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Proactive personality and health literacy among patients with permanent colostomy: an observational study

Original article

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Abstract: **Objective:** To investigate the distribution of health literacy (HL) levels and the association of HL with proactive personality in patients with permanent colostomy.

Methods: A cross-sectional study was conducted to measure proactive personality and HL using validated scales. A total of 172 patients with permanent colostomy were selected from January 2021 to May 2022 in Yantai City, China. Descriptive statistics, *t*-test, ANOVA, Pearson correlation analysis, and multiple linear regression analysis techniques were used.

Results: The results obtained from the study showed that the HL status of the participants was moderate. The correlation between participants' total HL scores and proactive personality scores was 0.417 (*P*-value <0.001). In addition, HL showed statistically significant differences according to education level, place of residence, profession, and average monthly household income.

Conclusions: This study showed that patients with higher proactive personality scores had higher HL. The key stakeholders require several positive strategies to improve the HL of patients with permanent colostomy by cultivating their proactive personalities, and these important policies will help to improve patient health and quality of life.

Keywords: *health literacy • observational study • permanent colostomy • proactive personality • surgical nursing*

1. Introduction

Colorectal cancer (CRC) is one of the most common malignant tumors of the gastrointestinal system. It is the third leading cause of cancer death in the world, and its incidence is steadily rising in developing nations.[1] The global burden of CRC is expected to increase by 60% to more than 2.2 million new cases and 1.1 million annual deaths by 2030. According to statistics, there are approximately 1 million patients with a permanent stoma in China, and there are approximately 100,000 new patients with stomas every year.[2]Bowel cancer can grow deeper into the wall of the bowel and can spread to lymph nodes in the area if untreated. It can subsequently spread. Age, smoking, family history, obesity, and inflammatory bowel disease are risk factors for CRC.[3] Surgery

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is the main treatment for CRC. The aim of surgery is to remove as much cancer as possible and nearby lymph nodes. After surgery, a stoma (an opening of the bowel onto the abdomen) is often formed, and bowel motions come through the stoma into a bag. Stoma may be temporary or permanent. Approximately 1 in 10 people with rectal cancer need a permanent stoma.[4] However, studies have shown that patients with rectal cancer who received a permanent stoma had worse overall quality of life than those without a stoma.[5] In addition, the change in bowel movement after a permanent stoma coupled with a lack of health literacy (HL) among patients causes great inconvenience to patients' lives.

HL is "the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions."[6] Several studies have shown that HL can improve patients' prognosis and quality of life and that having high health literacy can reduce readmission rates, mortality rates, and health care costs.[7,8] Limited HL is associated with an increased likelihood of complications after colorectal surgery.[9] Proactive personality refers to stable personality tendencies when dealing with the surrounding environment. Individuals adopt active and proactive behavior to change their internal personality traits in relation to the current environment, which affects individuals' psychology and work outcomes.[10] To reduce the negative effects of permanent ostomy, considerable personal initiative is required to explore an effective lifestyle while maintaining an adequate level of HL. Currently, many studies have examined the current status of HL and the factors that influence it, mainly with regard to college students, older adults, and patients with chronic diseases. However, few studies have examined the correlation between HL and proactive personality levels in patients with permanent enterostomies. Therefore, we use active personality and behavior theory to explore the relationship between active personality and HL.[11]

2. Methods

2.1. Study population

This cross-sectional study was conducted among patients with permanent colostomy in the gastrointestinal surgery department of a tertiary grade A hospital in Yantai City, China, between January 2021 and May 2022.

Inclusion criteria were as follows: (1) confirmed diagnosis of colon or rectal cancer by clinical, pathological, and imaging examinations;[12] (2) permanent enterostomy performed laparoscopically and stable condition after surgery; (3) age ≥18 years; and (4) ability to communicate normally, sign the informed consent form, and voluntarily participate in this study. The exclusion criteria were as follows: (1) cancer metastasis to other organs; (2) serious physical diseases, such as heart failure and stroke; (3) previous history of psychiatric disorders, such as anxiety disorders and depression; (4) physical disability; and (5) participation in similar studies.

2.2. Variables and measures

2.2.1. General information questionnaire

The questionnaire was designed by the researcher based on a review of the relevant literature and consultation with experts. It collected information on gender, age, education level, marital status, place of residence, housing status, occupation, primary caregiver, and per capita monthly household income.

