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Exploring variables affecting sense of coherence and social support in recovery after colorectal cancer surgery among the oldest old

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ABSTRACT

Objective: To explore the associations between sense of coherence, perceived social support, and demographic and clinical characteristics among survivors ≥ 80 years treated for curable colorectal cancer.

Methods: This exploratory, cross-sectional survey investigates 56 individuals surgically treated for stage I–III colorectal cancer between one and five years prior. Statistical analysis permitted exploration of associations between sense of coherence, perceived social support, and demographic- and clinical variables.

Results: Lower sense of coherence was associated with higher age, limitations in physical function, and the need for homecare nursing. Lower perceived social support was associated with re-admission, higher age at time of surgery, and male gender. No correlations were found between sense of coherence and perceived social support.

Conclusion: The results are important for healthcare professionals to consider when dealing with older people who underwent surgery for colorectal cancer, especially in the discharge process to facilitate optimal follow-up care and recovery.

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Introduction

Colorectal cancer (CRC) is the third leading cancer worldwide with approximately 1.9 million people affected annually.¹ CRC is a disease of older people; median age at diagnosis is 72 years in Norway.² With increased life expectancy, CRC prevalence will rise in the coming decades. Surgery is the cornerstone of cure and left untreated CRC is a fatal disease accompanied by complications and suffering.³ In Norway, the post-operative care for patients ≥ 80 years after curative CRC surgery is determined individually rather than by means of systematic follow-up programs.⁴ An excessive post-operative mortality rate among older CRC patients was observed after the first post-operative year, although it has slightly decreased recently due to improvements in surgical techniques and enhanced operative care.³ Furthermore, older CRC patients are particularly at risk of post-operative complications, delayed recovery, and re-admissions.^{5,6} Two

thirds of older cancer patients report unmet social support needs after discharge⁷ with CRC patients reporting even lower social support levels than other cancer types.⁸ The main reasons for support after hospital discharge among older CRC patients are to sustain rehabilitation, provide practical assistance at home, wound care, stoma care, and safety.^{9,10} An important resource in recovery is support from family and friends.¹⁰ After the first post-operative year the survival rate among older CRC patients approximately equals that of the non-diseased population,¹¹ indicating a more stable phase in the recovery. However, reduced physical function and symptom burden can continue to affect recovery, everyday life, and coping capacity.^{12,13} Older individuals constitute a heterogeneous population with great variety in health status, comorbidity, coping capacity, social support, as well as functional and cognitive impairment.^{14,15} Recovery from CRC surgery in older individuals varies between being manageable and strenuous, requiring individual ways to cope with postoperative challenges in daily life.

The Salutogenesis theory has been proposed by Antonovski as a way to explore coping capacity¹⁶ in older CRC patients. This theory introduced the term *sense of coherence* (SOC), i.e., an individual health

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promoting resource, that determines how the individual manages stress.¹⁷ A strong SOC involves the following aspects: 1) Situational awareness where diagnosis, treatment, and impairments are comprehensible; 2) Stress is perceived as manageable due to sufficient internal and external resources; and 3) Life is perceived as meaningful despite the cancer diagnosis and challenges in recovery.¹⁶ Research shows that high SOC levels protect against negative health outcomes in an older general population.¹⁸ Antonovsky believed that SOC develops through life experience and stabilizes in adulthood.¹⁶ Major life events and professional interventions have been shown to alter individuals' SOC; however, this has not been explored in older patients after CRC treatment.^{19,20}

Factors that affect coping capacity are important for facilitating a better return to optimal function after surgery. The salutogenesis approach may be useful for revealing factors that affect recovery.¹⁶ Knowledge of the influence of demographic and clinical variables and the role of social support on coping capacity in older people surgically treated for CRC is limited. The present paper aims to 1) explore associations between SOC and demographic variables (gender, age, marital status, and living situation) and clinical variables (recipient of homecare nursing, function status, cancer site, severe postoperative complications, and readmissions), 2) explore perceived social support in association with demographic and clinical variables, and 3) test the hypothesis that high levels of perceived social support correlate with a high SOC score.

Material and methods

This study is an exploratory, cross-sectional analysis of survey data from patients ≥ 80 years at least one year after surgical treatment for CRC. To ensure quality reporting the study applied the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) checklist for cross-sectional studies.²¹ (see Appendix S1).

