

Latent profile analysis of perceived stress and influencing factors in colorectal cancer patients[†]



Original article

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Received: 17 January 2024; Accepted: 14 April 2024; Published: 20 September 2024

Abstract: Objective: To understand the latent categories of perceived stress in colorectal cancer patients and analyze the characteristics of different categories of patients.

Methods: A total of 255 colorectal cancer patients receiving treatment in the gastrointestinal surgery and oncology departments of a tertiary Grade A hospital in Sichuan Province, from January 2023 to June 2023, were selected as the study subjects. General information questionnaire, Chinese version of the Perceived Stress Scale (CPSS), and Comprehensive Score Table for Patient-Reported Outcome Measures of Economic Toxicity (COST-PROM) were used for data collection.

Results: Perceived stress in colorectal cancer patients was classified into 3 latent categories: C1 “Low stress-stable type” (19.2%), C2 “Moderate stress-uncontrolled type” (23.9%), and C3 “High stress-anxious type” (56.9%). The average score of perceived stress was (34.07 ± 5.08) . Compared with C1 type, patients with a monthly household income of ≤ 3000 RMB were more likely to belong to the C2 and C3 types ($P < 0.05$), and patients without a stoma were less likely to belong to C3 type ($P < 0.05$). Compared with C2 type, male patients were more likely to belong to C3 type ($P < 0.05$), and patients without a stoma were less likely to belong to C3 type ($P < 0.05$). Compared with C3 type, patients with higher economic toxicity scores were more likely to be classified into C1 and C2 types ($P < 0.05$).

Conclusions: Perceived stress in colorectal cancer patients exhibits distinct categorical features. Male gender, lower income, presence of a stoma, and higher economic toxicity are associated with higher levels of perceived stress in colorectal cancer patients.

Keywords: colorectal cancer • economic toxicity • influence factors • latent profile analysis • perceived stress

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1. Introduction

Colorectal cancer, also known as colon cancer, is a malignant tumor of the digestive tract and is most commonly manifested by changes in bowel habits and stool consistency in the early stages. With the background of socioeconomic transition, sedentary lifestyles, and

a shift toward a Westernized diet, the incidence of colorectal cancer has been rapidly increasing and has become the second most common malignant tumor in China.¹ The primary treatment for colorectal cancer is surgery, complemented by radiation and chemotherapy.

[†]This project was supported by the Health and Humanities Research Center Project of Zigong City Key Research Base of Philosophy and Social Sciences (No. JKRWY22-26).

How to cite this article: Tan YY, Liu YH, Zhang ZH, Huang WR, Yan ML, Li XR. Latent profile analysis of perceived stress and influencing factors in colorectal cancer patients. *Front Nurs*. 2024;3:303–312.

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Throughout the entire treatment process, patients face significant pressures from the disease itself, medical expenses, and the impact on their family and work.² Perceived stress refers to the psychological state of confusion or threat that individuals experience after cognitive evaluation of stressful events, leading to a state of tension and loss of control.³ A survey conducted by Huang⁴ on 251 colorectal cancer patients found that only 3.2% of patients fell within the normal range of stress perception, with the majority of patients perceiving high levels of stress. This is related to their concerns about post-operative complications, the economic costs of disease treatment, rehabilitation, and ostomy supplies, as well as self-management factors. Existing studies have found that the factors influencing stress in colorectal cancer patients are complex and highly heterogeneous.^{5,6} Latent profile analysis, which is individual-oriented, distinguishes homogeneous individuals with similar characteristics into different categories with significant features based on their scores on scale items, maximizing the differences between category groups. This analytical approach has been widely applied in psychology, behavioral science, and medical fields due to its unique advantages.⁷ Based on the exploration of the stress perception types in colorectal cancer patients, this study further analyzed the characteristics of the influencing factors of different stress perception types, so as to provide a theoretical basis for developing interventions to reduce economic toxicity and psychological stress in patients.

2. Methods

2.1. Research participants

According to the Kendall sample size estimation method,⁸ the sample size was calculated as 10 times the number of variables, considering a 20% attrition rate. Therefore, a minimum total sample size of 180 cases was required. Convenience sampling was employed to select 255 colorectal cancer patients admitted for inpatient treatment in the Department of Gastrointestinal Surgery and Oncology at a tertiary hospital in Sichuan Province, China, from January 2023 to June 2023, as the study participants.

