-being in colorectal cancer (CRC) patients during adjuvant treatment. Qualitative data from 30 participants (ten CRC patients, ten relatives and ten healthcare professionals) were collected by performing two sets of semi-structured interviews. Three categories were identified: (a) BPN frustration, (b) hope as a source of motivation, and (c) sources of hope. This last category included several subcategories: positive attitude, religious faith, positive medical feedback, knowing that they were going to receive a short-term chemotherapy, and being aware that other patients were in a worse condition. CRC patients felt their basic psychological needs were thwarted during adjuvant treatment. However, hopeful thoughts were reported as relevant sources of motivation to live, which positively impacted on patients' psychological well-being. Future research could explore the construct of hope as a hypothetical moderator between BPN and CRC patients' well-being during treatment.

**Keywords** Disease · Qualitative · Chemotherapy · Motivation · Well-being

## Introduction

Self-determination theory (SDT; Ryan & Deci, 2017) is a broad theory of personality and motivation composed of six mini-theories, joined to provide a comprehensive map of human behavior and functioning. The fourth mini-theory, the basic psychological needs theory (BPNT), highlights the role of three basic psychological needs (BPN; autonomy, competence, and relatedness) to support people's health and well-being outcomes. Moreover, BPNT outlines the manner in which social environments can

satisfy or thwart these needs (Legault, 2017; Ryan & Deci, 2017).

Autonomy satisfaction refers to the individuals' perception that they are the origin of their own actions and participate in self-directed decision-making without external pressures, whereas autonomy frustration involves feeling controlled through externally established elements or self-imposed compulsion (DeCharms, 1968; Deci & Ryan, 1985). Competence satisfaction refers to feelings of efficacy, that one's actions are useful to attain desired goals, whereas competence frustration involves perceptions of unsuccessful behaviors and low self-efficacy (Bartholomew et al., 2011). Relatedness satisfaction reflects feeling integrated and accepted by others come maintaining close and intimate social relationships. Conversely, relatedness frustration involves the experience of social exclusion and solitude (Chen et al., 2015). Overall, satisfaction of these BPN leads to experiencing well-being outcomes (e.g., life satisfaction, vitality, meaning in life, positive affect) whereas BPN frustration leads to experiencing ill-being outcomes (e.g., depressive symptoms, anxiety, burnout, negative affect) (Ryan & Deci, 2017).

In health contexts, research based on SDT have mainly examined the relations between need satisfaction and well-being outcomes. As proposed in the SDT model of health behavior change (Ryan et al., 2008), satisfaction of BPN improves mental health (e.g., lower depression, anxiety, and higher quality of life) and the adherence to health-related

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behaviors (e.g., tobacco abstinence, physical exercise, healthier diet, medication use). However, few studies have explored BPN frustration related to ill-being in clinical settings. In this line, for example, research has shown that BPN frustration was associated with lower quality of life in patients with HIV (Majeed et al., 2017), and that people with morbid obesity had their BPN thwarted, suffering impaired optimal functioning and well-being (Megías et al., 2018). Another study with patients presenting severe chronic fatigue showed that BPN frustration predicted higher symptoms of stress and the associated maladaptive pattern of fatigue and poor sleep (Campbell et al., 2017). Therefore, it seems interesting to determine the factors related to need frustration in people with diseases, with the aim of alleviating negative psychological symptoms and improving their quality of life.

Nevertheless, cancer patients have received little attention from a BPNT perspective. Some of the studies focused on physical exercise (Milne et al., 2008) and healthcare domains in breast cancer patients (Hull et al., 2016), in order to understand the relationship between BPN satisfaction and positive well-being outcomes, rather than the negative consequences of suffering frustration of autonomy, competence, and relatedness. We should take into consideration that cancer treatment is associated with side effects such as fatigue, reduced quality of life, or psychosocial disorders, among others (Kroeker et al., 2019; Shapiro & Recht, 2001), which could be linked to BPN frustration. With the aim of improving patients' wellness throughout cancer treatment, other theoretical frameworks have been applied to understand coping responses associated with better disease adjustment. For example, the hope theory (Snyder, 1989) has been commonly applied to cancer patients undergoing adjuvant treatment (Irving et al., 1998; Song et al., 2000; Vellone et al., 2006). Previous research showed that breast cancer patients with higher hopeful thinking (thoughts of the positive expectation of achieving one's goal, such as overcoming the disease) adapted better to the disease and had improved health status and quality of life (Irving et al., 1998; Taylor, 2000).