Participants and procedures

The participants were recruited from a hospital that provides surgical service to a population of 370,000 inhabitants in Norway. Inclusion criteria were patients surgically treated for stage I-III CRC between one and five years prior to the study who were ≥ 80 years at the time of surgery. Exclusion criteria were inability to understand and speak Norwegian and cognitive impairment. Patients matching the inclusion criteria were identified through a screening of the electronic patient record system. Invitations to participate in the study were sent to 120 eligible participants by mail in 2020 with detailed information about the study, a questionnaire, a consent form, and a reply envelope. The first author contacted patients who had consented to make an appointment for data collection through a telephone interview. Afterwards, clinical data were collected from patient records. Ten participants returned the questionnaire without the signed consent form. Consequently, data from medical records could not be retrieved for them. After three months, a reminder was sent to non-responders. One patient consented to participate in the study but was unable to conduct the survey by phone or return the survey by mail and was thus excluded. The Regional Ethics Committee of Western Norway (REK vest 2017/1739) approved the study.

Measurements

Demographic variables such as gender, age, marital status, cohabitation, and recipient of homecare nursing were collected. Clinical variables on comorbidity, tumor characteristics, and treatment were collected from electronic medical records. Physical function was assessed by the Eastern Cooperative Oncology Group (ECOG) scale of

Performance Status.²² Postoperative complications were graded according to the Accordion Severity Grading system.²³

The Sense of coherence scale (SOC-13) is a 13-item questionnaire that measures patients' capacity to cope by assessing how they handle stress and remain healthy. The SOC-13 consists of the following domains: manageability (four items), comprehensibility (five items), and meaningfulness (four items) with a 7-point Likert scale. The total score ranges from 13 to 91 points, where a higher score indicates a stronger SOC.¹⁶ As recommended by the author, the questionnaire is presented in one sum score.¹⁷ The questionnaire has been validated with high internal consistency, assessed by Cronbach's α test.²⁴ It has been translated into numerous languages and found to be applicable across many cultures,²⁴ thus effective in an older Norwegian population.^{25–27} Internal consistency of the SOC-13 in the present sample was acceptable (Cronbach's $\alpha = 0.83$).

The Medical Outcomes Study- Social Support Survey (MOS-SSS) is a 19-item questionnaire that captures how often various types of support were perceived to be available.²⁸ The MOS-SSS assesses four subscales: emotional/informational support (eight items), tangible support (four items), affectionate support (three items), and positive social interaction (four items), in addition to one extra item. A higher score indicates a greater level of perceived social support. The questionnaire is rated on a 5-point Likert scale. The questionnaire has been used to assess the perceived social support levels of cancer patients, including those with CRC.^{7,29–31} The internal consistency of the MOS-SSS and the separate subscales in the present sample was acceptable (Cronbach's $\alpha > 0.83$).

Statistical analysis

Frequencies (n) and proportions described demographic and clinical data. The Chi-square test of independence was used to assess the difference between participants and non-participants. Non-normality of the data was revealed by the Kolmogorov–Smirnov test, resulting in non-parametric analysis being performed. The Mann-Witney U was applied to analyse associations between categorical demographic and clinical variables with SOC-13 and MOS-SSS. Spearman's correlation (ρ ; ρ) assessed relationships between ranked variables of demographic and clinical data with SOC-13 and MOS-SSS, with and without controlling for confounding variables (ρ_p) namely; age group, cancer site, gender, time since surgery, and physical function, with the exception of variables already in the analysis. 95% confidence intervals (95% CI) for Spearman's correlation were based on the bootstrap method with 1,000 samples. Spearman's correlation was evaluated according to Cohen's guidelines; 0.10–0.29 were interpreted as a small correlation, 0.30–0.49 represented a medium correlation, 0.50 and above were interpreted as a strong correlation.³²

One participant did not complete the MOS-SSS questionnaire and three had one missing item in the questionnaire. Another participant did not complete the SOC-13 and two had missing items in the SOC-13, where one had one missing item and the other had two missing items. Missing items were handled according to the specific analysis; pairwise for Mann-Witney U and Spearman's correlation and listwise for Spearman's partial correlation. Analyses were performed using IBM® SPSS® Statistics, version 26. A two-tailed p -value of less than 0.05 was considered statistically significant.