Inclusion criteria were as follows:

- Age ≥ 18 years⁹;
- Diagnosed with colorectal cancer based on clinical and pathological examination¹⁰;
- Underwent surgical treatment during the current hospitalization;
- Provided informed consent and voluntarily participated in the study.

Exclusion criteria were as follows:

- A history of mental illness, cognitive impairment, or communication barriers;
- Patients with severe physical illnesses such as stroke, Parkinson's disease, etc.

The study was approved by the ethics committee of the participating hospital (No. KY2023095), and all participants were informed of the study details, provided their consent, and voluntarily participated.

2.2. Survey tool

- (1) General Information Survey Questionnaire: Designed by the researcher based on literature review. It includes sociodemographic data such as age, gender, educational level, place of residence, occupation, employment status, and average monthly household income; as well as disease-related information such as the presence of ostomy, treatment methods, and disease staging.
- (2) Comprehensive Economic Toxicity Scale for Patient-Reported Outcomes: The self-assessment questionnaire developed by scholars from the University of Chicago in 2014 consists of 2 dimensions,¹¹ namely, Positive Financial Well-being and Negative Psychological Reactions, with a total of 11 items. In 2017, Yu et al.¹² translated the scale into Chinese and conducted an analysis of its reliability and validity. The results showed that the Chinese version of the Comprehensive Score Table for Patient-Reported Outcome Measures of Economic Toxicity (COST-PROM) questionnaire had a Cronbach's α coefficient of 0.889, a test-retest reliability of 0.77–0.98, and a content validity index of 0.83–1.00. The Likert 5-point scale was used, with scores ranging from 0 to 4, indicating "not at all" to "very much." The scores of each item were cumulatively added to obtain a total score, with lower scores indicating greater economic toxicity experienced by patients due to the illness. The total score ranges from 0 to 44.
- (3) Chinese Perceived Stress Scale (CPSS): The Perceived Stress Scale (PSS) is used to assess an individual's level of stress based on their perceived stress levels. Originally developed by American psychologist Cohen et al.¹³ Yang and Huang¹⁴ translated and revised the PSS scale into Chinese to suit the cultural background of China. The Chinese version consists of 2 dimensions, namely, "Perceived Tension" and "Perceived Helplessness," with a total of 14 items. The scale uses a Likert 5-point scoring method, ranging from 1 (never) to 5 (always), with scores assigned from 0 to 4 accordingly. The total

score on the scale ranges from 0 to 56. In clinical practice, the scale is divided into the following categories: 0–25 indicates normal stress, 26–39 indicates moderate stress, and 40–56 indicates high stress. Higher scores indicate a greater level of stress experienced by the individual.

2.3. Data collection methods

The following data collection method was used: before conducting the survey, train the survey personnel to familiarize them with the questionnaire content and obtain support and cooperation from relevant departments; during the survey, explain the purpose and significance of the survey to the respondents, obtain informed consent, and have them sign an informed consent form; use standardized instructions to guide respondents in correctly completing the questionnaire and promptly clarify any questions they may have; when collecting the questionnaires, promptly supplement and verify incomplete information on-site, and collect the questionnaires on the spot.

2.4. Statistical methods

Data analysis using Mplus 8.3 (Muthén & Muthén, Los Angeles, CA, United States) and SPSS 26.0 (IBM Corporation, Armonk, NY, United States) statistical software was conducted as follows:

- (1) Based on the nature of the observed variables (perceived stress as a continuous variable), the latent profile analysis module in Mplus 8.3 software was selected to analyze the data.¹⁵ Starting with a single-category model, the number of categories in the model was gradually increased until the model fit indices reached their optimal levels. Model fit indices include:
 - Akaike information criterion (AIC), Bayesian information criterion (BIC), and adjusted BIC (aBIC) that are used as model fit indices, with smaller values indicating better model fit.
 - The entropy value ranges from 0 to 1, with a value closer to 1 indicating more precise classification. When Entropy = 0.8, it suggests a classification accuracy of over 90%.
 - Likelihood ratio test (LMR) and likelihood ratio test based on bootstrap (BLRT) are used for model comparison. When the test is significant ($P < 0.05$), it indicates that the Kth model fits better than the K-1th model. By considering the aforementioned indices in the fit results of each categorical model, the best-fitting model is selected.