The main and novel aim of this study was to examine BPN experiences in colorectal cancer (CRC) patients during adjuvant chemotherapy treatment, and their associations with their motivation to continue living and coping with CRC, and their perceived psychological well-being. The viewpoints of patients, relatives, and healthcare professionals were included to provide a holistic view of the subjective experiences, attitudes, perceptions, and beliefs that patients have at this stage of their lives. The present research was consequently grounded in a qualitative design to collect in-depth information about the participants, and it led to the emergence of novel insights concerning the important role of hope to maintain motivation to cope with CRC in spite of BPN frustration. In this sense, this study extends the current literature on self-determination theory (Ryan & Deci, 2017), and hope theory (Snyder, 1989), and offers insights which could be used by health

professionals to support CRC patients' motivation and well-being during chemotherapy.

## Methods

### Participants

Ten CRC patients, ten relatives, and ten healthcare professionals ( $n = 30$ ) participated in this study. Patients were purposefully recruited between December 2017 and September 2018 from an oncology unit located in a public Spanish Hospital [University Hospital of Vinalopó, Elche]. Patients were five women and five men, aged between 42 and 75 years old ( $M_{\text{age}} = 58.8$ ,  $SD = 12.47$ ). They were diagnosed with colon ( $n = 6$ ) or rectal ( $n = 4$ ) adenocarcinoma, at Stages II and III, and were treated with adjuvant chemotherapy (Capecitabine, CAPOX, or FOLFOX) for 3 or 6 months, between 4 and 7 weeks after surgery. To be interviewed, included CRC patients had to be more than 18 years of age, be diagnosed with CRC at Stage II-III, be treated with chemotherapy preceded by curative surgery for colon or rectal cancer, and to be in the middle of chemotherapy treatment.

Relatives were those family members who cohabited with patients and were the main caregivers of each patient throughout the treatment. They included five husbands, two wives, one sister, one son, and one daughter (23–75 years,  $M_{\text{age}} = 50.90$ ,  $SD = 17.14$ ). Finally, healthcare professionals comprised the whole oncologist team that treated these CRC patients. The team consisted of one psycho-oncologist, four oncologists, and five nurses (four men and six women), aged between 35 and 55 years ( $M_{\text{age}} = 40.80$ ,  $SD = 7.70$ ). The psycho-oncologist had an initial meeting with the patients of 1 h, and a meeting of 40 min per month until recovery. The oncologists attended the patients in consultations of 15–20 min every 2–3 weeks during treatment. The nurses were with the patients during an extraction for an initial blood analysis and approximately 1 h during the 4-h chemotherapy sessions (6–12 sessions along 3–6 months).

### Procedure

Several meetings were held between the research group and the healthcare professionals of the oncologist team to explain the purpose of the study and to establish collaborative bridges between the two groups. Once the healthcare professionals had agreed to participate, the oncologists were responsible for recruiting patients during their usual medical consultations and encouraging them to participate in the present study. The patients who showed interest (100% of the patients) were subsequently contacted by phone by the first author of this study (MR), to set an individual meeting to conduct a semi-structured face-to-face interview.

The participants' interviews were performed to identify and explore their BPN experiences (autonomy, competence, and relatedness), motivation to continue living, and well-being during adjuvant chemotherapy treatment. This data collection technique was chosen because it allows collecting open-ended data, and delving deeply into participants' thoughts, feelings, and beliefs which are sometimes associated with sensitive issues (DeJonckheere & Vaughn, 2019). According to the advice and recommendations given by the healthcare professionals, patients were interviewed when they had received half of the adjuvant chemotherapy cycles. This stage was considered as 'ideal' because at the beginning of the treatment, patients are in a difficult psychological stage due to their new condition, whereas at the end, they are more affected by the side effects of the chemotherapy (e.g., toxicity).

MR also conducted semi-structured interviews with the healthcare professionals and the patients' relatives, to know their opinions about the patients' BPN experiences, motivation to continue living, and well-being during chemotherapy treatment. All the relatives who were requested also agreed to be interviewed.

When analyzing this first set of interviews to patients, relatives, and healthcare professionals, the concept of 'hope' and its sources emerged inductively (see Data Analysis). Therefore, a second set of interviews was carried out, just with patients, to know in depth the subjective meaning of the hope construct for them, their' sources of hope, and the influence of hope in their psychological health during the treatment.

