

Unmet Supportive Care Needs of Patients With Colorectal Cancer: Significant Differences by Type D Personality

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Colorectal cancer (CRC) is the fourth leading cause of death from cancer, accounting for 608,000 deaths worldwide annually (World Health Organization, 2013). The crude incidence of CRC increased from 19% in 2000 to 33% in 2009, but the global five-year survival rate increased from 69% to 75% via surgical resection (Andreoni et al., 2007; Bureau of Health Promotion, Department of Health, 2012; Paulson, Mahmoud, Wirtalla, & Armstrong, 2010). The number of patients with CRC receiving active treatment and survivors in Taiwan also is increasing (Lai et al., 2009).

Patients with CRC struggle with distress related to their daily lives during and after treatment. A substantial amount of evidence has demonstrated that physical (e.g., nausea, vomiting, fatigue) and psychological (e.g., anxiety, depression) distress accompany active treatment (Börjeson, Starkhammar, Unosson, & Berterö, 2012; Toftthagen, McAllister, & McMillan, 2011). After completing treatment, patients may continue to experience symptoms (e.g., fatigue, sleep disturbance, diarrhea, constipation) and late side effects (e.g., peripheral neuropathy, bowel dysfunction, pelvic fractures, urogenital dysfunction) (Schneider et al., 2007). Physical and psychological distress could increase the level of unmet supportive care needs, and high levels of unmet needs may decrease quality of life (Denlinger & Barsevick, 2009; Faul, Shibata, Townsend, & Jacobsen, 2010).

Supportive care needs in cancer commonly are found across many domains, including psychological, health system and information, physical and daily living, patient care and support, and sexual needs (Boyes, Girgis, & Lecathelinais, 2009; Schofield, Gough, Lotfi-Jam, & Aranda, 2012; Shih et al., 2009; Sutherland, Hill, Morand, Pruden, & McLachlan, 2009). Previous studies have found that disease and treatment status,

Purpose/Objectives: To explore the association between supportive care needs and type D personality, and to identify personality traits, including negative affectivity (NA) and social inhibition (SI), and their influence on the supportive care needs of patients with colorectal cancer (CRC).

Design: Cross-sectional, correlational survey.

Setting: Oncology and surgical outpatient clinics at a medical center in northern Taiwan.

Sample: 277 patients diagnosed with CRC.

Methods: Data were collected using a set of structured questionnaires to measure supportive care needs, symptom distress, anxiety, depression, and personality traits. The associations between type D personality and supportive care needs were verified by the Mann-Whitney U test. The significant roles of personality traits were identified by generalized estimating equations, controlling for biophysical and psychological factors overall, and for the five supportive care domains.

Main Research Variables: Supportive care needs, type D personality.

Findings: Patients with CRC reported the most unmet needs in the health system and the information domain. Type D patients had higher needs overall and in most domains, except for sexuality needs. A higher level of NA indicated higher overall and psychological needs. A higher level of SI indicated lower needs in health system and information.

Conclusions: The level of unmet supportive care needs of patients with CRC is highly associated with type D personality. The trait of NA alters levels of overall supportive care and psychological needs, and the trait of SI influences needs in health system and information.

Implications for Nursing: Assessing personality traits before providing an education program is highly recommended for patients with cancer. The assessment could improve the quality of personalized education programs and better meet patient needs.

Key Words: supportive care, colorectal cancer, personality

demographic factors (e.g., age, gender), physical and psychological factors (e.g., symptom distress, anxiety, depression) may be related to unmet supportive care needs (Campbell et al., 2010; McDowell, Occhipinti, Ferguson, Dunn, & Chambers, 2010; Sanders, Bantum, Owen, Thornton, & Stanton, 2010).

