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Application of an ITHBC-Based Self-Management Intervention Program for Inflammatory Bowel Disease Patients

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Abstract

To explore the effectiveness of an ITHBC-based self-management intervention program for patients with inflammatory bowel disease (IBD), Eighty IBD patients who visited the Gastroenterology Department of a tertiary hospital in mainland China between July and December 2024 were enrolled. Participants were numbered sequentially based on their admission order and randomly assigned to either the control group (n=40) or the intervention group (n=40) using a random number table. The control group received standardized clinical pathway treatment and routine nursing care, while the experimental group received care based on the IBD self-management intervention protocol. The study compared the effects of these two interventions on patients' self-management capabilities, clinical symptom relief, and readmission rates. Results showed that Pre-intervention scores on the IBD Self-Management Behavior Scale exerted no significant difference between groups ($P > 0.05$); In Post-intervention, the experimental group demonstrated significantly higher scores than the control group ($P < 0.05$); Pre-intervention SCS-IBD scores showed no significant difference between groups ($P > 0.05$); In Post-intervention, trial group SCS-IBD scores were significantly lower than control group scores ($P < 0.05$). The rehospitalization rate in the intervention group was significantly lower than that in the control group after the intervention ($P < 0.05$). In Conclusion, the IBD self-management intervention program based on the ITHBC theory not only effectively improved self-management behaviors in IBD patients but also efficiently alleviated clinical symptoms and reduced rehospitalization rates, which fully validated the effectiveness of the theoretical model and provided a reference paradigm for the theoretical construction of subsequent chronic disease intervention programs in the near future.

Keywords: Integrated Theory of Health Behavior Change (ITHBC), inflammatory bowel disease, self-management program

1. Introduction

Inflammatory bowel disease (IBD) is a collective term for a group of chronic, recurrent, non-specific inflammatory bowel disorders with unclear etiology. Its core pathological features primarily manifest as disruption of the intestinal mucosal barrier, abnormal immune responses, and imbalance in tissue repair (Zhang & Li, 2014). Clinically, based on the location of lesions, depth of inflammation, and disease behavior, it is classified into two major subtypes: ulcerative colitis (UC) and Crohn's disease (CD) (Bruner et al., 2023). In recent years, accelerated global industrialization and environmental shifts have driven a significant rise in IBD incidence. Europe and North America exhibit the highest prevalence rates exceeding 0.3%, while China's incidence has climbed to 3.62 per 100,000, posing substantial challenges and burdens for public health management (Buie et al., 2023; Ng et al., 2017).

While IBD primarily manifests as intestinal symptoms (abdominal pain, diarrhea, bloody stools, and intestinal obstruction), it may also present with systemic symptoms (fever, malnutrition) and extraintestinal manifestations (joint symptoms, skin/mucosal symptoms, and ocular symptoms), causing severe physical discomfort for patients (Farrell et al., 2016). However, the impact of IBD extends far beyond these physical manifestations. Recurrent disease flare-ups can trigger negative psychological emotions such as anxiety, depression, and stigmatization (Barberio et al., 2021). The condition's effects on academic performance, career development, and family life may lead to social withdrawal and diminished self-worth (Emerson et al., 2022; Grootenhuis et al., 2009). Disease factors may also lead to social avoidance and loss of family roles (Magalhães et al., 2014). Additionally, IBD medical costs are generally high. Relevant studies indicate (Yu et al., 2021; Zhou et al., 2021) that in China, the average (standard deviation) direct and indirect costs per IBD patient are approximately $11,668.68 ($7,944.44) and $74.90 ($253.60), respectively. Nearly 98.0% of patients express concern about their financial situation, and about 79.7% attempt to save money for medical expenses, even delaying necessary treatments. This compels us to confront the physical, psychological, social, and economic burdens IBD imposes on patients and their families.