All participants were given the choice of being interviewed in whatever quiet place they preferred (e.g., research center at the university, patients or relatives' home, hospital rooms). Questions for patients, relatives, and healthcare professionals were developed by MR in consultation with DG, VB and AJ (initials of the other members of the research team), who had expertise in qualitative research and health promotion. The final script of the questions was sent to the oncologist team, who supported its structure and content (see the script of questions in Table 1).

This research was approved by the Ethical Research Boards of University Hospital of Vinalopó and Miguel Hernández University of Elche. All participants were informed about the aim and procedures of the study before the interviews, and provided written consent. We tried to avoid very technical psychological terms and, therefore, patients were told that the general objective of this study was to examine patients' experiences, motivation to continue living and coping with CRC, and well-being during chemotherapy treatment. The participants' anonymity and confidentiality were guaranteed using coded identification numbers.

## Data Analysis

All semi-structured interviews were audio-recorded and transcribed verbatim by the interviewer with a word processor.

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

*a) Questions about BPN experiences during adjuvant treatment*

Patients, relatives, and healthcare professionals\*

- Do you feel competent in your daily life activities?
- Do you feel autonomous (with freedom to decide and to perform daily activities by yourself)?
- Do you feel that your social relationships are improved or worsened? How does cancer affect your social life?
- In general, how do you feel during treatment?
- Despite the side effects of the treatment and the discomfort previously reported, what motivates you to continue living?

*b) Questions about hope during adjuvant treatment*

Patients

- What expectations do you have regarding the disease?
- What goal do you want to achieve?
- Do you think you have the means or solutions for your goal / to fight the disease?
- What means / solutions / do you use to reach the goal / fight the disease?
- Do you feel capable of finding a solution to combat the disease? Do you think you have the energy and motivation to achieve it? What does 'hope' mean to you?
- What things give you hope and what things take it away from you?
- What gives you strength and energy and what takes your strength and energy away?
- How do you think the evolution of hope has been throughout the treatment?
- Do you think that having hope makes you feel better, that is, that you feel more comfortable about the disease?

Questions are addressed to patients in the first section of the table, but were adapted to ask the same information to relatives and healthcare professionals

Transcriptions were analyzed using NVivo software, which was used to organize and store the data efficiently (Bazeley & Jackson, 2013). The qualitative data were analyzed following strategies of both 'directed' (deductive) and 'conventional' (inductive) content analysis (Hsieh & Shannon, 2005). As the study employed a BPNT perspective, the analysis started with a deductive phase to detect any type of information related to the purpose of the study. Concretely, all the transcriptions were read several times in detail to become familiar with the data. After that, the text fragments which represented key concepts about BPN experiences, motivation to continue living, and perceived psychological well-being of CRC patients were identified and coded. Then, beyond BPNT, in an inductive phase of the analysis, the research team identified several experiences, thoughts, and reflections reported by patients and relatives which had to do with the concept of 'hope' and 'hope sources', as a means to be motivated to cope with CRC in spite of BPN frustration. Therefore, a second set of interviews was performed to inductively explore the meaning of hopeful thinking for these patients and their sources of hope at that time. This round of interviews was also used to cross-examine and deepen issues related to the first set of interviews, to avoid gaps in the data.

Finally, all the information, which had previously been coded (deductively or inductively), was classified in three

main categories; ‘basic psychological need frustration’, ‘hope as a source of motivation’, and ‘sources of hope’. This last category included several subcategories: ‘positive attitude’, ‘religious faith’, ‘receiving positive feedback from physicians’, ‘knowing the short-term of chemotherapy treatment’, and ‘comparison with other patients in a worse condition’.

The process of data analysis, which was led by MR, was supervised by the other members of the research group (DG, VB and AJ), who played the role of ‘critical friends’ (Smith & McGannon, 2018). Concretely, in a series of three meetings, MR presented the data analysis using diagrams, described the codes included in the different categories, and responded to the questions and suggestions of the critical friends. The critical friends helped their colleague to refine the names and contents of the obtained codes and categories, in order to achieve a more coherent map of interrelated categories and subcategories. The final map of categories and subcategories sustained the headlines and structure of results presented in the following section. The critical friends also collaborated to improve the write-up of the analysis and the entire article. The inclusion of other researchers during the data analysis process improved the quality of interpretations and favoured a more rigorous data analysis (Smith & McGannon, 2018).

