Original Paper

Effectiveness of a WeChat-Based Self-Compassion Intervention for Patients After Sphincter-Preserving Surgery for Rectal Cancer: Randomized Controlled Trial

Chuanqin Wu[1,2], BSN; Qingqing Hong[1,2], BSN; Yuanyuan Liang[1,2], BSN; Yang Hao[1,2], BSN; Jiaqian Chen[1,2], BSN; Zhijun Shu[1,2], BSN; Min Hu[1,2], MSN; Tingting A[3], MSN; Beibei Song[1,2], MSN; Shaohua Hu[1,2], PhD

[1]Department of Nursing, First Affiliated Hospital of Anhui Medical University, Hefei, Anhui, China

[2]School of Nursing, Anhui Medical University, Hefei, Anhui, China

[3]Department of Cardiology, Maanshan People's Hospital, Maanshan, China

Corresponding Author:

Shaohua Hu, PhD
Department of Nursing
First Affiliated Hospital of Anhui Medical University
218 Jixi Road
Hefei, Anhui 230022
China
Phone: +86 551 62922005
Email: yfy203065@fy.ahmu.edu.cn

Abstract

Background: Patients after sphincter-preserving surgery (SPS) for rectal cancer often need to manage persistent bowel symptoms during recovery and may experience psychological distress, including loneliness, anxiety, and depressive symptoms. Self-compassion interventions have been used among patients with cancer, but research on digital self-compassion interventions for this population, particularly during home-based recovery after discharge, remains limited.

Objective: This study aimed to evaluate the effect of a WeChat Mini Program–based self-compassion intervention on self-compassion in patients after SPS for rectal cancer. We also examined changes in cancer-related loneliness, anxiety, and depressive symptoms and evaluated intervention feasibility and platform usability.

Methods: From September 2025 to February 2026, we conducted a single-center, two-arm, parallel-group, single-blind randomized controlled trial at a tertiary Grade A hospital in Anhui Province, China. A total of 160 patients were randomized 1:1 to the intervention or control group. The intervention group received a 4-week WeChat Mini Program–based self-compassion intervention, and the control group received routine postoperative follow-up. The primary outcome was self-compassion, and secondary outcomes were cancer-related loneliness, anxiety, and depressive symptoms. Outcomes were assessed at baseline (T0), at the end of the intervention (week 4; T1), 4 weeks after the intervention (week 8; T2), and 8 weeks after the intervention (week 12; T3). Intervention feasibility was evaluated based on task completion and platform use. The System Usability Scale (SUS) was used to assess platform usability among intervention-group participants who completed T3. Generalized estimating equations were used to examine between-group differences in changes over time, and multiple imputation was used for sensitivity analysis of missing data.

Results: A total of 160 participants were randomized, with 80 in each group. At T1, improvement in self-compassion was greater in the intervention group than in the control group (β=6.13, 95% CI 4.44-7.82; *P*<.001). This difference remained significant at T2 (β=5.25, 95% CI 3.60-6.90; *P*<.001) and T3 (β=6.52, 95% CI 4.66-8.38; *P*<.001). Reductions in cancer-related loneliness, anxiety, and depressive symptoms were also greater in the intervention group at all follow-up time points (all *P*<.001). Results of the multiple-imputation sensitivity analysis were generally consistent with the primary analysis. In the intervention group, 62 of 80 (77.5%) participants completed at least 75% of the training tasks. Among the 52 intervention-group participants who completed T3, the mean SUS score was 74.13 (SD 8.00), above the benchmark of 68.

Conclusions: During home-based recovery after SPS for rectal cancer, the intervention group showed greater improvement in self-compassion and greater reductions in cancer-related loneliness, anxiety, and depressive symptoms than the control group, and these between-group differences were observed at T2 and T3. Further multicenter studies with longer follow-up are needed.