Researchers have pointed out that the level of satisfaction with supportive care needs may be affected by personal characteristics, such as type D personality (Butow et al., 2012; Mols, Oerlemans, Denollet, Roukema, & van de Poll-Franse, 2012). Type D personality, also called distressed personality, is associated with two personality traits, negative affectivity (NA) and social inhibition (SI) (Denollet, Pedersen, Vrints, & Conraads, 2006; Ferguson et al., 2009). NA indicates the tendency to experience negative emotions, and SI indicates the tendency to inhibit the expression of emotions and behaviors in social interaction (Denollet, 2000, 2005; De Fruyt & Denollet, 2002). People with high levels of NA and SI are classified as having type D personality (Denollet, 2005). Previous studies have demonstrated that people with cancer who have type D personalities perceived higher levels of symptom distress, anxiety, and depression, and poorer quality of life (Mols & Denollet, 2010a; Mols, Denollet, Kaptein, Reemst, & Thong, 2012; Mols, Holterhues, Nijsten, & van de Poll-Franse, 2010; Shun et al., 2011). Patients with CRC who have a type D personality may experience more unmet needs.

According to a large survey of 3,080 cancer survivors, type D personality among patients with CRC has been found to be an independent predictor of poor health status and quality of life and increased healthcare use, with more visits to general practitioners and specialists (Mols, Denollet, et al., 2012; Mols, Oerlemans, et al., 2012; Shun et al., 2011). A study examining older adults noted that a higher level of neuroticism, a trait that was positively correlated with NA, was associated with greater awareness of future care needs (Sörensen, Duberstein, Chapman, Lyness, & Pinguart, 2008). Patients with higher levels of NA perceived more negative outcomes, which is linked to higher levels of worry and anxiety and requires more support (Sörensen et al., 2008). Those with higher levels of SI tended to avoid problem solving (Sörensen et al., 2008).

To the authors' knowledge, no study has focused on the relationship between personality traits and supportive care needs in patients with cancer. The aims of the current study were to explore the association between supportive care needs and type D personality, and to identify the roles of NA and SI after controlling for biophysical and psychological factors in patients with CRC who were undergoing active treatment or had completed treatment. The results could help healthcare providers to better understand unmet care

needs based on personality traits, as well as to develop and offer personalized education programs.

Methods

Design

A cross-sectional survey with convenience sampling was used. Potential participants were recruited from surgical units and outpatient clinics in the oncology and surgical departments of the National Taiwan University Hospital. Eligible participants were adults aged 18 years or older who were diagnosed with CRC and had completed treatment or were undergoing active treatment. The study was approved by the institutional review boards of the hospital, and patient consent was obtained prior to data collection. The questionnaires were completed item-by-item by two research assistants who conducted interviews with patients as they arrived for follow-up visits or with patients hospitalized in surgical wards. All completed questionnaires were usable. Of the 330 eligible patients approached, 277 completed the data-collection process from March 2009 to October 2010. The sample size of 277 reached over 99% power in the current study (Cohen & Cohen, 1983).

Instruments

Data were collected using a structured questionnaire consisting of the Chinese version of the **Supportive Care Needs Survey–Short Form 34 (SCNS-SF34)** (Boyes et al., 2009), the modified **Symptom Distress Scale (SDS)** (Chen, Liao, Lin, Chang, & Lai, 2009), the **Hospital Anxiety and Depression Scale (HADS)** (Zenger & Liang, 1986), the 14-item **Type D Scale (DS-14)** (Denollet, 2005), and a background information form.

The SCNS-SF34 is a 34-item survey in which participants rate their care needs. It consists of five domains: psychological, health system and information, physical and daily living, patient care and support, and sexuality. The respondents rate their needs from 1 (no needs) to 5 (high need for help). The scores in each domain are summed and can be analyzed as the total of all items in the domains. Standardized scores range from 0–100 for each domain (McElduff, Boyes, Zucca, & Girgis, 2004). Higher scores indicate greater unmet care needs. The Chinese version has been tested on patients with cancer with a Cronbach alpha of 0.91 in Taiwan (Chen et al., 2009). The Cronbach alpha for the Chinese version SCNS-SF34 in this study was 0.92.