- (2) Data analysis was performed using SPSS 26.0 statistical software. For quantitative variables that followed a normal distribution, mean $\pm$ standard deviation ($\bar{x} \pm s$) was used to represent the data, and between-group comparisons were conducted using the *F*-test. For qualitative data, frequency and percentage (%) were used to represent the data, and between-group comparisons were conducted using the chi-squared test. Logistic regression analysis was used to assess the impact of various factors on the latent categories. The significance level was set at $\alpha = 0.05$.

3. Materials and methods

3.1. General information about colorectal cancer patients

The study involved 255 cases of colorectal cancer patients, which included the following aspects (Table 1).

3.2. Analysis of perceived stress profiles in colorectal cancer patients

A total of 1–5 latent class models were extracted, and the fit indices are shown in Table 2. As the number of classes increased, the AIC, BIC, and sample size-aBIC decreased. When the number of latent classes was 3, the entropy was 0.946, and both the LMR and BLRT tests reached a significant level ($P < 0.05$). When the number of latent classes was 4, although the LMR and BLRT tests reached a significant level ($P < 0.05$), the entropy decreased. Considering the overall characteristics of each class, the model with 3 latent classes was deemed as the most appropriate (refer to Table 2). The probabilities of colorectal cancer patients belonging to each class were 0.938, 0.948, and 1.000, respectively, indicating that the results of the 3 latent class model are reliable, as shown in Table 3.

The naming of latent categories for perceived stress in colorectal cancer patients is based on the determined latent class model. Three categories were obtained, and their scores on 14 items of perceived stress are shown in Figure 1. The first 7 items in Figure 1 represent the dimension of tension, while the last 7 items represent the dimension of lack of control.

- Category 1 (C1) consists of 49 (19.2%) colorectal cancer patients. The scores of various items in this category are low and tend to be stable, indicating that these patients experience lower psychological stress and have stable emotions. The average score of perceived stress for this category is (26.39 ± 2.797), so it is named as the “Low Stress-Stable Type.”

Variables	N	%
<i>Gender</i>		
Male	153	60
Female	102	40
<i>Age (years)</i>		
≤60	97	38
>60	158	62
<i>Residence</i>		
Rural	141	55.3
Urban	114	44.7
<i>Education</i>		
Primary school and below	147	57.6
Junior high school	67	26.3
High school and above	41	16.1
<i>Occupation</i>		
Farmer	110	43.1
Worker	81	31.8
Civil servant/public institution employee	34	13.3
Other	30	11.8
<i>Monthly family income (RMB)</i>		
≤3000	179	70.2
>3000	76	29.8
<i>Pre-admission employment status</i>		
Employed	122	47.8
Retired	114	44.7
others	19	7.5
<i>Disease stage</i>		
Stage I	35	13.7
Stage II	98	38.4
Stage III	91	35.7
Stage IV	31	12.2
<i>Treatment method</i>		
Surgery	106	41.6
Surgery + chemotherapy/radiotherapy	149	58.4
<i>Colostomy</i>		
Present	115	45.1
Absent	140	54.9

Table 1. General information about colorectal cancer patients (N=225).

- Category 2 (C2) consists of 61 (23.9%) colorectal cancer patients. The scores of various items in this category are relatively high. Particularly, the scores on item 4 (feeling capable of dealing with annoying things in life), item 6 (feeling confident in handling one's problems), and item 7 (feeling that things are going according to one's own wishes) are higher than the other 2 categories. This suggests that these patients are prone to self-doubt and have difficulty effectively coping with significant life events. The average score of perceived stress for this category is (33.92 ± 2.789), so it is named as the "Moderate Stress-Uncontrolled Type."
- Category 3 (C3) consists of 145 (56.9%) colorectal cancer patients. The scores of various items in this category are at a high level. In particular, the scores on item 1 (feeling anxious about unexpected events) and item 3 (feeling tense and stressed) are higher than the other 2 categories. This indicates that these patients have poor emotional well-being, are mentally tense, and experience significant psychological stress. The average score of perceived stress for this category is (36.72 ± 3.533), so it is named as the "High Stress-Anxious Type."

3.3. Univariate analysis of perceived stress latent categories in colorectal cancer patients

Univariate analysis of the distribution of perceived stress latent categories in colorectal cancer patients revealed significant differences ($P < 0.05$) in the categories' distribution across patient's gender, age, place of residence, education level, occupation, monthly family income, pre-admission employment status, stoma presence, and economic toxicity scores, as shown in Table 4.