Self-management behavior refers to the comprehensive process by which individuals proactively engage in health management activities to maintain well-being during chronic disease progression. These activities include learning about the disease and recovery, independently monitoring health status, actively cooperating with treatment, implementing lifestyle interventions, and regulating emotions (van der Gaag et al., 2022). Currently, this concept is widely applied in managing chronic conditions such as type 2 diabetes (Xie et al., 2020), hypertension (Asmat et al., 2024), and hypercholesterolemia (Majeed et al., 2024), contributing to improved disease control. However, related research (Ren et al., 2024) indicates that the self-management status of IBD patients remains concerning, primarily due to insufficient disease awareness, poor medication adherence, inadequate disease monitoring, and barriers in doctor-patient communication. Despite numerous scholars employing various theories to intervene in the self-management capabilities of IBD patients, the outcomes remain disappointing (Hunt et al., 2020; Mikocka-Walus et al., 2017). The Integrated Theory of Health Behavior Change (ITHBC) is a comprehensive theoretical model that

systematically integrates core elements from multiple behavioral science theories. It aims to provide a more holistic and dynamic framework for explaining and promoting health behavior change in chronic disease management (Lang et al., 2023). This theoretical model encompasses four dimensions—cognitive restructuring, motivational enhancement, skill training, and behavioral reinforcement—to promote the short-term establishment and long-term maintenance of healthy behaviors, thereby enhancing patients' self-management capabilities. Currently, it is widely applied in health behavior interventions for tuberculosis patients and hemodialysis patients (Bao et al., 2022; Chen et al., 2025). To further enhance the self-management capabilities of IBD patients, this study will implement nursing practices based on the ITHBC theoretical model for IBD patients to observe its specific practical application outcomes.

2. Materials and Methods

2.1 Study Population

Eighty patients with inflammatory bowel disease (IBD) who visited the Department of Gastroenterology at a tertiary hospital in mainland China between July 2024 and December 2024 were enrolled as study subjects. Inclusion Criteria: (1) Clinically, endoscopically, and pathologically confirmed IBD (including Crohn's disease (CD) or ulcerative colitis (UC)) (Lamb et al., 2019); (2) Age 16–75 years with disease duration ≥6 months; (3) Disease status in remission or mildly active phase (CDAI < 150 for CD; Mayor score ≤ 4 for UC); (4) Normal cognitive and communication abilities, basic literacy, ability to independently use a smartphone or complete questionnaires with researcher assistance, understanding of intervention content, and willingness to participate in follow-up; (5) Willingness to participate in the study, signing of written informed consent, and commitment to full cooperation throughout the intervention. Exclusion Criteria: (1) Concurrent severe IBD-related complications such as intestinal obstruction, intestinal perforation, abdominal abscess, toxic megacolon, active opportunistic infections (e.g., tuberculosis), or other severe systemic diseases; (2) Pregnant or lactating women; (3) Participation in other clinical studies affecting self-management or systematic behavioral interventions within the past 3 months; (4) Patients with a predicted survival period <6 months who cannot complete long-term follow-up; (5) Patients whose data collection is expected to be disrupted during the study period due to planned relocation, overseas travel, etc. The 80 patients to be enrolled will be numbered sequentially based on their order of presentation. Using a random number table, patients will be allocated to either the control group or the experimental group, with 40 patients in each group.

2.2 Study Design

This study is a single-blind, randomized controlled trial.

2.3 Research Methods

2.3.1 Control Group

Received standardized clinical pathway treatment and routine care. Underwent routine

follow-up (telephone calls, scheduled visits) after initial consultation, completed relevant questionnaires, and underwent dynamic assessment of related indicators throughout the process.

2.3.2 Experimental Group

In addition to the control group interventions, the experimental group received an intervention program based on the ITHBC framework.

2.3.2.1 Intervention Goals

(1) Short-term Goals: Enhance IBD patients' knowledge base, stimulate self-management motivation, master basic self-management skills, improve medication adherence, optimize diet and lifestyle, and strengthen psychological coping abilities. (2) Long-term goals: Establish stable healthy behaviors, reduce disease recurrence rates, improve patients' quality of life, and decrease utilization of healthcare resources.

Intervention Period: The intervention period spans 6 months:

Months 1–2: Intensive intervention (weekly 90-minute group sessions)

Months 3–6: Online follow-up (monthly telephone or WeChat guidance)

Implementation of ITHBC-Based Intervention Program:

(1) Planning Phase (Motivational Engagement and Co-Shaping of Personalized Plans): This phase aims to stimulate patients' intrinsic motivation for change, reduce behavioral resistance, help patients recognize the necessity of self-management, and collaboratively develop feasible action plans with healthcare providers. Specific interventions include: 1) Motivational Interviewing: For patients lacking change readiness, nurses employ open-ended questions and reflective listening to guide patients in expressing conflicting feelings about disease management while reinforcing their intrinsic motivation for change (e.g., “What quality of life do you envision for the next year?” “How does your current disease management approach impact achieving this goal?”) to foster change readiness. 2) Disease Cognition Restructuring: Through the “Disease Diary” task (recording symptom-emotion-behavior correlations) over 3 days, patients gain visual evidence of the causal link “self-management → symptom improvement,” replacing the negative belief that “the disease is uncontrollable.” 3) Decision Balance Analysis: Collaboratively explore the “benefits” (e.g., reduced recurrence frequency, improved quality of life, enhanced sense of control) and ‘drawbacks’ (e.g., time-consuming, inconvenient, initial challenges) of self-management. By presenting authoritative evidence and success stories, help patients recognize that benefits far outweigh drawbacks, facilitating their transition to the “Preparation Stage.” 4) Goal Setting and Plan Refinement: For patients in the “Preparation” or ‘Action’ stages, collaboratively establish short- and long-term self-management goals. For example: “Over the next two weeks, use the symptom diary app daily to record bowel movements and abdominal pain scores.” Meanwhile, develop personalized plans covering medication, diet, and stress management based on these goals.

(2) Action Phase (Skill Building): This phase employs group-based intervention sessions aimed at enhancing patients' self-management skills. It provides concrete behavioral change strategies and tools to boost self-efficacy, primarily through the following measures: 1) Symptom Monitoring: Assist patients in establishing personal symptom diaries using either paper or electronic formats. Recordings should include: stool frequency, stool consistency, abdominal pain intensity, rectal bleeding, weight, fever, fatigue levels, etc. Emphasize identifying early warning signs of disease activity, such as stool frequency >6 times/day, severe abdominal pain, persistent vomiting, or high fever that does not subside, which indicate disease exacerbation requiring immediate medical attention. 2) Medication Management: IBD drug therapy is complex and variable, requiring personalized adjustments based on disease type, severity, treatment response, and individual tolerance. Treatment follows a stepwise approach, progressing from basic anti-inflammatory drugs to immunomodulators, then to biologics and small-molecule drugs. To enhance medication adherence, patients should receive thorough education using medication checklists to clarify dosages, timing, and storage. Medication organizers or mobile apps with reminders should be utilized. Adverse effects must be closely monitored, and medication records reviewed during follow-ups to adjust treatment plans as needed. 3) Dietary Intervention: IBD patients' diets must balance reducing intestinal irritation with meeting nutritional needs. Currently recommended dietary approaches include the Mediterranean diet, low-FODMAP diet, specific carbohydrate diet, and Crohn's disease elimination diet. Patients are encouraged to use health apps or smartphones for dietary tracking, with healthcare providers monitoring progress through these records. 4) Emotional Regulation: Encourage patients to join IBD support groups to gain emotional support and practical advice through peer interaction, alleviating feelings of isolation and stigma. For patients with significant psychological distress, implement relaxation therapies such as mindfulness-based stress reduction and emotional regulation techniques. Refer to psychiatrists when necessary.

(3) Environmental Support: Aims to establish an external support system promoting patient self-management. Specific interventions include: Inviting primary family caregivers to participate in the fourth group session. Training family caregivers on key observation points for primary IBD symptoms and techniques for positively encouraging patients to enhance self-management confidence. Second, healthcare providers establish an “IBD Self-Management WeChat Group.” Nurses regularly share articles on IBD self-management to guide patient learning and encourage timely sharing of successful self-management experiences, helping patients cultivate a positive mindset.

(4) Feedback Reinforcement: This phase aims to consolidate behavioral changes and address relapse risks. Key intervention measures include: 1) Monthly follow-ups via telephone or WeChat online platforms to review patients' self-management records, acknowledge progress made, promptly address emerging issues, and replace old unhealthy habits with healthy behaviors. 2) Relapse prevention plans: Collaboratively develop “behavioral relapse/relapse response protocols” with patients. Examples include corrective measures for disrupted medication schedules during travel, or a checklist of relaxation techniques to activate during low moods or increased stress. This significantly enhances patients' “self-efficacy” when

facing challenges. 3) Facilitating Role Transition: Encourage patients who have become "senior" self-managers to share experiences within self-management groups, shifting from "recipients of help" to "providers of help." This process deepens their behavioral identification and sense of value, creating a virtuous cycle of "helping relationships."