Trial Registration: Chinese Clinical Trial Registry ChiCTR2500107801; https://www.chictr.org.cn/showprojEN.html?proj=283239

J Med Internet Res 2026;28:e93835; doi: 10.2196/93835

Keywords: self-compassion; mHealth; mobile health; WeChat-based intervention; psychological intervention; rectal cancer; sphincter-saving surgery; randomized controlled trial

Introduction

Background

In 2024, colorectal cancer was the third most commonly diagnosed cancer and the second leading cause of cancer death worldwide, with more than 2 million new cases and approximately 918,000 deaths [1]. In 2022, colorectal cancer ranked second in cancer incidence in China [2], with rectal cancer being more common than colon cancer [3]. Owing to advances in neoadjuvant treatment and surgical techniques, rectal cancer treatment has increasingly focused on preserving anal function and postoperative quality of life while maintaining oncological safety [4]. Sphincter-preserving surgery (SPS) is an important treatment option for rectal cancer [5]. Although SPS preserves the anal sphincter, rectal resection and reconstruction of bowel continuity may affect rectal reservoir function and anorectal sensation and coordination [6,7]. Consequently, patients may experience bowel dysfunction after surgery. Approximately 77.4% of patients experience low anterior resection syndrome (LARS) to varying degrees after SPS for rectal cancer, with 53.1% experiencing major LARS [8]. LARS is characterized by increased stool frequency, clustering, urgency, difficulty with evacuation, and fecal incontinence [9]. Although LARS symptoms may improve 1 to 2 years after surgery, some patients continue to experience bowel dysfunction more than 10 years after surgery [10,11]. These persistent, recurrent, and unpredictable symptoms affect patients' daily lives, emotional well-being, and social interactions.

Among patients with rectal cancer who underwent SPS, 32.0% of those without preoperative mental health disorders developed new mental health problems during postoperative follow-up, and bowel dysfunction was one of the associated factors [12]. After surgery, patients often adjust their daily routines because of toilet dependence, unpredictable bowel movements, and concerns about accidental incontinence or body odor [13]. The embarrassment and uncertainty associated with these symptoms may lead some patients to gradually reduce outings and social interactions [14]. Some patients also experience cancer-related loneliness, which is related not only to being alone but also to toilet dependence, changes in family life, and restrictions on social activities. Even when family support is available, patients may still feel that many cancer-related difficulties have to be faced alone, together with feelings of worry and helplessness [15]. Persistent psychological distress is associated with poor health-related quality of life among colorectal cancer survivors [16]. Patients' self-perception while they cope with bowel symptoms is a part of postoperative adjustments. In a qualitative study of patients with bowel dysfunction after rectal cancer surgery, some participants described the need to reduce self-criticism and guilt as they adapted to these changes [17]. Self-criticism refers to a tendency to blame oneself or make negative self-evaluations when facing difficulties [18]. Higher levels of self-criticism are associated with higher levels of anxiety and depressive symptoms among patients with cancer [19].

Neff [20] defined self-compassion as treating oneself with kindness when facing suffering or personal shortcomings, recognizing one's experiences as part of the common human experience, and maintaining a balanced awareness of negative emotions. Self-compassion includes 3 positive components, namely, self-kindness, common humanity, and mindfulness, and 3 negative components, namely, self-judgment, isolation, and overidentification [20]. For patients living with long-term bowel dysfunction, self-compassion may help reduce self-blame, avoid becoming overly absorbed in negative experiences, and lessen feelings of isolation related to physical changes [17,18]. Higher levels of self-compassion are associated with lower levels of psychological distress and better quality of life among patients with cancer [21]. Self-compassion interventions have been delivered to patients with cancer through face-to-face programs, videoconferencing, and online formats. Although most studies have involved patients with breast cancer, young adult cancer survivors and populations with mixed cancer types have also been included [22-25]. These studies have shown that self-compassion interventions can increase self-compassion and reduce anxiety and depressive symptoms [22-25].

Recovery after SPS for rectal cancer continues into patients' daily lives after discharge, and continued participation in face-to-face psychological interventions may be limited by time, distance, and appointment schedules [26,27]. Digital approaches allow interventions to extend into the home setting. Existing digital interventions for colorectal cancer have mainly focused on information provision, health education, symptom monitoring, and general support [28]. Self-compassion interventions require repeated practice and continued engagement. In addition to providing digital content, intervention design therefore needs to consider the factors that affect patients' completion of the exercises and continued engagement. The capability, opportunity, motivation–behavior (COM-B) model proposes that capability, opportunity, and motivation jointly influence the initiation and maintenance of behavior [29]. Capability refers to the physical and psychological capacity required to perform a behavior, including relevant knowledge and skills; opportunity refers to external conditions, such as time, environment, and social support; and motivation comprises beliefs, emotions, and habits that influence behavioral choices and persistence [29]. The COM-B model has been used to

examine behavior-related factors and identify facilitators and barriers to engagement in and maintenance of behaviors in populations with chronic conditions, such as cancer, diabetes, and stroke [30-32]. However, research on delivering self-compassion interventions at home and supporting continued engagement among patients after SPS for rectal cancer remains limited.