3.4. Multivariate logistic regression analysis of perceived stress latent categories in colorectal cancer patients

Multinomial logistic regression analysis was conducted with significant variables from the univariate analysis as

Variable	AIC	BIC	aBIC	Entropy	P _{LMR}	P _{BLRT}	Category probabilities
1	6626.604	6725.760	6636.993				
2	6027.092	6179.367	6043.046	0.879	0.0001	0.0000	0.305/0.65
3	5725.934	5931.328	5747.454	0.946	0.0233	0.0000	0.19/0.24/0.57
4	5589.471	5847.983	5616.556	0.900	0.0000	0.0000	0.20/0.23/0.20/0.37
5	5282.385	5594.016	5315.035	0.916	0.3751	0.0000	0.20/0.37/0.23/0.19/0.01

Note: AIC, Akaike information criterion; BIC, Bayesian information criterion; BLRT, Bootstrapped likelihood ratio test.

Table 2. Fit indices of latent profile models for different categories.

independent variables and the three perceived stress latent categories as the dependent variable. The assigned values for the independent variables were in Table 5.

Economic toxicity score was used as is.

The results showed that compared with C1 category, there was a higher likelihood of having a monthly family income ≤ 3000 RMB in C2 category (OR = 5.457, 95% confidence interval [CI]: 1.427–20.869, $P = 0.013$) and C3 category (OR = 0.15, 95% CI: 0.037–0.606, $P = 0.008$); the likelihood of not having a stoma was lower in C3 category compared with C1 category (OR = 3.517, 95% CI: 1.185–10.437, $P = 0.023$); the likelihood of being male was higher in C3 category compared with C2 category (OR = 0.28, 95% CI: 0.127–0.615, $P = 0.002$); the likelihood of not having a stoma was lower in C3 category compared with C2 category (OR = 1.344, 95% CI: 1.643–7.219, $P = 0.001$); and patients with higher economic toxicity scores (indicating lower economic burden)

Variable	Category 1	Category 2	Category 3
Category 1	0.938	0.062	0.000
Category 2	0.052	0.948	0.000
Category 3	0.000	0.000	1.000

Note: BLRT, Bootstrapped likelihood ratio test.

Table 3. Probabilities of membership in 3 latent categories.

were more likely to be categorized as C1 (OR = 1.415, 95% CI: 1.208–1.658, $P < 0.001$) and C2 (OR = 1.23, 95% CI: 1.093–1.385, $P = 0.001$), as shown in Table 6.

4. Discussion

There is heterogeneity in the perceived stress among colorectal cancer patients. This study utilized latent profile analysis to classify the perceived stress of colorectal cancer patients into “Low Stress-Stable Type,” “Moderate Stress-Uncontrolled Type,” and “High Stress-Tense Type.” The “High Stress-Tense Type” accounted for 56.9% of the total population, indicating that a majority of colorectal cancer patients experience a significant level of perceived stress, which is consistent with the findings of Sheng.⁶

Our study found that patients in the “High Stress-Tense Type” (C3) scored the highest in item 1 (“Feeling uneasy about unexpected events”). This may be attributed to the common association of cancer with mortality. When diagnosed with cancer without mental preparedness, patients may worry about their physical condition, treatment process, and future life, leading to anxiety and feelings of unease. Patients in the “Low Stress-Stable Type” (C1) and “Moderate Stress-Uncontrolled Type” (C2) scored the highest in item 12 (“Feeling preoccupied with things that must be done”). This could be due to the significant impact of colorectal cancer diagnosis