Symptom distress was assessed by the modified SDS from the week prior to conducting the questionnaire. The 23-item scale was modified from the SDS (McCorkle & Young, 1978) by Lai et al. (2009). The Likert-type scale ranges from 1 (no distress) to 5 (as much distress as possible). A higher score indicates a greater

level of symptom distress. A previous study using the scale to test patients with CRC showed a Cronbach alpha of 0.78 (Shun et al., 2011). The Cronbach alpha for the current study was 0.76.

The 14-item HADS was used to assess patient anxiety and depression (Zeger & Liang, 1986). Each item was scored from 0–3, and each subscale was summed to produce a score ranging from 0–21. Higher scores indicated higher levels of anxiety and depression. It has been used in patients with cancer in Taiwan with good reliability (Cronbach alpha = 0.81–0.92) (Chen et al., 2009; Shun et al., 2012). The Cronbach alphas for the anxiety and depression portions of HADS in the current study were 0.87 and 0.67, respectively.

The DS-14 is a 14-item scale developed to assess two characteristics of type D personality (i.e., NA and SI) (Denollet, 2005). It uses a five-point, Likert-type scale ranging from 0 (not true) to 4 (most true). The NA and SI subscales have seven items with a total score ranging from 0–28. Higher scores on each subscale indicated a greater presence of that personality trait (i.e., NA or SI). Type D personality is classified as scoring a 10 or greater on both subscales (Denollet, 2005). The DS-14 has been tested on populations with chronic illness with good construct validity and reliability, with Cronbach alphas of 0.86 and 0.88 for SI and NA, respectively (Denollet, 2005). The Chinese version of the DS-14 has been used on this population with a Cronbach alpha of 0.75 for SI and 0.85 for NA (Shun et al., 2011). The Cronbach alphas for the NA and SI scales in the current study were 0.87 and 0.8, respectively.

Demographic characteristics and clinical characteristics were collected with a background information form. The demographic characteristics included gender, age, employment status, marital status, education, and religious affiliation. Clinical characteristics included disease diagnosis and stage, whether it was the first diagnosis or a recurrence, if the patient had a colostomy, whether treatment was completed or ongoing, and functional status. Functional status was measured by the **Karnofsky Performance Status (KPS) scale**, which is an 11-point scale with 10-point intervals ranging from 100 (normal function) to 0 (death) (Mor, Laliberte, Morris, & Wiemann, 1984). It has been used generally in cancer-related studies in Taiwan (Lai et al., 2003; Shun, Beck, Pett, & Berry, 2006).

Data Analysis

SPSS®, version 15.0, was used to analyze data. Descriptive statistics were used to analyze the demographic and clinical characteristics, and to identify the top 10 items of unmet supportive care needs for patients receiving active treatment and for patients who completed treatment. The unmet needs are defined as the score of an item higher than 3 (low need) to 5 (high need) on

Table 1. Sample Characteristics (N = 277)

Characteristic	\bar{X}	SD
Age (years)	58	11
Education (years)	11.65	4.7
Time since diagnosis (months)	24.5	26.3
Characteristic	n	%
Gender		
Male	157	57
Female	120	43
Employment status		
Unemployed	180	65
Part-time or full-time employment	97	35
Marital status		
Married	221	80
Single, divorced, or widowed	56	20
Education level		
Illiterate	11	4
Elementary school	55	20
Junior high school	35	13
Senior high school	58	21
College	95	34
Graduate school	23	8
Religious affiliation		
Buddhist, Taoist, Christian, or Catholic	233	84
None	44	16
Functional status (KPS)		
50	1	< 1
70	2	1
80	12	4
90	82	30
100	180	65
Diagnosis		
Colon	217	78
Rectal	60	22
Stage		
I	36	13
II	73	26
III	108	39
IV	60	22
Treatment status		
Completed treatment	132	48
Active treatment	145	52
Diagnosis status		
First diagnosis	250	90
Recurrent	27	10
Had a colostomy		
Yes	29	10
No	248	90