2.2.2. HL scale for patients with permanent colostomy

This study used the Health Literacy Scale for Patients with Permanent Enterostomies developed by Yan et al.[13] The scale contains 3 dimensions, namely the functional literacy dimension (6 entries), knowledge literacy dimension (17 entries), and attitudinal literacy dimension (8 entries), for a total of 31 entries. The scale is scored on a 5-point Likert scale with each entry consisting of 5 different levels, strongly disagree, disagree, average, agree, and strongly agree, with scores ranging from 1 to 5, respectively. The sum of the scores of the entries included in each dimension is the score of that dimension, and the total score is the sum of the scores of each dimension. The higher the score is, the higher the literacy of the patient. The content validity of the scale was verified to be 0.890, the Cronbach's α coefficient of the scale was 0.864, and the split-half reliability coefficient was 0.923, indicating good reliability and validity.

2.2.3. Proactive personality scale

The proactive personality scale was developed by Bateman and Crant in 1993[11] to measure individual differences in proactive personality tendencies. This scale has been widely used in different workplaces with teachers, students, and medical professionals.[14–16] This study used the Chinese version of the scale, which was revised by Shang and Gan in 2009.[17] The scale is unidimensional with 11 items and is rated on a 7-point Likert scale ranging from 1 to 7, indicating "very non-conforming" to "very conforming," respectively. The higher the score, the more pronounced the proactive personality tendency. The Cronbach's α coefficient for the revised scale was 0.86.

2.3. Data collection

In this study, questionnaires were distributed by the investigator. The purpose of the survey, the main points, and precautions were explained to the patients using a uniform guideline. The patients signed an informed consent form after providing consent. They were asked to complete the questionnaires according to their actual situation and return them on the spot. For patients who had difficulty in completing the questionnaires, the investigator assisted them by dictation.

2.4. Ethical approval

This study was approved by the ethics committee of Yantai Yuhuangding Hospital (IRB approval number: 2023-406). All patients voluntarily participated in this study and signed informed consent. The data were processed confidentially and the participant's personal information will not be disclosed through subsequent studies using numbers.

2.5. Data analysis

SPSS version 27.0 (IBM Corporation, Armonk, New York, United States) was used for data analysis. The scores for HL and proactive personality showed normal distributions. Descriptive statistics were used to analyze the demographic characteristics, proactive personality, and HL, including the mean, standard deviation, frequency, and percentage. The effect of sociodemographic variables on HL was analyzed using the independent samples *t*-test and ANOVA. Correlations between HL and proactive personality were tested by Pearson correlation. Using multiple linear regression to analyze factors influencing HL. The level of significance was 0.05.

3. Results

A total of 172 patients with permanent colostomy completed the survey. The mean age of the participants was 64.93 ± 9.40 years. The demographic data of the respondents are summarized in Table 1.

The total HL score of 172 patients with permanent colostomy in this study was 118.58 ± 14.62, with scores of 24.19 ± 2.98 in the functional domain, 62.93 ± 10.05 in the knowledge domain, and 31.47 ± 4.73 in the attitude domain. The total score of proactive personality was 60.00 ± 13.08 (see Table 2 for more details).

The results of one-way ANOVA showed that education level, place of residence, profession, and average monthly household income had an impact on the HL scores of patients with permanent colostomy, as shown in Table 3.

Items	N (%)
Gender	
Male	128 (74.42)
Female	44 (25.59)
Educational level	
Primary school	56 (32.56)
Junior high school	64 (37.21)
High school/secondary school	36 (20.93)
College	12 (7.00)
Undergraduate and above	4 (2.32)
Marital status	
Married	156 (90.70)
Divorced	4 (2.32)
Widowed	12 (7.00)
Residence	
Rural	96 (55.81)
Town/city	76 (44.19)
Profession	
Worker	72 (41.86)
Farmer	52 (30.23)
Teacher	12 (7.00)
Medical workers	32 (18.60)
Others	4 (2.32)
Primary caregiver	
Spouse	96 (55.81)
Sons and daughters	68 (39.53)
Others	8 (4.70)
Average monthly household income, yuan	
<3000	9 (55.81)
3001–5000	40 (23.26)
5001–7000	20 (11.63)
>7001	16 (9.30)

Table 1. Demographic data of participants (N = 172).

Domain	Minimum	Maximum	Score (M ± SD)
Functional domain	18	30	24.19 ± 2.98
Knowledge domain	40	85	62.93 ± 10.05
Attitude domain	22	40	31.47 ± 4.73
Total HL score	87	155	118.58 ± 14.62
Total proactive personality scores	28	77	60.00 ± 13.08

Note: HL, health literacy.

Table 2. HL scores of patients with permanent colostomy.

Pearson correlation analysis showed a positive correlation between proactive personality and HL in patients with permanent enterostomies ($r = 0.417$, $P < 0.001$). The correlations for each dimension and entry are detailed in Table 4.