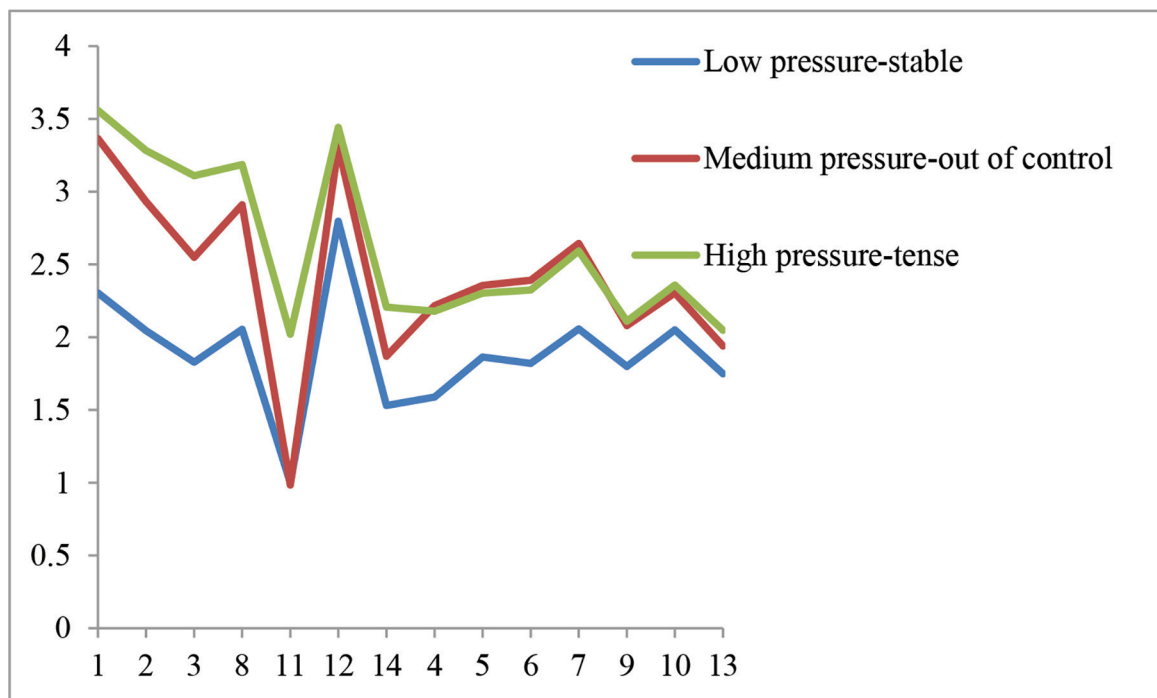


Figure 1. Three potential profile distributions of stress perception characteristics in colorectal cancer patients.

Variables	C1 (n = 49)	C2 (n = 61)	C3 (n = 145)	χ^2/F	P
<i>Gender</i>				$\chi^2 = 12.892$	0.002
Male	35 (71.4%)	25 (41%)	93 (64.1%)		
Female	14 (28.6%)	36 (59%)	52 (35.9%)		
<i>Age (years)</i>				$\chi^2 = 8.754$	0.013
≤60	10 (20.4%)	23 (37.7%)	64 (44.1%)		
>60	39 (79.6%)	38 (62.3%)	81 (55.9%)		
<i>Residence</i>				$\chi^2 = 46.308$	<0.001
Rural	6 (12.2%)	37 (60.7%)	98 (67.6%)		
Urban	43 (87.8%)	24 (39.3%)	47 (32.4%)		
<i>Education</i>				$\chi^2 = 43.577$	<0.001
Primary school and below	10 (20.4%)	43 (70.5%)	94 (64.8%)		
Middle school	19 (38.8%)	10 (16.4%)	38 (26.2%)		
High school and above	20 (40.8%)	8 (13.1%)	13 (9%)		
<i>Occupation</i>				$\chi^2 = 73.210$	<0.001
Farmer	3 (6.1%)	24 (39.3%)	83 (57.2%)		
Worker	23 (46.9%)	24 (39.3%)	34 (23.4%)		
Civil servant/public institution employee	21 (42.9%)	5 (8.2%)	8 (5.5%)		
Other	2 (4.1%)	8 (13.1%)	20 (13.8%)		
<i>Monthly family income (RMB)</i>				$\chi^2 = 72.898$	<0.001
≤3000	10 (20.4%)	47 (77%)	122 (84.1%)		
>3000	39 (79.6%)	14 (23%)	23 (15.9%)		
<i>Pre-admission employment status</i>				$\chi^2 = 42.684$	<0.001
Employed	8 (16.3%)	29 (47.5%)	85 (58.6%)		
Retired	40 (81.6%)	29 (47.5%)	45 (31.1%)		
Unemployed	1 (2.1%)	3 (5%)	15 (10.3%)		
<i>Disease stage</i>				$\chi^2 = 1.536$	0.957
Stage I	7 (14.3%)	9 (14.8%)	19 (13.1%)		
Stage II	21 (42.9%)	20 (32.8%)	57 (39.3%)		
Stage III	15 (30.6%)	24 (39.3%)	52 (35.9%)		
Stage IV	6 (12.2%)	8 (13.1%)	17 (11.7%)		
<i>Treatment method</i>				$\chi^2 = 0.220$	0.896
Surgery	20 (40.8%)	24 (39.3%)	62 (42.8%)		
Surgery + chemotherapy/ radiotherapy	29 (59.2%)	37 (60.7%)	83 (57.2%)		
<i>Stoma</i>				$\chi^2 = 22.363$	<0.001
Present	14 (28.6%)	17 (27.9%)	84 (57.9%)		
Absent	35 (71.4%)	44 (72.1%)	61 (42.1%)		
<i>Economic toxicity score (mean + standard deviation)</i>	20.12 ± 4.526	13.08 ± 4.379	9.83 ± 3.832	F = 115.559	<0.001