KPS—Karnofsky Performance Status scale

the SCNS-SF34. The Mann-Whitney U test was used to examine the association between supportive care needs and type D personality. Six generalized estimating equations (GEEs) were used to determine the most important predictors for overall needs and for the five domains because the overall care needs and five domains were not normally distributed in the current study. The GEE, an extension of the generalized linear model, was developed by Zeger, Liang, and Albert (1988), and it can be used with or without normal distributions

Table 2. Top 10 Unmet Supportive Care Needs for the Active Treatment Group (N = 145)

Rank	Item	Domain of Care Need	n	%
1	Being informed about things you can do to help yourself get well	Health system and information	60	41
2	Worry that the results of treatment are beyond your control	Psychological	51	35
3	Having one member of hospital staff with whom you can talk about all aspects of your condition, treatment, and follow-up	Health system and information	49	34
4	Uncertainty about the future	Psychological	48	33
5	Fears about the cancer spreading	Psychological	43	30
6	Being given information (written, diagrams, drawings) about aspects of managing your illness and side-effects at home	Health system and information	41	28
7	Not being able to do the things you used to do	Physical and daily living	38	26
8	Being given explanations of those tests for which you would like explanations	Health system and information	37	26
9	Concerns about the worries of those close to you	Psychological	35	24
10	Being adequately informed about the benefits and side effects of treatments before you choose to have them	Health system and information	32	22

Note. Unmet needs are defined as the score of the item higher than 3 (low need) to 5 (high need).

(Ballinger, 2004). In each GEE analysis, NA and SI were entered after controlling the factors that may affect the level of care needs (i.e., age, gender, education level in years, treatment status, cancer stage, cancer diagnosis, colostomy, symptom distress, level of anxiety, and depressive status).

Results

Patient Characteristics

The demographic characteristics and disease-related information for the 277 patients are summarized in Table

1. In the current study, 57% (n = 157) of the participants were men, with ages ranging from 23–82. The majority of participants were unemployed, married, and Buddhist or Taoist. Most of the patients were diagnosed with stage III rectal cancer and were receiving active treatment. The average time since diagnosis was 24.5 months, ranging from 1–140 months. For those who had completed treatment, the average time for completion was 27.5 months, ranging from 1–123 months.

Unmet Patient Care Needs

The top 10 unmet care needs for the two groups, patients undergoing active treatment and those who completed treatment, are shown in Tables 2 and 3. The rank of unmet needs was based on the percentage of patients reporting a score greater than 3 on the SCNS-SF34. The most reported unmet need was “being informed about things you can do to help yourself get well” for both groups. The top 10 unmet supportive care needs involved three domains, but health system and information and psychological were dominant. According to the mean scores for the five domains, the highest was health system and information, and the lowest was sexuality.

Association Between Supportive Care Needs and Type D Personality

The results of the association between supportive care needs and type D personality were examined by the Mann-Whitney U test because only 38 patients were identified as type D personality based on the cutoff point of the DS-14. The results, which are shown in Table 4, indicate that patients with type D personality had significantly higher demands in overall supportive care needs ($Z = -6.436, p < 0.0001$) and in most domains, except for sexuality needs ($Z = -1.259, p = 0.208$), when compared to patients with non-type D personality.

The Significant Role of Personality Trait After Controlling Other Significant Factors

The significant factors in the GEE analysis are summarized in Table 5. Overall supportive care needs were significant in relation to age ($\beta = -0.563, p = 0.022$), symptom distress ($\beta = 2.51, p = 0.001$), depression ($\beta = 3.27, p = 0.001$), and NA ($\beta = 1.61, p = 0.009$). The results indicate that NA affected overall supportive care needs, with higher NA requiring more care needs.