Study Objective

This study used self-compassion theory to guide the intervention content and the COM-B model to structure intervention delivery. The primary objective was to evaluate the effect of a WeChat Mini Program–based intervention targeting self-compassion among patients with rectal cancer after SPS. We also examined changes in cancer-related loneliness, anxiety, and depressive symptoms and evaluated intervention feasibility and platform usability during home-based rehabilitation after discharge.

Methods

Study Design and Setting

This study was a single-center, two-arm, parallel-group, single-blind randomized controlled trial conducted at a tertiary Grade A hospital in Anhui Province, China, between September 2025 and February 2026. The intervention group received a 4-week self-compassion intervention delivered through the e-Self-Compassion Care WeChat Mini Program, whereas the control group received routine postoperative follow-up. Primary and secondary outcomes were assessed at baseline (T0), at the end of the intervention (week 4; T1), 4 weeks after the intervention (week 8; T2), and 8 weeks after the intervention (week 12; T3). The study is reported in accordance with the CONSORT-EHEALTH (Consolidated Standards of Reporting Trials of Electronic and Mobile Health Applications and Online Telehealth) guidelines, and the checklist is provided in Checklist 1.

Participants and Eligibility Criteria

Researchers identified potentially eligible patients on the ward with the assistance of clinical nurses and screened them according to the predefined inclusion and exclusion criteria. Patients who had not received a temporary stoma were generally recruited around postoperative day 3, when they were able to ambulate and their postoperative condition permitted participation. Patients who had previously received a temporary stoma were recruited after readmission for stoma reversal, once bowel movements through the anus had resumed. Researchers explained the study and follow-up schedule to eligible patients. Those who agreed to participate provided written informed consent, completed the baseline assessment (T0), and were then randomized.

The inclusion criteria were as follows: (1) aged at least 18 years; (2) histopathologically confirmed rectal cancer and having undergone SPS; (3) for patients who had previously received a temporary stoma, completion of stoma reversal and resumption of bowel movements through the anus; (4) an estimated survival of at least 1 year as assessed by the treating physician; (5) having a smartphone, being able to use WeChat (Tencent Holdings Ltd), and having basic literacy and comprehension skills; and (6) being aware of their condition and willing to participate in the study. The exclusion criteria were as follows: (1) other concurrent malignancies or life-threatening conditions; (2) a permanent stoma or any other chronic intestinal diseases; (3) visual or hearing impairments that could interfere with study participation or severe mental or cognitive disorders; (4) receipt of another structured psychological intervention within the previous 4 weeks; and (5) recent major stressful events that could affect psychological status.

Basic literacy and comprehension skills were assessed during face-to-face communication based on whether patients could understand the study information and communicate with the researchers. Severe mental or cognitive disorders were assessed using information from medical records, together with confirmation from clinical nurses. Recent major stressful events were identified from patients' verbal reports during eligibility screening.

Sample Size Calculation

The sample size calculation was based on self-compassion as the primary outcome. Following previous studies on compassion-based interventions for patients with cancer, we assumed a moderate effect size of Cohen d=0.50 [33]. The sample size was calculated using G*Power (version 3.1; Heinrich Heine University Düsseldorf) with a 2-sided α of .05, power of 0.80, and a 1:1 allocation ratio. The calculation indicated that at least 64 participants were required in each group. Allowing for an estimated 20% loss to follow-up, we planned to recruit 80 participants per group, for a total sample of 160 participants.

Randomization and Blinding

After providing written informed consent and completing the baseline assessment, participants were randomly allocated to the intervention or control group in a 1:1 ratio. The randomization sequence was generated using SPSS Statistics (version 27.0; IBM Corp) by a researcher who was not involved in recruitment, intervention delivery, or outcome assessment. We used block randomization with variable block sizes of 4 and 6. Group assignments were placed in sequentially numbered, sealed, opaque envelopes and kept by a designated researcher. The envelopes were opened in sequence according to the order of participant enrollment after the baseline assessment to determine group assignment. Because the intervention content and delivery differed between groups, participants and intervention staff could not be blinded. Outcome assessors and statistical analysts remained blinded to group assignment throughout the study.