## Results

This section describes the BPN frustration experiences in CRC patients during the process of adjuvant chemotherapy treatment. Data concerning motivation to continue living related to the hope construct, and several hope sources which allowed patients to cope more adequately with the treatment, are also presented.

### Basic Psychological Need Frustration

According to many informants, overall, chemotherapy caused a change in the patients’ daily lifestyle. This condition led patients to abandon several social plans, resulting in the frustration of their need for relatedness. Patients reported feeling less connectedness with their friends for not being able to participate in the same activities as them:

‘During the treatment, I don’t go out with friends because they usually go to some places where I can’t go... they drink some beers until late into the night and I can’t keep up with them... Only hello and goodbye, I have lost my group of friends ...On Saturdays we used to go to see football together, on Tuesdays to the bar to play cards, and now I can’t...’ (01, patient).

This issue was also reported by the patient’s wife, who said, ‘He no longer goes with friends, I tell him to go to the

park, where he has friends who are retired, but he no longer feels like going. He says that he is muddled...now he has completely distanced himself from his social life...from his friends’ (09, relative). This situation also thwarted needs for autonomy and competence, as these negative effects of chemotherapy were not chosen and also patients did not feel able to maintain their social relationships.

The general negative effect of treatment on patients’ social life was related to several side effects that thwarted their BPN, such as fatigue, stoma (an artificial opening on the side of the abdomen for the evacuation of feces as a result of an operation), sexual problems, and neurotoxicity. In this vein, fatigue was reported by patients as a condition that negatively affected their well-being. They expressed notable feelings of ‘uselessness’ and ‘dependency’ in daily activities, which would reflect competence and autonomy frustration:

‘I spend all day at home because I can’t do anything, and I’m not in the mood. Even my sister has to shower and dress me... I feel very tired, even when she washes my hair... I have to sit down so that my sister can shower me. I don’t have any strength and I feel more dependent on everyone for everything... I feel useless because I can’t do anything. To get up, to go to the toilet, to sit down, they have to help me with everything... I can’t go up the stairs of my house, I have to stop... my sister comes up, crying when she sees my face... I don’t want to leave home because I can go down the stairs, but going up the stairs is impossible’ (05, patient).

Furthermore, fatigue led patients to stay at home and prevented them from participating in group activities, leading to relatedness frustration. For example, a patient said ‘I used to have more relationships, but now I don’t feel like it anymore... because the chemotherapy exhausts me, and I don’t feel like interacting’ (01, patient).

As reported by several healthcare professionals, the stoma pouch that some patients carried also affected relatedness negatively. Patients did not entirely enjoy social events because of stoma management:

‘Many patients with a stoma pouch feel ashamed to go out and they participate less in group activities because the stoma makes noise, and patients feel embarrassed, because gas comes out and they can’t control either the sound or the smell’ (04, nurse).

Accordingly, patients informed that stoma characteristics restricted them from performing some activities such as eating certain foods and bathing in the pool. This would also frustrate their need for autonomy, as the stoma restricted some activities and foods, compromising their active engagement in the

decision-making process. Competence need was also frustrated, as it was very difficult to experience success in life with so many things that patients could not do:

‘Two days ago, I tried to eat mandarin oranges and the stoma pouch was swollen and I had to discard the stoma pouch every hour because of the gases it contains... the same happens with artichokes, broccoli, cauliflower... I have to replace the stoma pouch every hour and it limits being able to go anywhere’ (01, patient).

‘The stoma is awful, and it makes me feel ashamed when I go out on the street. Before leaving home, I think it over carefully. Also, when I go to my country house, I can’t take a bath in the swimming pool, then I leave because it is not comfortable to see people bathing when I can’t’ (04, patient).

Additionally, patients reported sexual problems due to chemotherapy side effects and surgery. Patients experienced pain, lack of desire, and inefficiency, which negatively affected their autonomy, competence, and relatedness. Patient 10 said, ‘I have stopped having sexual relations because I don’t feel like having them. I notice less lubrication, and the scar hurts me when I am penetrated, and I have stopped until I finish the treatment... also the libido decreases because you no longer have your period’.