2.3.2.2 Quality Control:

(1) Train relevant members before implementing the intervention plan. Ensure each medical staff member attends at least two training sessions before starting the intervention and correctly masters the operational procedures. (2) Strengthen quality control during the intervention process. Strictly follow the established plan, promptly identify and rectify issues during implementation. (3) Assign separate personnel for intervention delivery and data collection to minimize human bias. (4) Require two members to jointly complete data entry, ensuring the accuracy of raw data. All data undergoes cross-verification by the research team before subsequent statistical analysis.

2.3 Observation Indicators

2.3.1 Inflammatory Bowel Disease Self-Management Behavior Scale (Shang et al., 2019)

This 36-item scale comprises seven dimensions—medication management, dietary management, disease monitoring, emotional management, exercise management, daily life management, and resource utilization—tailored to China's sociodemographic context. Grounded in self-management theory and social cognitive theory, it objectively assesses IBD patients' self-management behaviors. Using a 5-point Likert scale, the total score ranges from 36 to 180 points, with higher scores indicating better self-management behaviors. The overall Cronbach's α coefficient is 0.945, demonstrating good internal consistency.

2.3.2 Symptom Cluster Assessment Scale for Inflammatory Bowel Disease (SCS-IBD) (Gu et al., 2020)

This 18-item scale comprises five dimensions: intestinal symptoms, psychological symptoms, systemic symptoms, nutritional symptoms, and abdominal symptoms. Its concise items offer strong clinical utility, facilitating self-monitoring of disease progression in IBD patients. It uniquely excels in longitudinally assessing symptom cluster changes. Using a 5-point Likert scale, the total score ranges from 18 to 90, with higher scores indicating more severe symptoms. The overall Cronbach's α coefficient is 0.900, demonstrating good internal consistency.

2.3.3 Rehospitalization Rate

It refers to the proportion of patients readmitted within six months post-intervention due to poor disease control or complications, serving as an indicator of improved self-management capacity. Rehospitalization rate = Number of readmissions / Total number of subjects in each group × 100%.

2.4 Statistical Methods

Statistical analysis was performed using SPSS 26.0 software. Continuous variables (e.g., age, disease duration, Self-Management Behavior Scale scores, Symptom Cluster Assessment

Scale scores) were first tested for normality (Shapiro-Wilk test) and homogeneity of variance. Normally distributed variables were expressed as mean ± standard deviation (±SD). Intra-group comparisons used paired t-tests, while inter-group comparisons employed independent samples t-tests. Non-normally distributed variables were presented as median (interquartile range) [M (IQR)]. Nonparametric tests were applied: the Mann-Whitney U test for intergroup comparisons and the Wilcoxon signed-rank test for intragroup comparisons. Categorical data (e.g., gender, education level, readmission rate) were expressed as counts (percentages) [n (%)]. Intergroup comparisons employed the chi-square test or Fisher's exact test when theoretical frequency <5.

3. Results

3.1 Comparison of General Baseline Characteristics Between Groups

Among the 40 patients in the control group, 24 were male and 16 were female. Ages ranged from 18 to 66 years, with a mean age of (36.78 ± 6.63) years. Marital status: 27 were married, 6 were unmarried, and 7 were divorced. Educational attainment: 17 had junior high school education or below, 12 had high school or vocational school education, and 11 had college education or above; disease duration ranged from 1 to 10 years, with a mean duration of (5.27 ± 3.18) years; disease types: Crohn's disease (CD) in 15 cases, ulcerative colitis (UC) in 25 cases. In the experimental group of 40 patients, there were 25 males and 15 females; Age: 17–63 years, mean age (35.21 ± 5.65) years; Marital status: Married 26, Unmarried 8, Divorced 6; Educational attainment: 17 with junior high school or below, 13 with high school or vocational school, 10 with college or above; disease duration ranged from 1 to 11 years, with a mean duration of (5.53 ± 3.21) years; disease types: Crohn's disease (CD) 17 cases, ulcerative colitis (UC) 23 cases. No significant differences were observed between the two groups in baseline characteristics ($P > 0.05$).

Comparison of self-management behaviors before intervention showed no significant difference in IBD Self-Management Behavior Scale scores between groups before intervention ($P > 0.05$). After intervention, the experimental group exhibited significantly higher scores than the control group ($P < 0.05$), as shown in Table 1.