Intervention

Intervention Development and Theoretical Basis

The 4-week self-compassion training program used in this study was developed by a research team consisting of gastrointestinal surgery health care professionals and nursing

researchers. The research team searched the literature on self-compassion and online interventions and summarized the training content and delivery methods used in previous studies [22-24]. Based on this work, an initial version of the program was developed considering the common psychological difficulties experienced by patients after SPS for rectal cancer and the characteristics of home-based training. Fifteen experts from gastrointestinal surgery, nursing, psychology, and traditional Chinese medicine were then invited to participate in 2 rounds of expert consultation and evaluate the importance, feasibility, and delivery of the training content. Based on the experts' feedback, the research team revised the training content, wording, exercise formats, reminder methods, and forms of interaction. After discussion within the research team, the final program consisted of 4 training themes and 20 training items. The program was then integrated into the e-Self-Compassion Care WeChat Mini Program. A total of 20 participants, including 10 patients after SPS and 10 health care professionals, were invited to test the Mini Program. After testing, semistructured interviews were conducted to collect their experiences and suggestions for improvement. The interviews focused on perceived usefulness, perceived ease of use, and areas for improvement. This testing phase was covered by the study's ethics approval, and all participants provided informed consent before testing. Based on this feedback, the research team further refined the content presentation, operation, and interactive features of the Mini Program (Multimedia Appendix 1).

The training content was primarily informed by self-compassion theory [20]. The 6 components of mindfulness, overidentification, common humanity, isolation, self-kindness, and self-judgment were incorporated throughout the training content and informed the 4 training themes. Because the training was mainly completed at home after discharge, the intervention design also needed to consider whether patients had opportunities to complete the exercises and were willing to continue participating. The COM-B model emphasizes that behavior is influenced by capability, opportunity, and motivation [29]. Therefore, the model was used to structure the delivery of the training. The application of self-compassion theory, the 4 weekly training themes, and the COM-B model in the intervention is shown in Figure 1. The representative interfaces of the e-Self-Compassion Care WeChat Mini Program are shown in Figure 2. Detailed training content and timing are provided in Multimedia Appendix 2.

Figure 1. Theoretical basis, weekly themes, and delivery framework of the self-compassion intervention. COM-B: capability, opportunity, motivation–behavior.