Results

Demographic and clinical characteristics

Of 120 eligible patients, 56 (47%) responded to the questionnaire (Fig. 1). Reasons for non-participation were not obtained. No significant differences were found between responders and non-responders regarding gender, age, cancer site, or time since surgery.

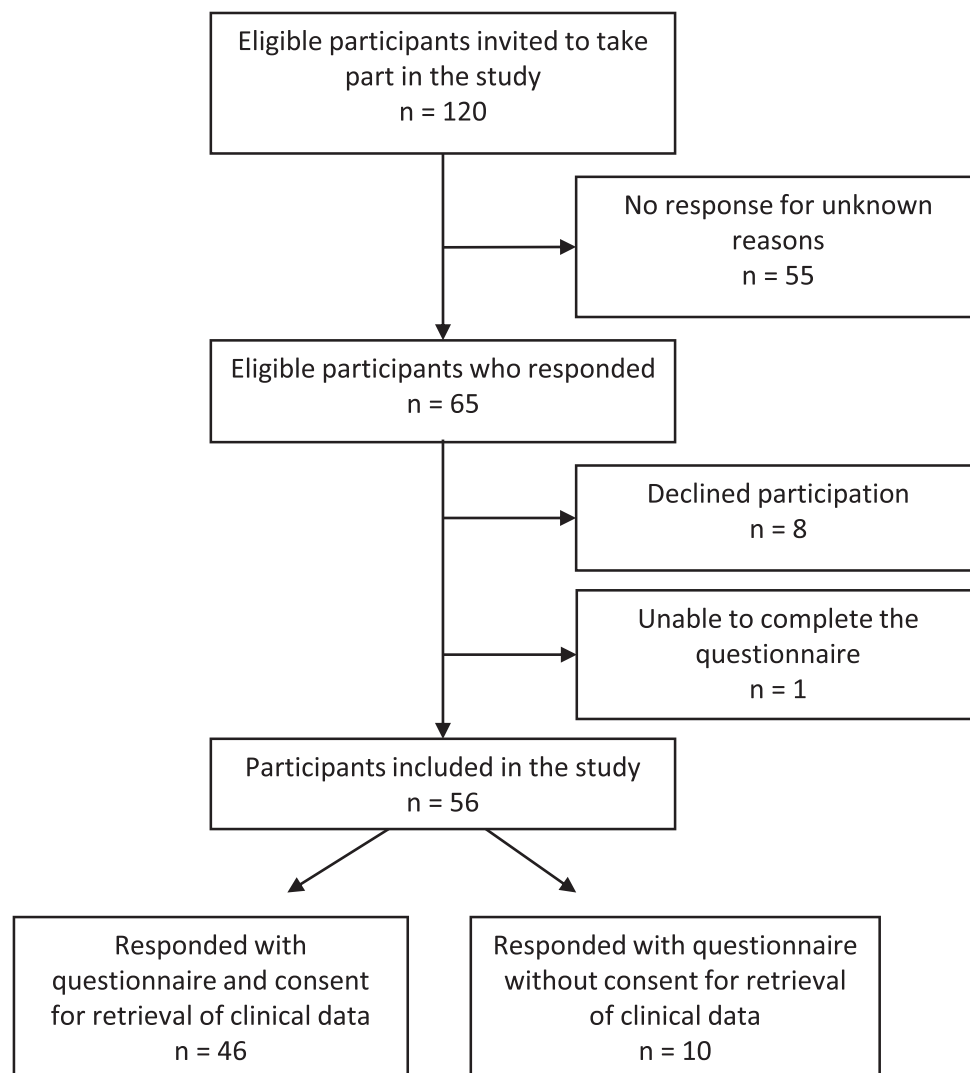


Fig. 1. Flow chart of the inclusion process.

Table 1 presents the participants' demographic and clinical characteristics. The median age of participants at the time of surgery was 83 years (range 80–90 years) and 86 years (range 82–94 years) when answering the questionnaire, a median time of 3 years (range 1–5) after treatment. Median length of hospital stay was 5 days (range 2–19 days). The most common severe postoperative complications were rectal bleeding, wound dehiscence, and acute kidney failure. The most common causes of readmission to hospital were deteriorated general condition, infection or acute abdominal pain, often within the first two weeks up to two months after discharge. Two participants were re-admitted due to the need for surgical intervention.