Table 4. Analysis of different characteristics of the 3 latent categories, N (%).

and treatment on the psychological and emotional state of patients. Anxiety, depression, fear, and stress may make patients more sensitive and urgent about

Variables	Assigned values
<i>Gender</i>	
Male	1
Female	2
<i>Age (years)</i>	
≤60	0
>60	1
<i>Residence</i>	
Rural	0
Urban	1
<i>Education</i>	
Primary school and below	0
Junior high school	1
High school and above	2
<i>Occupation</i>	
Farmer	0
Worker	1
Civil servant/public institution employee	2
Other	3
<i>Monthly family income (RMB)</i>	
≤3000	0
>3000	1
<i>Pre-admission employment status</i>	
Unemployed	0
Employed	1
Retired	2
<i>Stoma presence</i>	
None	0
Present	1

Table 5. The assigned values for the independent variables.

unfinished tasks. They may seek to alleviate these negative emotions and strive for a sense of positive control by completing certain tasks.

The influencing factors of the latent categories of perceived stress among colorectal cancer patients are as follows:

- (1) Male colorectal cancer patients perceive higher levels of stress. The results of this study indicate that the stress levels of male patients are higher than those of female patients. Existing research has focused more on stress in female patients,^{16,17} often overlooking the psychological assessment of male patients. In reality, men may face greater psychological pressure. First, men are often associated with a strong and fearless image. The diagnosis and treatment of colorectal cancer may impact their self-identity and self-esteem, exacerbating their psychological burden. Second, influenced by social and cultural beliefs, men are expected to be strong and self-reliant. They may be reluctant to express emotions, seek psychological support, or seek medical help, making it easier for them to internalize psychological stress. In many societies, men are often expected to be the financial pillar of the family, providing economic support and stability. When they are unable to work due to illness or their financial situation is affected, they may face greater pressure from societal expectations and internal sources. Therefore, healthcare providers can assist patients in coping with psychological stress by listening, expressing concern, and providing emotional support. Building a trusting relationship with patients, encouraging them to express emotions, offering emotional comfort and coping strategies, and guiding them to seek professional psychological counseling or support groups¹⁸ can be beneficial.

Variables	Variable coefficient	Standard error	Wald χ^2	P-value	OR value	95% CI
<i>Comparison 1: C3 versus C1</i>						
Monthly family income ≤3000 RMB	-1.895	0.711	7.102	0.008	0.15	0.037-0.606
No stoma	1.258	0.555	5.137	0.023	3.517	1.185-10.437
Economic toxicity	0.347	0.081	18.498	<0.001	1.415	1.208-1.658
<i>Comparison 1: C3 versus C2</i>						
Gender: Male	-1.274	0.402	10.059	0.002	0.28	0.127-0.615
No stoma	1.237	0.378	10.724	0.001	3.444	1.643-7.219
Economic toxicity	0.207	0.06	11.754	0.001	1.23	1.093-1.385
<i>Comparison 2: C1 versus C2</i>						
Monthly family income ≤3000 RMB	1.697	0.684	6.148	0.013	5.457	1.427-20.869

Note: Comparison 1: C3 is used as the reference group; Comparison 1: C1 is used as the reference group; CI, confidence interval.

Table 6. Multinomial logistic regression results of stress perception categories in colorectal cancer patients.