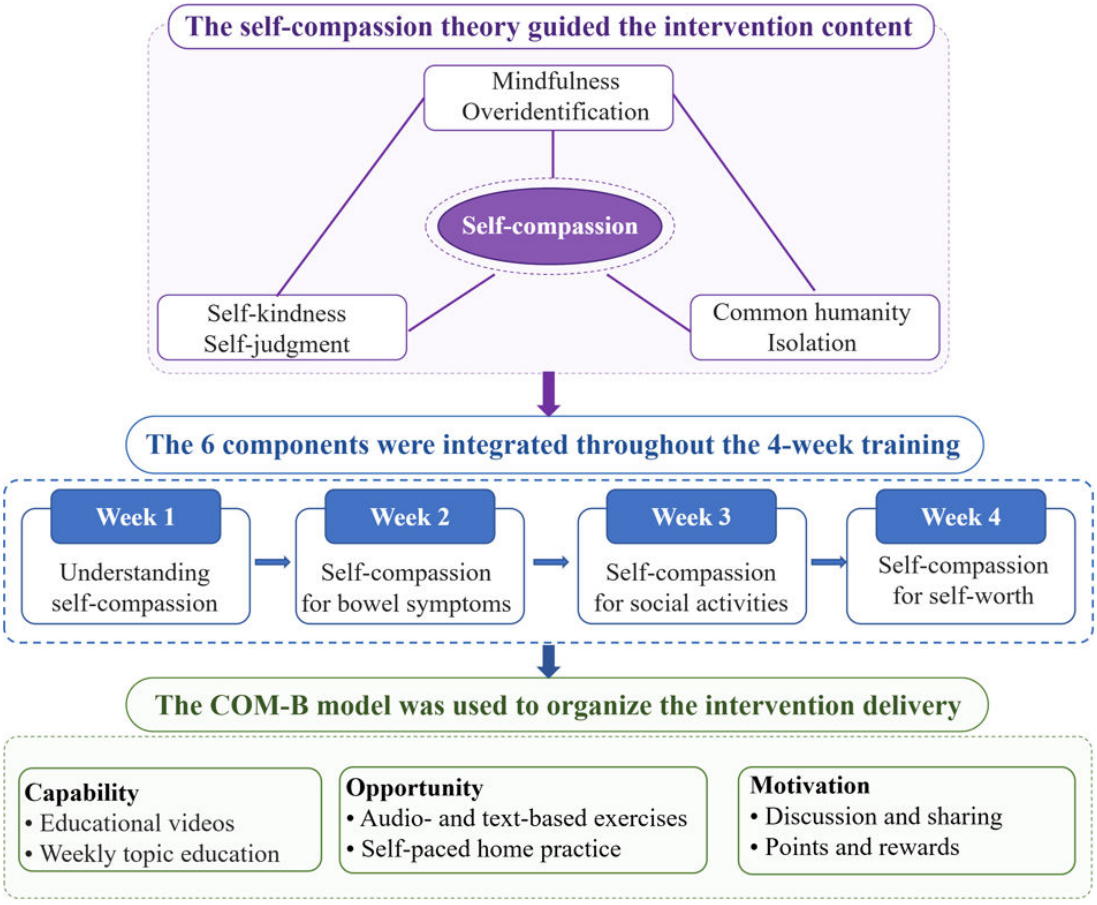


Figure 2. Representative interfaces of the e-Self-Compassion Care WeChat Mini Program. (A) 4-week training modules; (B) training content; (C) breathing exercise; (D) points redemption.



A B C D

Intervention Group

Participants in the intervention group received 4 weeks of self-compassion training through the e-Self-Compassion Care WeChat Mini Program after discharge. Before discharge, the researchers introduced the participants to the WeChat Mini Program and assisted them with logging in. The training was delivered weekly, with 1 theme each week and a training time of approximately 30 to 40 minutes per week. Week 1 focused on understanding self-compassion, week 2 focused on self-compassion for bowel symptoms, week 3 focused on self-compassion in social activities, and week 4 focused on self-compassion related to self-worth.

The capability component used simple animated educational videos and weekly theme-based education to introduce self-compassion and content related to the weekly theme. The opportunity component provided exercises that could be completed at home in audio, image, and text formats. These exercises included self-hugging, breathing awareness, perspective-taking, self-dialogue, and meditation. Participants could complete the exercises at times that suited their circumstances. The motivation component provided training reminders, discussion board interactions, and point-based rewards. The researchers delivered the training content weekly, monitored training completion through the WeChat Mini Program backend, and responded to participants' questions on the discussion board. Participants could earn points by completing training activities, participating in discussions, and sharing their exercise experiences. The points could be exchanged for gifts according to the platform's rules.

Control Group

Participants in the control group received routine postoperative follow-up care after discharge, including printed postoperative rehabilitation materials, reminders about follow-up visits, and routine inquiries about postoperative recovery. They were also provided with a hospital telephone number for consultation when needed. The control group did not receive the self-compassion training delivered through the WeChat Mini Program. The timing and content of outcome assessments were the same in both groups.

Intervention Fidelity and Participant Retention

To support consistent intervention delivery and reduce loss to follow-up, the research team provided standardized training to the health care professionals and researchers involved in the study before the intervention began. The training covered guidance on questionnaire completion, discussion board management, and training content delivery. During the intervention, the researchers monitored the participants' completion of training tasks through the WeChat Mini Program backend. Participants whose training tasks remained incomplete were contacted by telephone and reminded to continue training. Training content was delivered weekly through the e-Self-Compassion Care WeChat Mini Program. If a participant had not logged in to the WeChat Mini Program for 48 consecutive hours, the system automatically sent a reminder. Follow-up and outcome assessments at T1, T2, and T3 were conducted by telephone at the scheduled time points. If a participant was unavailable at the scheduled time, the researchers arranged another time to complete the assessment. After the platform and follow-up data were compiled, 2 researchers checked participant IDs, group assignments, follow-up completion status, outcome

scale scores at each time point, and platform usage records. Platform usage records included training task completion, days of use, and number of log-ins. The researchers checked these data to identify missing or inconsistent entries. Research data were stored in encrypted form, and access was managed according to assigned permissions.