Relationship between the Sense of coherence scale and demographic and clinical variables

Median SOC scores were similar for male and female participants, indicating they had similar coping capacity after surgery, see Table 2. Participants who currently received homecare nursing had significantly lower SOC scores than participants who did not receive homecare nursing, see Table 3. The SOC score had a moderate inverse correlation with age at surgery ($\rho = -.33$, 95% CI = $-.058$, $-.558$, $p = .025$), although after checking for confounding variables the significance disappeared ($\rho_p = -.25$, $p = .110$). ECOG was found to have a

strong correlation with SOC score ($\rho = -.53$, 95% CI = $-.298$, $-.714$, $p < .001$) also after correcting for confounding variables ($\rho_p = -.47$, $p = .002$) i.e., participants with a high level of physical function had a significantly higher SOC score than participants reporting lower ECOG. No associations were found between the SOC score and the occurrence of severe complications, readmissions, or the other clinical or demographic variables.

Relationship between the Medical Outcome Study-Social Support Survey and demographic and clinical variables

The score of the MOS-SSS subscale 'affectionate support' was significantly lower in males compared to females ($p = .010$), see Table 2. As a group, females reported both higher total MOS-SSS and on all MOS-SSS subscales, indicating that females perceived all aspects of social support to be more available; however, not all findings were significant, see Table 2. A significantly higher level of 'affectionate support' and 'social interaction' were observed in participants who did not currently receive homecare nursing, see Table 3. Participants readmitted after discharge experienced lower levels of 'tangible support' compared to those not readmitted (median score 14.0 vs. 20.0, $p = .008$). Perceived 'tangible support' had a moderate inverse correlation with age at surgery ($\rho = -.30$, 95% CI = $.009$, $-.572$, $p = .045$) and

Table 1
Demographic and clinical characteristics of participants.

		N (%)	Missing
Gender	Male	17 (31.5)	2
	Female	37 (68.5)	
Age group	80-86	25 (54.3)	10
	87+	21 (45.7)	
Marital status	Single/ Widowed	34 (63.0)	2
	Married/Partners	20 (37.0)	
Cohabiting		24 (44.4)	2
Current recipient of homecare nursing		18 (34.0)	3
ECOG	Grade 0	9 (16.7)	2
	Grade 1	35 (64.8)	
	Grade 2	6 (11.1)	
	Grade 3	4 (7.4)	
Co-morbidity	Cardio-vascular disease	33 (71.7)	10
	Respiratory disease	7 (15.2)	
Cancer site	Colon	41 (89.1)	10
	Rectum	5 (10.9)	
TNM	Stadium 0	1 (2.3)	13
	Stadium I	12 (27.9)	
	Stadium II	16 (37.2)	
	Stadium III	14 (32.6)	
ASA	2	21 (45.7)	10
	3	25 (54.3)	
Type of surgery	Right hemicolectomy	28 (60.9)	10
	Left hemicolectomy, sigmoid- or subtotal colectomy	12 (26.1)	
	Rectal resection or amputations	6 (13.0)	
Postoperative complications	Mild and moderate: Grade 1 and 2	22 (47.8)	10
	Severe: Grade 3, 4, and 5	9 (19.5)	
Re-admissions		15 (32.6)	10
Presence of stoma	Never had a stoma	36 (78.3)	10
	Permanent stoma	5 (10.9)	
	Temporary stoma, reversed	5 (10.9)	

Abbreviations: ECOG, Eastern Cooperative Oncology Group performance status; TNM, Tumor-node-metastasis classification; ASA, American Society of Anesthesiologists grading system.

Note: Three participants underwent surgery for B-cell lymphoma, a tubulo-villous adenoma and hyperplastic polyps, thus not included in TNM classification. Postsurgical complications according to Accordion Severity Classification of Postoperative Complications.

current age ($\rho = -.34$, 95% CI = $-.034$, $-.641$, $p = .021$) also after correcting for confounding variables for age at surgery ($\rho_p = -.33$, $p = .035$) and current age ($\rho_p = -.41$, $p = .007$). There were no other significant findings in perceived social support between participants who experienced or did not experience severe postoperative complications.