For each domain, the results indicate that patients who are of younger age ($\beta = -0.198, p = 0.005$), receiving active treatment ($\beta = 3.537, p = 0.025$), having higher levels of symptom distress ($\beta = 0.51, p = 0.009$) and anxiety ($\beta = 0.884, p = 0.038$), and having more traits of NA ($\beta = 0.951, p < 0.0001$) had higher levels of psychological needs. The patients receiving active treatment ($\beta = 6.321, p = 0.005$), with higher levels of depression

($\beta = 1.195, p = 0.004$) and fewer traits of SI ($\beta = -0.444, p = 0.014$) had more health system and information needs. The patients with better functional status ($\beta = -0.696, p < 0.0001$) had fewer physical and daily living needs, while those with higher levels of symptom distress ($\beta = 1.124, p < 0.0001$) had more physical and daily living needs. The patient care and support needs increased when the patients had better functional status ($\beta = 0.352, p = 0.025$) and higher levels of depression ($\beta = 1.132, p = 0.002$). Sexual needs were negatively correlated with age ($\beta = -0.143, p = 0.022$) and gender ($\beta = -3.097, p = 0.041$), indicating that patients who were of older age and female had lower sexual needs than those who were of younger age and male.

Discussion

The current study found that type D personality was an important factor that affected most domains of care needs, with the exception of sexuality. Previous studies have reported that type D patients with cancer perceived higher levels of symptom distress, anxiety, and depression, as well as poorer quality of life (Mols & Denollet, 2010a; Mols, Denollet, et al., 2012; Mols et al., 2010; Shun et al., 2011). Mols, Denollet, et al.'s (2012) study indicated that patients with type D personality believe their illness has significantly more serious consequences and that it will last significantly longer than patients without type D personality believe. Because of this, patients with type D personality may present more symptoms that they attribute to their illness. This may be why those patients require more supportive care needs overall and in most of the domains.

The current study found that higher levels of NA indicated higher overall and psychological needs. Patients with higher levels of NA could perceive more negative outcomes, which were linked to worry and anxiety and required more support (Sörensen et al., 2008). In addition, symptom distress was associated with supportive care needs not only in the psychological domain, but also in the physical and daily living domain of the current study. Patients experiencing more severe symptoms have shown an increase in uncertainty and heightened anxiety, leading to an increased need for psychological care (Shaha, Cox, Talman, & Kelly, 2008). Higher levels of SI indicated lower needs in health system and information. Those with higher levels of SI tended to avoid problem solving and hesitated to contact people for help, including healthcare providers (Sörensen et al., 2008). This may lead to a lower demand for health system and information needs.

Consistent with a previous study (Chen et al., 2009), the authors found that those with higher levels of depressive mood have more overall supportive care needs, health system and information needs, and patient care

and support needs. Those with higher levels of anxiety have more care needs in the psychological domain. Patients with psychological distress tend to have negative thoughts, which could lead them to experience more physical distress and to perceive less social support (Mols & Denollet, 2010b; Mols et al., 2010). Those reactions may be why patients with psychological distress reported higher demands in supportive care needs.

Treatment status was an important factor that affected the level of psychological and health system and

Table 3. Top 10 Unmet Supportive Care Needs for the Completed Treatment Group (N = 132)

Rank	Item	Domain of Care Need	n	%
1	Being informed about things you can do to help yourself get well	Health system and information	31	23
2	Being given information (written, diagrams, drawings) about aspects of managing your illness and side-effects at home	Health system and information	25	19
3	Worry that the results of treatment are beyond your control	Psychological	16	12
4	Concerns about the worries of those close to you	Psychological	15	11
5	Fears about the cancer spreading	Psychological	14	11
6	Being adequately informed about the benefits and side effects of treatments before you choose to have them	Health system and information	13	10
7	Having one member of hospital staff with whom you can talk to about all aspects of your condition, treatment, and follow-up	Health system and information	13	10
8	Not being able to do the things you used to do	Physical and daily living	12	9
9	Being given explanations of those tests for which you would like explanations	Health system and information	12	9
10	Being informed about cancer, which is under control or diminishing (i.e., remission)	Health system and information	11	8

Note. Unmet needs are defined as the score of the item higher than 3 (low need) to 5 (high need).