Data Collection

Data were collected by research staff who had received standardized training and were not involved in intervention delivery. After providing written informed consent, participants completed the baseline assessment (T0) face-to-face during hospitalization and before randomization. Demographic data were collected using a general information questionnaire, and disease- and treatment-related data were obtained from the hospital's medical record system. Participants in both groups completed follow-up assessments by telephone at T1, T2, and T3. Participants who did not complete a scheduled follow-up were contacted again by research staff, and the reasons for loss to follow-up or study withdrawal were recorded.

Outcome Measures

Overview

Primary and secondary outcomes were evaluated at baseline (T0), the end of the intervention (week 4; T1), 4 weeks after the intervention (week 8; T2), and 8 weeks after the intervention (week 12; T3). Baseline measures were obtained using paper questionnaires, whereas follow-up outcome assessments at T1, T2, and T3 were conducted by telephone.

Primary Outcome Measure

Self-compassion was assessed using the Self-Compassion Scale (SCS), which comprises 26 items across 6 dimensions: self-kindness, common humanity, mindfulness, self-judgment, isolation, and overidentification[34]. Responses are rated on a 5-point Likert scale (1=almost never to 5=almost always), with the self-judgment, isolation, and overidentification items reverse scored. Total scores range from 26 to 130, with higher scores indicating higher levels of self-compassion. We used the Chinese version of the SCS, which has a reported a Cronbach α of 0.84 [35].

Secondary Outcome Measures

Cancer-related loneliness was assessed using the 7-item Cancer Loneliness Scale (CLS), which measures cancer-related loneliness among patients with cancer [36]. Responses are rated on a 5-point Likert scale (1=never to 5=always). Total scores range from 7 to 35, with higher scores indicating greater cancer-related loneliness. We used the Chinese version of the CLS, which has a Cronbach α of 0.91 [37].

Anxiety symptoms were assessed using the 7-item Generalized Anxiety Disorder Scale (GAD-7), which measures the frequency of anxiety symptoms during the previous 2 weeks [38]. Responses are rated on a 4-point Likert scale (0=not at all to 3=nearly every day). Total scores range from 0 to 21, with higher scores indicating more severe anxiety symptoms. We used the Chinese version of the GAD-7, which has a Cronbach α of 0.90 [39].

Depressive symptoms were assessed using the 9-item Patient Health Questionnaire (PHQ-9), which measures the frequency of depressive symptoms during the previous 2 weeks [40]. Responses are rated on a 4-point Likert scale (0=not at all to 3=nearly every day). Total scores range from 0 to 27, with higher scores indicating more severe depressive symptoms. We used the Chinese version of the PHQ-9, which has a Cronbach α of 0.86 [41].

Feasibility and Usability Assessment

Intervention feasibility was mainly assessed based on participants' use of the 4-week program. Backend logs from the WeChat Mini Program were used to record the number of training tasks completed by each participant (out of 20), days of program use, and number of log-ins. These indicators were used to describe participants' actual engagement with the intervention.

The System Usability Scale (SUS), developed by Brooke in 1986 [42], was used to assess the usability of the intervention platform. The scale consists of 10 items, with odd-numbered items positively worded and even-numbered items negatively worded. Responses are rated on a 5-point Likert scale (1=strongly disagree to 5=strongly agree). Item scores are converted, summed, and multiplied by 2.5 to obtain a total score ranging from 0 to 100, with higher scores indicating better usability. A score of 68 is commonly used as a benchmark representing average usability, with scores above 68 indicating above-average usability [43]. We used the validated Chinese version of the SUS, which has a reported Cronbach α of 0.84 [44]. The SUS was administered by telephone at T3 (week 12) and was completed only by participants in the intervention group who completed this follow-up.

Statistical Analysis

All analyses were conducted using SPSS Statistics (version 27.0). Continuous variables were summarized as mean (SD) or median (IQR), depending on their distribution, and categorical variables were summarized as numbers with corresponding percentages. For baseline comparisons, independent-samples 2-tailed *t* tests or Mann-Whitney *U* tests were used for continuous variables, and chi-square tests or Fisher exact tests were used for categorical variables.