Relationship between the Medical Outcome Study-Social Support Survey and Sense of coherence scale

No significant correlations were found between SOC score and total MOS-SSS score or the MOS-SSS sub-scale scores.

Table 2
Differences by gender in reported outcome scores on Sense of coherence and Medical Outcome Study-Social Support Survey.

	Males Median	Females Median	Total Median	Range	P
Sense of coherence Scale	67.5	69.0	68.0	34-91	0.831
Medical Outcome Study-Social Support Survey	70.0	84.0	79.0	32-95	0.115
Emotional/informational support	25.5	34.0	33.0	8-40	0.240
Tangible support	15.0	18.5	17.0	4-20	0.442
Affectionate support	11.0	15.0	12.0	3-15	0.010*
Positive social interaction	11.0	12.0	12.0	5-15	0.073

* $p < 0.05$.

Discussion

This study explored associations between SOC, perceived level of social support, and demographic and clinical characteristics among survivors ≥ 80 years treated for CRC. We found SOC to be associated with age at time of surgery, physical functioning, and current receipt of homecare nursing. Re-admission and gender were associated with perceived social support and/or its sub-scales. Our study found a negative correlation between age at surgery and SOC score. Antonovsky proposed that a major life event could result in a decline in SOC and people with an originally lower SOC were more susceptible to further decline.¹⁶ People with decreased SOC were especially vulnerable to challenging situations, resulting in less effective coping strategies and an increased mortality risk.^{33,34} Furthermore, according to Baltes and Smith,³⁵ one must be realistic about the aging process and its effects on individuals and their coping capacity. A part of the aging process is an escalation in decreasing control of bodily function, cognition, and relationships in addition to increased comorbidities.^{35,36} Thus, the morbidity associated with the surgical trauma may have a greater impact on individuals with a higher age.⁶ Because of the moderate inverse correlation between SOC score and the variable "age at surgery" found in our study, one can suggest that surgery becomes a particularly challenging life event with increasing age and further hypothesize that the oldest CRC patients may benefit from individualized pre- and postsurgical interventions with health promotion efforts.

Our study found that a high SOC score was associated with high physical function in terms of the ECOG classification, in accordance with other studies of older participants,^{18,37,38} although none within the context of recovery after CRC surgery. This association of high functional level in everyday life and a higher coping capacity underlines the need to address functional capacities during the treatment trajectory of older patients with CRC, and to focus on older people's wishes to maintain their activities in daily life after surgery.³⁹

A decline in physical function among older people surgically treated for CRC has been shown to influence independent living,¹⁰ which is in line with our finding of a significant association between lower SOC and the domain of "currently receiving homecare nursing". It is reasonable to assume that receiving homecare nursing is a proxy for declining physical function and loss of ability to perform activities of daily living. However, according to Antonovsky,¹⁶ external resources like homecare nursing should compensate for the lack of internal resources, and thus not be expressed in terms of lower SOC in this group. Therefore, one can question whether healthcare services target the symptom but do not solve the underlying cause. The possible associations between lower levels of SOC and the need for healthcare resources require further investigation.

We found that a lack of perceived tangible support was associated with unplanned hospital re-admission. This finding is in accordance with the study of a general surgical population by Graham.⁴⁰ In addition to observation and identification of changes in the older CRC patients during recovery, close supervision and support can alleviate everyday challenges. Inadequate care at home after discharge can lead to deterioration in a person's health that can require re-admission. In our study, 15 participants were re-admitted, several due to deterioration in their general condition. Further research is warranted to explore whether interventions with increased social support after discharge could reduce the number of unplanned re-admissions in this population. However, some post-operative complications after CRC surgery can appear after discharge such as anastomotic leakage or abscess. Because of the timespan between re-admission and data collection we cannot exclude that the decline in social support may have occurred over time. Other researchers have discussed if the decline in support during recovery could be an expression of prolonged burden experienced by caregivers.^{8,31} Family

Table 3

Differences in participant reported outcome on Sense of coherence and Medical Outcome Study-Social Support Survey between participants currently receiving and not receiving homecare nursing.