Because age grouping was not considered during the study, only the correlation between total HL and proactive personality is reported by age in Table 5. The results showed that age was negatively correlated with the total proactive personality score

Items	Score (M ± SD)	*t*/*F*	*P*-valve
Gender			
Male	128 (74.42%)	0.925	0.338
Female	44 (25.59%)		
Educational level			
Primary school	56 (32.56%)	10.213	<0.001
Junior high school	64 (37.21%)		
High school/secondary school	36 (20.93%)		
College	12 (7.00%)		
Undergraduate and above	4 (2.32%)		
Marital status			
Married	156 (90.70%)	0.158	0.854
Divorce	4 (2.32%)		
Widowed	12 (7.00%)		
Residence			
Rural	96 (55.81%)	25.162	<0.001
Town/city	76 (44.19%)		
Profession			
Worker	72 (41.86%)	12.579	<0.001
Farmer	52 (30.23%)		
Teacher	12 (7.00%)		
Medical workers	32 (18.60%)		
Others	4 (2.32%)		
Primary caregiver			
Spouse	96 (55.81%)	1.554	0.214
Sons and daughters	68 (39.53%)		
Others	8 (4.70%)		
Average monthly household income, yuan			
<3000	9 (55.81%)	10.943	<0.001
3001–5000	40 (23.26%)		
5001–7000	20 (11.63%)		
>7001	16 (9.30%)		

Note: HL, health literacy.

Table 3. Comparison of HL scores of patients with permanent colostomy with different characteristics.

Project	Functional domain	Knowledge domain	Attitude domain	Total HL score
If I see someone in trouble, I will do my best to help	0.395**	0.032	0.281**	0.193*
I am good at turning problems into opportunities	0.518**	0.342**	0.389**	0.467**
I am always looking for a better way of doing things	0.450**	0.263**	0.409**	0.404**
When I have a problem, I will face it head on	0.372**	0.080	0.322**	0.234**
I like to challenge the *status quo*	0.460**	0.074	0.260**	0.229**
If I believe in an idea, nothing prevents me from making it happen	0.455**	0.246**	0.325**	0.367**
If I believe in something, I will do it regardless of the odds of success or failure	0.294**	0.092	0.272**	0.211**
Nothing is more exciting than seeing my ideas come to life	0.453**	0.075	0.431**	0.283**
I am always looking for new ways to make my life better	0.444**	0.119	0.439**	0.314**
I enjoy facing and overcoming obstacles in my mind	0.427**	0.290**	0.537**	0.460**
I always wish I was special in the group (maybe in this world)	0.513**	0.505**	0.508**	0.616**
Active personality total score	0.525**	0.238**	0.452**	0.417**

Note: HL, health literacy.

Table 4. Correlation analysis between HL and proactive personality in patients with permanent colostomy.

Variable	Total HL	Total proactive personality
Age (years)		
Correlation	0.071	−0.068
P-value	0.356	0.377

Note: HL, health literacy.

Table 5. Correlation coefficient between age and total HL and proactive personality.

($r = -0.068$, $P = 0.377$) and positively correlated with HL ($r = 0.071$, $P = 0.356$), but no correlations were significant.

Table 6 shows that proactive personality explained 16.9% of the total variance in HL (Model 1). Simple regression analysis revealed that proactive personality had a significant effect on HL ($\beta = 0.417$, $P < 0.001$). Likewise, in Model 2, the impact of proactive personality on HL was evaluated by multiple linear regression analysis. The explained variance rate was 25.9% for HL. Profession had a significant effect on HL ($\beta = 0.341$, $P < 0.001$).

4. Discussion

The results of this study showed that the total HL score of patients with permanent colostomy was 118.58 ± 14.62,

Independent variable(s)	*B*	SE	*b*	*t*	*P*	VIF
Model 1						
(Constant)	15.771	7.453		2.116	0.036	
Proactive personality	0.373	0.062	0.417	5.979	<0.001	1.000
R^2: 0.417[a]	R^2: 0.169	*F*: 35.747	*P* = < 0.001[b]	*P* = < 0.001		
Model 2						
(Constant)	43.683	2.682		16.288	0.000	43.683
Education level	1.288	1.190	0.099	1.082	0.281	0.513
Place of residence	1.822	2.300	0.069	0.792	0.429	0.565
Profession	3.710	0.860	0.341	4.314	0.000	0.695
Average monthly household income all	1.851	1.058	0.141	1.750	0.082	0.671
R^2: 0.526[a]	R^2:0.259	*F*:15.975	*P* = < 0.001[b]			

Note: HL, health literacy; [a]Dependent variable: total health literacy score; [b]Predictor variables: (constant), mean score.