Generalized estimating equations (GEE) were used for the primary longitudinal analyses. The models included group, time, and the group-by-time interaction, with no additional covariates. Time was treated as a categorical variable, with T0 as the reference time point. The group-by-time interaction was used to compare changes from baseline between the intervention and control groups at each follow-up time point. The models used a normal distribution with an identity link function, an exchangeable working correlation structure, and robust SEs. Regression coefficients with 95% CIs were reported, together with estimated marginal means and SEs for

each group at each time point. For the primary outcome, SCS, we also calculated the standardized effect size at T3. Cohen *d* was calculated by dividing the GEE-estimated between-group difference in change at T3 by the pooled baseline SD of SCS scores in the 2 groups. The primary GEE analyses included all available observations from randomized participants, and missing outcome data were not imputed. A Bonferroni correction was applied to the group-by-time contrasts for SCS, CLS, GAD-7, and PHQ-9 at T1, T2, and T3 relative to baseline to account for multiple testing. The adjusted significance level was α=.0042 (.05/12).

Because loss to follow-up occurred during the study, we compared baseline demographic and clinical characteristics and baseline SCS, CLS, GAD-7, and PHQ-9 scores between participants who completed the T3 follow-up and those who did not. The same statistical tests used for the baseline group comparisons were applied for these comparisons. We then conducted a logistic regression analysis with T3 noncompletion as the dependent variable. Group, age, education level, and baseline SCS, CLS, GAD-7, and PHQ-9 scores were included to explore baseline factors associated with T3 noncompletion.

To assess the influence of missing outcome data on the study findings, we conducted a sensitivity analysis using multiple imputation. Under the missing-at-random assumption, 50 imputed data sets were generated using predictive mean matching. Each outcome was imputed separately. The imputation models included group, age, education level, baseline SCS, CLS, GAD-7, and PHQ-9 scores, together with available observations of the corresponding outcome from earlier time points. The same GEE model used in the primary analysis was fit to each imputed data set, and the parameter estimates were pooled. Participation, intervention adherence, platform use, and SUS scores were summarized descriptively. All tests were 2-sided. Except for the comparisons adjusted using the Bonferroni correction, P<.05 was considered statistically significant.

Ethical Considerations

The study protocol was approved by the Ethics Committee of the First Affiliated Hospital of Anhui Medical University (PJ2025-04-57) on June 27, 2025. Before participant recruitment, the research team revised the study protocol to adopt a randomized controlled trial design, specify self-compassion as the primary outcome, and increase the planned sample size to 160 participants. The ethics amendment was submitted on August 4, 2025, and approved on August 18, 2025. The study was registered with the Chinese Clinical Trial Registry (ChiCTR2500107801) on August 19, 2025. The first participant provided written informed consent on September 3, 2025. The study was conducted according to the final ethics-approved protocol.

Results

Participant Flow and Baseline Characteristics

A total of 276 patients were assessed for eligibility. Of these, 72 did not meet the eligibility criteria, leaving 204 eligible patients. Among the 204 eligible patients, 25 declined to participate, and 19 were not enrolled for other reasons. The remaining 160 patients were randomized, with 80 assigned to the intervention group and 80 to the control group. The recruitment rate, defined as the proportion of randomized participants among eligible patients, was 78.4% (160/204). At the end of the intervention (week 4; T1), 72 participants in the intervention group and 76 in the control group completed the assessment. At 4 weeks after the intervention (week 8; T2), 64 and 70 participants, respectively, completed the follow-up assessment. At 8 weeks after the intervention (week 12; T3), 52 and 62 participants, respectively, completed the follow-up assessment. The screening, randomization, and follow-up of participants are shown in Figure 3. As shown in Table 1, there were no statistically significant between-group differences in demographic, clinical, or outcome characteristics at baseline.

Figure 3. CONSORT (Consolidated Standards of Reporting Trials) flow diagram of the study.