Table 4. Mann-Whitney U Test for Type D and Non-Type D Personality in Domains of Supportive Care Needs (N = 277)

Supportive Care Need	Type D Patients (n = 38)		Non-Type D Patients (n = 239)		Z	p
	\bar{X} Score	\bar{X} Rank	\bar{X} Score	\bar{X} Rank		
Overall supportive care	142.23	216.68	72.68	126.05	-6.436	< 0.0001
Psychological	41.84	231.86	13.88	124.24	-7.718	< 0.0001
Health system and information	37.8	191.57	25.39	130.64	-4.375	< 0.0001
Physical and daily living	26.18	200.43	11.65	129.23	-5.169	< 0.0001
Patient care and support	30.92	175.84	17.57	133.14	-3.164	0.002
Sexuality	5.48	148.84	4.18	137.44	-1.259	0.208

Note. Type D personality is classified as a score of 10 or greater for negative affectivity and social inhibition.

information needs. Compared to participants who had completed treatment, those in active treatment had higher levels of psychological and health system and information needs. In the current study, “worry that the results of treatment are beyond control,” “uncertainty about the future,” and “fears about the cancer spreading” were the top-ranking unmet psychological needs in patients undergoing active treatment. “Being informed about things you can do to help yourself get well” was the most reported unmet need in health system and information. Healthcare providers should pay more attention to educating patients in active treatment about how to follow a rehabilitation or daily activity plan, as well as how to deal with worry, uncertainty, and fear.

Patients in the current study reported that the health system and information domain had the greatest unmet needs, and it involved the most items in the top 10 unmet supportive care needs. Most unmet needs involved patients’ desire to be informed about things they can do to help themselves get well. In general, Chinese patients tend to follow their physicians’ advice and treatment decisions, but they do not actively raise questions during clinical visits (Lai et al., 2009). Therefore, even after visits, they may have unanswered questions about how to take care of themselves at home. The other reason may be that healthcare providers explain important information to patients, but the information provided may be more treatment-oriented and not tailored to meet individualized concerns. To balance the busy clinical schedule with patient care needs, healthcare providers should work to modify the current system to include more patient-centered, individualized care services.

Limitations

The current study was a cross-sectional survey for unmet supportive care needs for patients with CRC. Therefore, the change of association between care needs and personality traits could not be explored in this study. In addition, supportive care needs as well as the relationship between supportive care needs and personality

traits at baseline may be different than at the time of the interviews. The relationship based on a longitudinal design may be different. The study was conducted at one site in Taiwan, so needs in different geographic areas and hospitals cannot be determined. Additional research should compare the differences in unmet supportive care needs in multiple medical centers. The distributions of overall supportive care needs and the five domains of needs were negatively skewed, indicating that the level of supportive care needs in the sample seems lower than that of the population. Therefore, interpretation of the results should be conservative, and the authors suggest that future studies use a larger sample.

Implications for Nursing

Assessing for personality traits seems to be an important approach for conducting personalized symptom management and developing coping strategies to decrease unmet supportive care needs. The authors found that, after controlling for the significant factors related to supportive care needs, NA and SI could be important factors affecting the level of supportive care needs. In addition, treatment status and physical (e.g., symptom distress) and psychological (e.g., anxiety, depression) distress were significant factors affecting the level of supportive care needs. Healthcare providers should perform assessments of patient personality traits to better understand patient characteristics and to provide more suitable educational information or communication processes, particularly for those with type D personality.

For example, patients with NA may need more psychological support to decrease levels of depression and anxiety, and they should receive better information on the health system from their healthcare providers. For those with higher levels of SI, healthcare providers should understand their restless, uncomfortable, or embarrassed feelings during communication or education sessions and encourage them to ask more questions. In addition, because health system and information was

the domain of the most unmet care needs, healthcare providers should develop more effective information or education programs for patients with cancer.