Table 1. Comparison of IBD Self-Management Behavior Scale Scores Before and After Intervention in Both Groups ($\bar{x} \pm s$)

Group	Sample Size	Inflammatory Bowel Disease Self-Management Behavior Scale Score/Points	
		Before intervention	After intervention
Control group	40	95.78±6.89	110.67±4.23
Experimental group	40	96.36±5.72	122.68±5.62
t		0.410	10.799
P		0.683	0.000

Comparison of self-reported symptoms before and after intervention between the two groups showed no significant difference in the Symptom Cluster Scale for Inflammatory Bowel Disease (SCS-IBD) scores before intervention ($P > 0.05$). After intervention, the SCS-IBD scores of patients in the experimental group were significantly lower than those in the control group ($P < 0.05$). See Table 2.

Table 2. Comparison of Inflammatory Bowel Disease Self-Management Behavior Scale Scores Before and After Intervention in Both Groups ($\bar{x} \pm s$)

Group	Sample Size	Symptom Cluster Scale for Inflammatory Bowel Disease (SCS-IBD)/Score	
		Before intervention	After intervention
Control group	40	52.16±3.25	43.14±3.21
Experimental group	40	51.84±3.77	36.61±3.06
t		0.407	9.313
P		0.685	0.000

Comparison of readmission rates within six months post-intervention due to factors such as poor disease control or complications revealed that the readmission rate in the intervention group was significantly lower than that in the control group ($P < 0.05$), as shown in Table 3.

Table 3. Comparison of Readmission Rates Between the Two Groups [n (%)]

Group	Sample Size	Number of readmissions	Readmission rate
Control group	40	12	12（30.00）
Experimental group	40	4	4（12.50）
χ^2			5.000
P			0.025

4. Discussion

As a chronic, recurrent, incurable yet manageable disease, IBD requires long-term or even lifelong patient management. Relying solely on short-term hospital treatment is far from sufficient. Relevant studies confirm (Duff et al., 2018; Kamp et al., 2019) that enhancing self-management skills not only effectively reduces the risk of IBD recurrence and improves malnutrition but also lowers the incidence of related complications, adjusts patients' psychological state, and enhances their quality of life. Besides, IBD incidence in China has surged exponentially in recent years. According to the latest statistics (Kaplan & Ng, 2016), China's IBD patient population is projected to reach 1.5 million by 2025. This substantial patient population will create an imbalance between healthcare supply and demand in China.

Therefore, enhancing IBD patients' self-management capabilities can not only alleviate pressure on healthcare resources but also allow limited resources to focus on treating critically ill patients, achieving rational resource allocation. Consequently, strengthening the improvement of IBD patients' self-management capabilities has become a highly prioritized issue among medical scholars in recent years. Based on this context, this study applied an IBD self-management program designed using the ITHBC theoretical model to IBD patients. This intervention effectively improved patients' self-management capabilities, thereby alleviating clinical symptoms and reducing readmission rates. It also fully demonstrated the necessity and efficacy of implementing self-management enhancement programs for IBD patients.

4.1 The IBD Self-Management Intervention Program Based on ITHBC Effectively Improves Self-Management Behaviors in IBD Patients

Self-management behaviors constitute the core component for disease control and improved prognosis in IBD patients, formed and sustained through the synergistic interaction of multidimensional factors including knowledge, motivation, and skills (Horvát et al., 2024). The self-management intervention program grounded in ITHBC theory overcomes the limitations of conventional care focused solely on knowledge impartation. Through a four-phase intervention "logic—cognitive restructuring, motivation enhancement, skill training, and behavioral reinforcement"—it achieves comprehensive coverage of the entire health behavior change process for patients (Koulouvari et al., 2025). In this study, the experimental group demonstrated significantly higher scores on the Inflammatory Bowel Disease Self-Management Behavior Scale compared to the control group, indicating that the ITHBC-based intervention effectively enhances patients' self-management capabilities. This success primarily stems from the self-management intervention program grounded in ITHBC theory. During the initial motivation phase, motivational interviewing shifts patient attitudes, dispels negative perceptions of "uncontrollable disease," and helps patients recognize that disease management offers far more benefits than drawbacks. This ultimately assists them in setting short- and long-term self-management goals. Moreover, during the behavioral change phase, group-based sessions enhanced patients' self-management skills in symptom monitoring, diet, medication adherence, physical activity, and emotional regulation. Later stages reinforced patients' external support systems through family member and healthcare provider follow-ups, providing immediate feedback and reinforcement for behavioral practice to prevent relapse risks. Consequently, post-intervention scores on the Inflammatory Bowel Disease Self-Management Behavior Scale scores were significantly higher in the experimental group than those in the control group ($P < 0.05$).