- (2) Low-income colorectal cancer patients perceive higher levels of stress. The results of this study indicate that patients with a monthly household income of ≤ 3000 RMB experience higher levels of stress, which is consistent with related research findings.⁴ On one hand, after being diagnosed with cancer, individuals need to immediately assume the role of a patient, which means they have to stop working or reduce their working hours to receive treatment. The reduction in income, job loss, and the burden of disease treatment intertwine, and some patients are unable to effectively adapt and coordinate, leading them to experience tension and anxiety. On the other hand, the high costs of surgery and medication may exceed their financial capacity, further increasing their psychological pressure. Additionally, the majority of patients surveyed in our study were farmers or migrant workers who lack stable employment and income sources. They may not have access to sufficient medical insurance or benefits and lack financial assistance and subsidies. This lack of resources can leave them feeling isolated and helpless, adding to their psychological burden. Therefore, healthcare providers can offer patients education on colorectal cancer treatment, medication, and support services. Explaining the treatment process, anticipated side effects, and potential financial resources can help patients better understand and cope with the economic burden. Additionally, healthcare providers can assist patients in finding applicable medical insurance reimbursement policies and support resources, helping them apply for medical assistance programs, medication discount programs, or aid from charitable organizations.¹⁹
- (3) Colorectal cancer patients with stomas perceive higher levels of stress. The results of this study indicate that patients with a stoma experience greater psychological pressure, which is consistent with the research findings of Hao et al.²⁰ Stoma creation is a common surgical procedure in the treatment of colorectal cancer, which connects the colon to the surface of the skin to create an artificial intestinal passage. This treatment modality, while saving patients' lives, also brings about negative impacts.²¹

In terms of social aspects, after stoma surgery, patients face changes in body image and self-esteem, which may lead to avoidance of social and group activities and increase psychological pressure. They require additional psychological support and counseling. In the workplace, some patients may be unable to work due to the stoma or face discrimination and awkwardness,

posing significant psychological challenges. In daily life, stoma surgery alters patients' diet, exercise abilities, personal hygiene habits, and other aspects. Additionally, due to the issues related to the stoma, patients require long-term assisted care from caregivers, which can affect caregivers' work and life, further increasing the psychological burden on patients. In terms of treatment costs, after stoma surgery, patients need to purchase related medical supplies such as stoma bags and baseplates, which require regular replacement and consumption, increasing the financial burden on patients.

Therefore, nurses can teach patients self-management skills for the stoma, dietary adjustments, and strategies to reduce related complications through a healthy lifestyle. This can better alleviate the economic burden and help patients cope with the psychological pressure associated with stoma discomfort.²²

- (4) Colorectal cancer patients with lower economic toxicity levels perceive higher levels of stress. Economic toxicity is an important driver of psychological stress, and Sharp et al.²³ found that economic stress is associated with increased risk of adverse psychological outcomes; consistent with the findings, people with low economic toxicity scores tended to experience high levels of stress. The treatment of colorectal cancer typically involves procedures such as surgery, chemotherapy, radiation therapy, and medication, all of which can incur significant medical expenses. If patients do not have sufficient medical insurance coverage or social welfare support, the economic burden can be substantial, leading to immense stress for patients and their families.

Furthermore, some patients may undergo a monitoring period after treatment, as well as face the risks of disease progression and recurrence. The economic burden associated with continued treatment and monitoring, along with the uncertainty of the disease, can contribute to psychological pressure and anxiety for patients.²⁴

5. Conclusion

The perceived stress of colorectal cancer patients can be categorized into 3 types: "low stress-stable type," "moderate stress-uncontrolled type," and "high stress-tense type." Nursing staff should focus on assessing male patients, those with a monthly household income of ≤ 3000 RMB, patients with stomas, and those with low economic toxicity score. Based on the assessment results, comprehensive support should be provided, including economic assistance, psychological

counseling, and social policy support, to alleviate the burden on patients and their families and improve their mental health and quality of life. This study is only a cross-sectional survey, the sample size is small, and the sample is only derived from the Sichuan region, with certain geographical limitations. Moreover, the impact of other unincluded variables needs further validation, and the expanded sample size should be investigated in the future and further studied on other variables.

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Ethical approval

This study was approved by the ethics committee of the Affiliated Hospital of Southwest Medical University (IRB Approval No.: KY2023095).

Conflicts of interest

All contributing authors declare no conflicts of interest.

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