For additional research, the authors suggest a longitudinal design to determine whether the association between supportive care needs and personality trait changes over time to offer continuous supportive care. In addition, the change in supportive care needs based on different personality traits could be examined. The intervention for supportive care needs based on different personality traits and its effect on decreasing the level of unmet needs could be developed for specific types of cancer. Gender and culture have been identified as factors affecting personality (Costa, Terracciano, & McCrae, 2001; Heine & Buchtel, 2009). Gender differences in personality trait were most obvious in European and American cultures, where traditional roles are minimized (Costa et al., 2001). Compared with people from individualistic cultures, those from collectivistic cultures appear to rely on personality traits to a lesser degree when understanding themselves and others (Heine & Buchtel, 2009). Collectivistic cultures, such as those of China and Japan, emphasize family and work group goals above individual needs. Therefore, conducting

Knowledge Translation

Assessing personality traits can help healthcare providers give patients higher quality supportive care services.

Comprehensive assessment for unmet supportive care needs is recommended for those with type D personality.

For patients with a higher level of negative affectivity, healthcare providers should pay attention to psychological needs, in addition to overall supportive care needs.

studies to examine the association between personality and unmet needs in gender differences and with varying cultures across countries also are suggested.

Conclusion

The current study found that the level of unmet supportive care needs of patients with CRC is highly associated with type D personality. The trait of NA was associated with increased overall and psychological needs, and the trait of SI was associated with increased health system and information needs. The health system and

Table 5. Predictors for Overall and Five Domains of Supportive Care Needs Using Generalized Estimating Equation Model (N = 277)

Variable ^a	β	95% CI	Wald Chi-Square	p
Overall supportive care needs				
Age	-0.563	(-1.045, -0.082)	5.259	0.022
Symptom distress	2.51	(1.055, 3.964)	11.439	0.001
Depression	3.27	(1.355, 5.186)	11.195	0.001
Negative affectivity	1.61	(0.395, 2.825)	6.745	0.009
Psychological needs				
Age	-0.198	(-0.336, -0.059)	7.814	0.005
Treatment status	3.537	(0.435, 6.638)	4.996	0.025
Symptom distress	0.51	(0.127, 0.894)	6.812	0.009
Anxiety	0.884	(0.049, 1.72)	4.303	0.038
Negative affectivity	0.951	(0.561, 1.34)	22.841	< 0.0001
Health system and information needs				
Treatment status	6.321	(1.892, 10.75)	7.826	0.005
Depression	1.195	(0.373, 2.017)	8.118	0.004
Social inhibition	-0.444	(-0.798, -0.089)	6.022	0.014
Physical and daily living needs				
Functional status	-0.696	(-0.97, -0.422)	24.832	< 0.0001
Symptom distress	1.124	(0.814, 1.434)	50.636	< 0.0001
Patient care and support needs				
Functional status	0.352	(0.043, 0.66)	5.001	0.025
Depression	1.132	(0.426, 1.838)	9.863	0.002
Sexual needs				
Age	-0.143	(-0.265, -0.02)	5.217	0.022
Gender	-3.097	(-6.073, -0.12)	4.158	0.041

^a The variables entered into the generalized estimating equation model included age, gender (0 = male, 1 = female), education in years, Karnofsky Performance Status, cancer stage, diagnosis status (0 = first diagnosis, 1 = recurrent), diagnosis (0 = colon, 1 = rectal), had colostomy (no = 0, yes = 1), treatment status (0 = completed treatment, 1 = active treatment), overall symptom distress, anxiety, depression, negative affectivity, and social inhibition.

CI—confidence interval

information domain had the greatest amount of unmet needs, and being informed about what patients can do to help themselves get well was the most popular unmet need in the population. Therefore, healthcare providers should concentrate on assessing patient personality traits to connect specific personality traits to related educational interventions, as well as provide sufficient health information to decrease the levels of unmet supportive care needs in patients with CRC.

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