4.2 The ITHBC-based Self-management Intervention Program for Inflammatory Bowel Disease Effectively Improves Clinical Symptoms and Reduces Readmission Rates Among IBD Patients.

IBD patients often present with a symptom cluster characterized by coexisting abdominal pain, diarrhea, fatigue, and other manifestations. This symptom cluster not only directly impacts patients' physical comfort but also exacerbates disease burden through psychological

stress responses, creating a vicious cycle of "symptoms-psychology-disease" (Lovén Wickman et al., 2016). In this study, patients in the intervention group who implemented the self-management program guided by ITHBC theory demonstrated significantly lower scores on the Inflammatory Bowel Disease Symptom Cluster Assessment Scale compared to the control group, along with a significant reduction in readmission rates. This indicates that the intervention program effectively improves symptom control and reduces the risk of disease recurrence. This is primarily because the intervention program optimizes patients' self-management behaviors, directly targeting key aspects of disease control: Enhanced symptom monitoring skills enabled patients to promptly recognize early warning signs of disease changes and implement targeted interventions, preventing minor symptoms from progressing to severe conditions. Standardized medication usage improved treatment efficacy and reduced disease fluctuations caused by non-compliance. Personalized dietary management minimized diet-related intestinal irritants, lowering the risk of triggering symptoms like abdominal pain and diarrhea. Concurrently, the intervention incorporates psychological resilience modules. Patients are encouraged to join IBD support groups, where peer interaction provides emotional support and practical advice, alleviating feelings of isolation and stigma. Mindfulness-based stress reduction training and emotion regulation techniques help mitigate disease-related anxiety and depression, thereby effectively improving psychological stress states. Enhanced self-management capabilities reduced emergency visits and hospitalization needs due to poor disease control, while also lowering readmission rates. Consequently, the Symptom Cluster Scale for Inflammatory Bowel Disease (SCS-IBD) scores were significantly lower in the intervention group compared to the control group ($P < 0.05$), and readmission rates were markedly lower in the intervention group than in the control group ($P < 0.05$).

5. Limitations and Future Directions

Although this study achieved its anticipated outcomes, certain limitations remain.

First, the study population was drawn exclusively from the gastroenterology department of a single tertiary hospital, resulting in limited sample representativeness. Future research should broaden the source of participants and conduct multicenter studies to further validate the generalizability of the intervention protocol. Second, the intervention period was six months, and while short- and medium-term effects were observed, chronic conditions like IBD require longer-term follow-up to assess sustained outcomes. Future studies should extend follow-up periods to evaluate the intervention's impact on long-term patient prognosis. Last but not least, this study primarily employed quantitative metrics to assess intervention outcomes, lacking attention to qualitative indicators such as patient subjective experiences and family caregiving burdens. Future research could integrate qualitative methodologies to analyze the implementation effects and influencing factors of the intervention program from a more comprehensive perspective.

Future research can build upon this study to further optimize the intervention program. On the one hand, integrating information technology to develop smartphone app-based intelligent intervention tools could enable personalized content delivery, real-time symptom monitoring, and

feedback, enhancing convenience and timeliness. On the other hand, the scope of intervention recipients could be expanded to include patient family members and caregivers, establishing a tripartite collaborative management model involving "patients-families-healthcare providers" to further enhance the sustainability of intervention outcomes.

In summary, this study's IBD self-management intervention program, grounded in the ITHBC theory, not only effectively improved patients' self-management behaviors but also alleviated clinical symptoms and reduced readmission rates. This comprehensively validates the theoretical model's efficacy, providing new empirical support for its clinical application while offering a reference paradigm for developing theoretical frameworks for chronic disease interventions. Besides, this program offers a novel and effective pathway for chronic management of IBD patients, while also providing valuable reference for the development and implementation of theory-driven intervention programs in chronic disease nursing.

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Competing interests

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Informed consent

Obtained.

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The Publication Ethics Committee of the Macrothink Institute.

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

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No additional data are available.

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