Another collateral damage of chemotherapy was neurotoxicity, which was manifested with trembling when patients touched cold objects, and tingling feet. Patients expressed their awkwardness when they tried to pick up something with their fingers, experiencing both autonomy and competence need frustration related to kitchen tasks:

‘I start doing something and I can’t. I get a trembling in my fingers when I touch the fridge, things fall out of my hands, it is due to the treatment... I feel more dependent on everyone for everything and useless because I can’t do anything...’ (05, patient).

‘The most affected part are the hands...I can’t take things out of the fridge. Then my husband must do it. I feel more dependent. If he is not at home, I take things out of the fridge but wearing thick gloves. Even at lunchtime, I feel an uncomfortable coldness when I pick up the cutlery’ (07, patient).

### Hope as a Source of Motivation

Most patients mentioned the construct of hope when they were asked about the origin of their motivation to continue living and coping with CRC. They reported that the hope of overcoming CRC, of recovering their previous lives, and

continuing to enjoy their family motivated them throughout the chemotherapy treatment, despite their frustrated BPN:

‘For me, hope is to think that I have a lot to live for; now I think day to day... Cancer makes you realize that life is too short and that you have to enjoy it... For me, hope is to live a long time and for nothing bad to happen to you’ (09, patient).

‘The hope that I will overcome cancer. If you lose hope, you will no longer have energy to get out of bed. Hope of overcoming cancer motivates me every day’ (01, patient).

‘I have never lost hope. My hope is to recover my life, and to see my grandchildren grow up, so I fight every day. What gives me strength and energy is the idea of getting well and returning to my normal life. My life has been perfect, and I hope to recover my health and to have time to enjoy my life again, because I love my family very much. Nothing will take away my hope, I am convinced that this will be overcome’ (06, patient).

The identification of overcoming CRC to recover normal life and continue enjoying the positive aspects of life (e.g., family love), as the goal of patients’ hope, was also reflected by relative 03: ‘My father is motivated to live and to see his grandchildren, to see them grow up and to enjoy them. My daughter was born when his illness began and that encouraged him a lot’.

### Sources of Hope

The following section provides participants’ comments about some aspects that fostered and nurtured their hope of overcoming cancer (desired goal) and motivated them to cope better with the disease during adjuvant treatment.

#### Positive Attitude

Patients reported that a positive attitude toward CRC motivated them and increased their hope of recovering in the future:

‘I have always thought positively, that I’m going to overcome cancer, and these thoughts motivate me to feel better every day’ (03, patient).

‘What I most try to do is to laugh and to have a positive attitude, in order to face the disease and feel hope of recovering. Attitude is very important for me’ (02, patient).

This fact was also expressed by some relatives, ‘He [patient] is very positive, and I think that it has helped him a lot to face the disease’ (07, relative).

## Religious Faith

Faith in God was another issue that increased some patients' hope. Beliefs about the existence of a higher being, along with prayer, raised their hope of overcoming the disease.

'I don't go to Mass, but I have faith in the Virgin and in God. I believe in those who are beyond us and that they will help me... my wife has made a promise to Christ, and we pray although I don't like going to church. Believing in God, like everyone, gives me hope to overcome the disease' (04, patient).

'Religious faith has helped me a lot. I have taken the cord of Jesus Christ (a religious necklace) that I had in the brotherhood. As I could not go up to dress Him [the statue of Jesus Christ], I have taken that, and every day I thank him for being alive' (03, patient).

## Receiving Positive Feedback from Physicians

Many patients stated that physicians' positive comments about the amelioration of the disease were a source of hope. For instance, patient 04 said: 'The fact that doctors tell you that everything is fine gives you hope'. Also, patient 02 said: 'I think about getting ahead and I like the doctors to tell me that everything is going well; that gives me great joy'.

Additionally, physicians mentioned to patients that, with the evolution of medicine, carrying a stoma nowadays does not imply a worse prognosis. This message also promoted patients' hope: 'If the doctor tells me that there is a lot of life expectancy even if I wear this (the stoma pouch), that encourages me a lot, and I believe there is more hope. This is not like before, when, if you were operated, you were going to die soon' (04, patient).

## Knowing the Short-Term of Chemotherapy Treatment

Being aware that they were going to receive a short-term chemotherapy treatment also heightened the beliefs about life expectancy and, therefore, patients' hope and motivation to continue living and coping with CRC: 'The worst is now, during the treatment, it's a terrible time but I know it's temporary and it will end... For me, the fact that it's a short time gives me the strength to fight every day... You know it's temporary and that it's going to end and that motivates you' (08, patient).