Table 6. The effect of proactive personality and its dimensions on HL.

which is moderate. This finding is consistent with the results of the study by Rothermel et al.[18] The reasons for this finding may be as follows: (1) The special nature of stoma surgery, especially in patients who have undergone surgery to form a permanent intestinal stoma, contributes to the willingness of patients and their caregivers to spend more time understanding how to perform stoma care in the postoperative period in the face of changes in defecation of the patterns. High scores in the functional domain in this study indicate that patients are willing to articulate their problems to health care providers and actively seek help when they encounter difficulties. (2) In the knowledge domain, nurses provide health education to patients with permanent enterostomies to help them understand stoma care, such as guidance on lifestyle changes, stoma care techniques, and related complications. Some studies have shown that good psychological care and health guidance can improve patients' knowledge and self-care ability while improving their levels of anxiety and depression.[19] In addition, with the development of the internet, patients can learn about stomas through various methods or channels, such as WeChat, apps, and online courses from various institutions, to improve their knowledge. (3) With regard to attitude, most patients indicated that they could manage their stoma and return to normal work and family life with a positive attitude. A positive attitude can help patients with a permanent intestinal stoma develop a positive mindset and a good sense of self-efficacy and can improve their confidence in coping with difficulties so that they can better adapt to life with a stoma.

In this study, patients with permanent enterostomies had a total proactive personality score of 60.00 ± 13.08. The higher the score, the more pronounced proactive personality tendencies were. It has been shown that individuals with proactive personalities can respond proactively to changes in their environment and can actively adapt and even exert an influence on their surroundings. Individuals with high proactivity are more willing to take action on their own initiative, more optimistic and confident in the face of difficulties and transitions in their career, hopeful, and able to recover quickly when they encounter setbacks, which positively affects their career adaptability.[20] Patients with a permanent colostomy not only suffer from cancer and surgical treatment but also must face the embarrassment brought by changes in defecation and the lifelong nature of the stoma. If not handled properly, there is a higher incidence of postoperative complications, such as ischemic necrosis of the stoma, stoma retraction, stoma prolapse, and stoma skin mucosa separation, leading to readmission of patients as well as increased physical pain and family burden. Therefore, it is important to actively help patients to develop an active personality so that they can face the difficulties of life with a stoma with a more positive attitude.

Sociodemographic variables play an important role in identifying risky groups and creating intervention strategies. In this study, it was observed that individuals with low education levels, those living in villages, and households with low monthly income had low levels of HL. Similar studies on the subject support our finding.[21,22]

The results of this study showed a moderate positive correlation between HL and proactive personality in patients with permanent enterostomies ($r = 0.417$, $P < 0.001$), meaning that the more pronounced their proactive personality tendencies are, the higher their HL scores. This may be related to the fact that patients with permanent enterostomies who have proactive personality traits are able to proactively seek, understand, assess, and utilize stoma-related health knowledge

and information to engage in behaviors that reduce health hazards and improve quality of life. It has been shown that individuals with highly proactive personalities can adapt quickly to their environment.[23] This may be related to the fact that people with a proactive personality, which is a positive psychological state, experience more emotional support. Furthermore, patients with a highly proactive personality can proactively identify problems and actively seek help during the recovery process. HL is a basic skill for seeking disease-related knowledge and improving quality of life. It is especially important for postoperative stoma patients to receive health knowledge, change bad habits, adopt healthy behaviors, and improve their quality of life. It is recommended that clinical workers actively help patients to develop highly proactive personalities during the perioperative period, consider the role of social support and encourage caregivers to participate to effectively improve HL.

4.1. Clinical implications

Our findings have some value because they provide information about the relationship between personality and HL and provide information about associated risk factors, which in turn can help to identify vulnerable patients and provide individualized interventions and treatments.

4.2. Limitations existed in this study

First, the questionnaire was administered using a convenience sampling method and was only distributed to patients with comprehensive abilities; therefore, the results may not describe the overall situation of the entire patient population. Second, this study was conducted in only one tertiary care hospital, and the sample size was relatively small. Finally, this study only included two variables, i.e., HL and proactive personality, at the time of investigation, which has some limitations, and more variables could be included in the future to explore the correlation between them.

5. Conclusions

The development of proactive personality can improve HL and promote improved health behaviors in patients with permanent enterostomies to reduce adverse clinical outcomes. Therefore, we suggested that some proactive strategies need to be adopted by the key stakeholders to improve the HL of permanent colostomy patients by developing their proactive personalities, and these important policies will contribute to the improvement of patients' health and quality of life.

Ethical approval

This study was approved by the ethics committee of Yantai Yuhuangding Hospital (IRB approval number: 2023-406).

Conflicts of interest

All contributing authors declare no conflicts of interest.

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