	Receiving homecare nursing Median	Not receiving homecare nursing Median	U	Z	P
Sense of coherence	62.0	73.5	411.5	2.90	0.004*
Medical Outcome Study - Social Support Survey	70.0	82.0	319.0	1.59	0.111
Emotional/informational support	30.5	33.5	312.5	0.84	0.396
Tangible support	16.0	19.0	377.5	1.41	0.156
Affectionate support	10.0	15.0	403.0	2.59	0.009*
Positive social interaction	9.0	13.0	486.5	3.52	<0.001*

*p <0.05.

members are expected to support the older CRC patient practically and emotionally during the cancer trajectory and recovery. This task can be exhausting and become a burden, thus leading to decreased support over time. Furthermore, we found that female gender scored higher on each subscale of the MOS-SSS. The relationship between gender and perceived social support among older CRC patients has been little explored, and with contradictory results.^{8,31}

This study found no correlation between the MOS-SSS and SOC. According to Antonovsky, social support has been presented as an external resource to manage stressful situations, with a clear beneficial relationship between social support and SOC.¹⁶ A quantitative study of Norwegian nursing home residents showed the importance of social support and SOC for health and wellbeing, although no correlation between the two concepts was described.²⁶ However, social support is a multifaceted concept with different types of measuring tools, an aspect that is beyond the scope of this study.

In addition to SOC, there are several other concepts that try to explain the inherent ability to cope with adversity, such as resilience,⁴¹ hardiness,⁴² and self-transcendence.⁴³ Resilience is the most common concept and entails the ability to “bounce back” despite encountering adversity.⁴⁴ SOC and resilience have a high empirical correlation and theoretical overlap.⁴⁵ SOC was chosen for this study as it has been used successfully within previous Norwegian cohorts.

Limitations and strengths

The present study is based on data from ≥ 1 year survivors ≥ 80 years treated for cure of CRC. Paradoxically, while older patients represent a major proportion of those diagnosed with CRC, most research is directed towards younger age groups. As older patients are generally more vulnerable compared to their younger counterparts, we think it is particularly important to address their ability to cope after major surgery. Our patients were recruited from the catchment area of our institution, which provides surgical service as single institution in a public healthcare setting. The participants represent the older patients who were able to participate in a study using standard tools such as the SOC and MOS-SSS and from this perspective, a 47% response rate can be deemed highly satisfactory. Our study population may be considered to have a reasonable distribution of age, functional status, tumor stage, and tumor location, and that our findings may be applicable to other populations with similar characteristics. However, the limited sample size increases the likelihood of a type II error due to limited statistical power. The participants may represent a selection of the healthiest patients who were probably more inclined to participate. The study was performed at the beginning of the COVID pandemic. Despite the fact that there were alarming rates of infection across the world, only 10,000 COVID-related deaths were registered in Norway out of a population of a little over five million inhabitants at the end of the data collection. Additionally, data collection was performed by phone without any face-to-face interaction between the researcher and the participants. Despite

societal lockdown, the restrictions in everyday life were limited compared to other countries. Therefore, the researchers consider the influence of the pandemic on the study as minimal. However, the authors cannot guarantee that the pandemic did not affect inclusion. Some of the eligible participants could have felt overwhelmed by the threat of the virus, and thus felt unable to participate in the study. Patients were included after one and up to five years after CRC surgery, and it is reasonable to assume that recovery after surgery has reached a stable level after 1 year. However, the possible influence of physiological decline in mental and physical functioning due to the aging process is hard to control for in the analysis. Therefore, time since surgery is used as a confounding variable in the correlation analysis. The ten questionnaires returned without the consent form are included in the study as we consider the act of completing the questionnaire and mailing it back to the researcher as an indication of consent. Further research is needed to explore the moderating effects of variables such as social support on SOC in datasets with a sufficient sample size.

Conclusion

Psychosocial aspects of recovery should receive greater attention when discharging older patients operated for CRC to facilitate optimal recovery and individualized follow-up care for an independent life at home. This study found that age at time of surgery, physical functioning, and need for homecare nursing was associated with coping capacity expressed as SOC. Furthermore, re-admission, age at time of surgery, and gender were associated with perceived social support. Our study found no correlation between SOC and perceived social support or any association between SOC and experienced post-operative complications or re-admission. Despite some limitations, we think that our study adds important knowledge on the ability of patients ≥ 80 years to cope with their life after major surgery for CRC. Further research is warranted to understand the relationship between psychosocial aspects and functional outcomes after CRC surgery.

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Supplementary materials

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