A relative supported this idea and stated that longer duration of treatment would make patients despair: 'The fact that there is very little time until finishing the treatment gives him hope of overcoming cancer and encourages him to think that it's something temporary that will end and a door will be closed forever ... I think that if doctors told you that treatment

lasts two years, it would be more overwhelming; six months is like it isn't so serious' (07, relative).

## Comparison with Other Patients in a Worse Condition

Some patients found the hope of recovering through the perception that other patients were undergoing harder conditions: 'Seeing other people who are worse off than me encourages me because I am better off and then I think I am going to recover' (02, patient). This was also stated by some relatives: 'Another thing that gives him hope is to see that there are other people worse off than him. I think that seeing people that are worse off makes him feel that he should be happier, because other people are going to die' (09, relative).

## Discussion

To our knowledge, this is the first study that has attempted to explore the psychological experiences of CRC patients in treatment from a BPNT perspective. Theoretical frameworks are needed to delineate the constructs involved in the psychological processes associated with the (non)adherence to health behaviors, in order to develop effective intervention strategies (Biddle et al., 2012). However, there is a lack of studies about motivational processes that lead to maladaptive behaviors and diverse detrimental outcomes that affect general ill-being in people diagnosed with cancer. The purpose of our study was to explore the BPN experiences in CRC patients undergoing adjuvant chemotherapy treatment, and their relationship with their motivation to continue living and coping with CRC, and their perceived psychological well-being.

We found that patients' thwarted BPN was due to several factors associated with the treatment, such as the chemotherapy process itself, fatigue, wearing a stoma pouch, sexual problems, and neurotoxicity. As other authors mentioned (Clifford et al., 2018; Fallon, 2013; Vrieling & Kampman, 2010), cancer treatment implies several side effects that negatively impact on patients' functioning. Our study provides insights about autonomy, competence, and relatedness frustration in CRC patients as a consequence of these adverse effects. Receiving chemotherapy regularly led patients to feel autonomy frustration because they could not avoid its negatives impact and carry on with their normal life. They reported not being able to perform the same social plans, also feeling less connected to their environment, which thwarted their need for competence and relatedness. Moreover, we found that the fatigue and neurotoxicity associated with chemotherapy thwarted the need for autonomy, competence, and relatedness in many CRC patients.

In this regard, a study with morbid obese patients (Megias et al., 2018) found that personal limitations and health problems associated with the disease thwarted their BPN. Similar results

were found in a study with breast cancer patients, who reported difficulties participating in social events and feelings of family dependence and inefficacy in activities such as taking a shower, climbing the stairs, or kitchen tasks (Curt et al., 2000).

Additionally, our research revealed that wearing a stoma pouch entailed living with clinical features (i.e., bowel changes, uncontrolled gases), which prevented patients from eating certain foods or participating in social activities. As other authors have pointed out (Vonk-Klaassen et al., 2016), this situation hindered their adequate interaction with the close environment, and negatively affected their quality of life. We also observed that sexual problems associated with the lack of lubrication and libido (produced by chemotherapy) and with pain due to the surgery scar thwarted BPN. These sexual problems have been described in the literature about CRC patients (Hendren et al., 2005; Vonk-Klaassen et al., 2016).

According to BPNT, BPN frustration leads to controlled motivation and maladaptive psychological outcomes, mainly depression and anxiety (Pitman et al., 2018). As previous research claimed (Ng et al., 2015; Tang et al., 2017), cancer patients who presented symptoms of depression and anxiety also perceived low global wellness and physical, role, cognitive, emotional, and social functioning over time. Despite our information about BPN frustration in CRC patients undergoing adjuvant treatment, most patients unexpectedly expressed feelings of positive motivation to continue living, attributing them to the concept of hope. Hope can be defined as a confident but uncertain expectation of attaining a good future, based on setting realistic and meaningful goals for the person (Dufault & Martocchio, 1985). Hope is a significant motivating and coping factor in the face of adversity (Sanatani et al., 2008). In clinical settings, hope was identified as an essential feature for enhancing coping mechanisms in patients diagnosed with severe illness such as cancer (Chi, 2007). Other authors have also observed that hope was linked to goal setting, positive personal attributes, future redefinition, meaning in life, peace, and energy (Owen, 1989).

Few constructs have been more frequently linked to health and well-being as hope (Scioli et al., 2016). Consequently, previous researchers have identified the positive effects associated with the hope construct in cancer patients, such as less anxiety, pain, and depression, and higher well-being, psychological adjustment, meaning in life, perceived health status, and healthier habits acquired (Benzein & Berg, 2005; Taylor, 2000; Vellone et al., 2006). Moreover, oncologists declared in a survey that hope is the single most important psychological factor impacting on mortality (Cousins, 1989).

Our study upholds the powerful role of hope as a source of motivation in CRC patients during adjuvant treatment. This finding is in accordance with previous qualitative research in palliative patients (Nierop-van Baalen et al., 2016), revealing that hope can give patients energy to fight the disease, continue living, recover their previous life, and see their grandchildren grow

up. Therefore, the novelty of these results lies in discussing the role that hope plays from a SDT perspective, in order to enhance the integral psychological well-being throughout the cancer. From our point of view, hope could reinforce autonomy, competence, and relatedness when they are hard to satisfy because of the harmful consequences of cancer treatment. In this regard, one study tested the reciprocal longitudinal interactions between the components of the hope theory and BPN satisfaction in the work environment (Wandeler & Bundick, 2011). The authors concluded that trainees' hope development can benefit from perceived professional competence, which in turn also positively influences future perceived levels of competence. Further research on the hope construct within the SDT framework is required, to comprehend its moderating role between BPN, motivation, and CRC patients' well-being during adjuvant treatment. Hope may act as a moderator between BPN frustration and well-being, so that if hope is high, the negative impact of BPN frustration on motivation and different outcomes may be attenuated.

Additionally, this study also revealed several sources of hope that gave CRC patients the motivation to continue living and facing adjuvant treatment. We found that hope was fostered by a positive attitude, religious faith, positive medical feedback, a short-term chemotherapy treatment, and comparison with other patients in a worse condition. These results are in line with previous studies (Nierop-van Baalen et al., 2016; Sanatani et al., 2008) and a review about the role of hope in cancer settings (Chi, 2007), which pointed out that the most common strategies to increase hope were religion and prayer, living the present, relationships and talking with others, achieving control of their situation and symptoms, positive thinking, and uplifting memories.

This study presents some limitations. On the one hand, CRC patients were interviewed when they were undergoing chemotherapy, an aspect which hindered the collection of a larger number of patients. However, the information obtained provides a significant contribution to our comprehension of the factors that thwart BPN during adjuvant chemotherapy treatment and, very importantly, we inductively identified the role of hope as a key construct to take into account from a SDT perspective in this population. Moreover, the participants were interviewed two times and their relatives and healthcare professionals were also interviewed, aspects which reinforced the method of this qualitative study. On the other hand, the interviews were performed in the middle of the CRC patients' treatment, so the findings cannot be generalized to other cancer populations and stages on the cancer continuum. Nevertheless, this qualitative study offered in-depth and rich data about the subjective perspectives of the patients' experiences during a very delicate and important phase of their lives, which is underexplored due to the difficult access to participants with this profile. Future longitudinal studies could collect more detailed information about the changes in BPN frustration, as the treatment involves many physical and

psychological changes over time. Additionally, quantitative studies are needed in order to explore the construct of hope as a hypothetical moderator between BPN and CRC patients' well-being during adjuvant treatment.

In summary, this study showed that CRC patients at Stages II and III have frustrated BPN during the treatment, although the hope to go on living motivates them throughout the process. Intervention programs aimed at improving patient's well-being should consider the factors that thwart their BPN and reinforce hope sources. In this regard, health professionals should promote patients' positive attitude and show a realistic/evidence-based, but caring and supportive, communication style. They should be very respectful of patients' religious faith and help patients (believers or non-believers) to face the disease and find psychological well-being during treatment. The establishment of clear and short-term health goals may also be desirable, so that patients do not feel overwhelmed and confused during CRC treatment. Finally, although comparisons with other concrete patients would be ethically problematic, it seems appropriate that patients with a good prognosis should be made aware of the fact that there are more complicated cases. This idea could help patients to analyze their problem with perspective, and promote their acceptance, gratitude, positive attitude, and hope.

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**Data Availability** Data available on request due to privacy/ethical restrictions: The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## Declarations

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

**Conflict of Interests** The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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