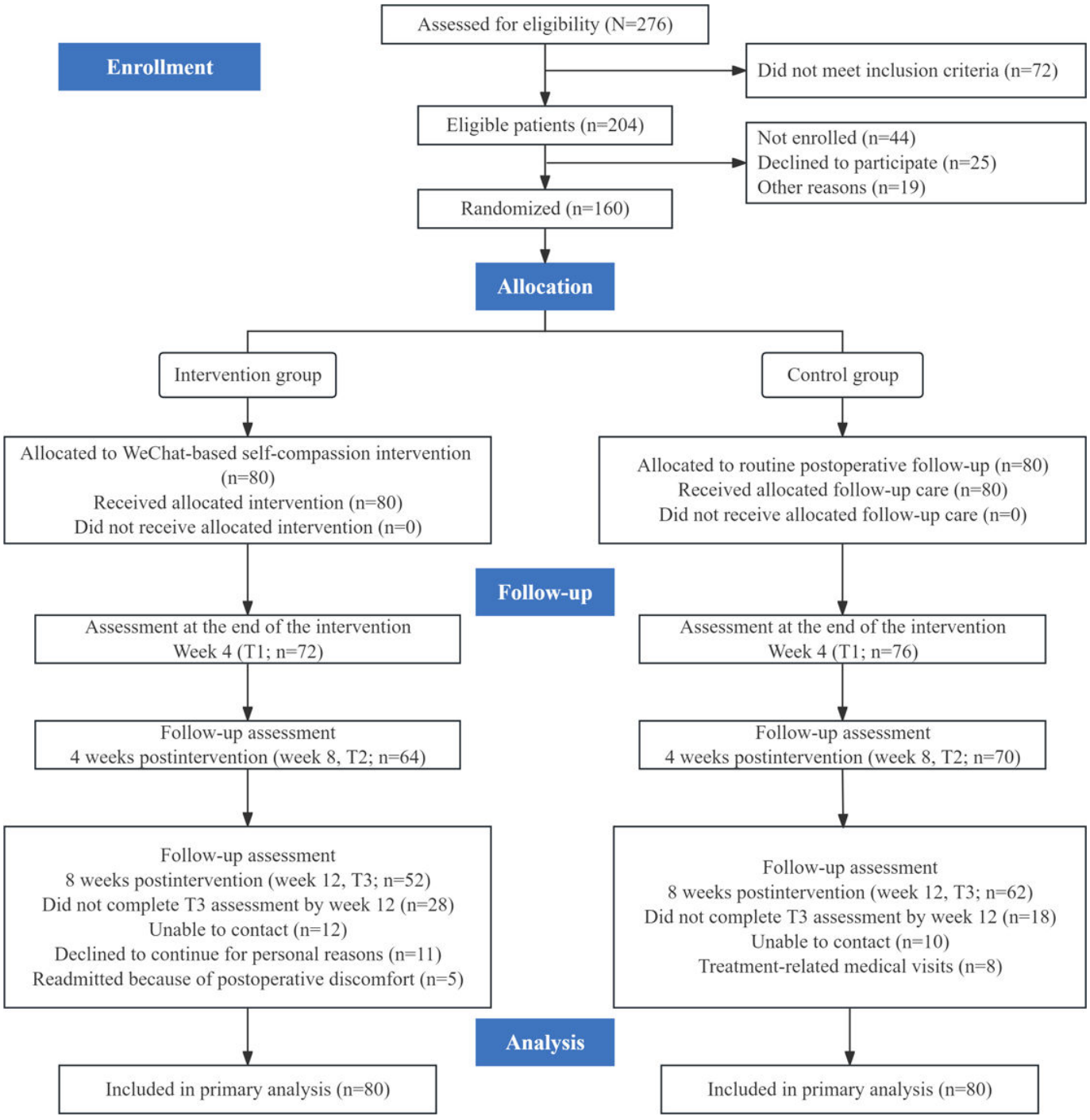


Table 1. Baseline demographic, clinical, and outcome characteristics of the participants (N=160).

Characteristics	Intervention group (n=80)	Control group (n=80)	*t* test/chi-square (*df*)	*P* value
Age (y), mean (SD)	61.51 (11.40)	60.59 (12.52)	0.49 (158)[a]	.63
Sex, n (%)			2.58 (1)[b]	.11
Male	42 (52.5)	52 (65)		
Female	38 (47.5)	28 (35)		
Marital status, n (%)			3.37 (1)[b]	.07
Married	73 (91.3)	65 (81.3)		
Not married	7 (8.8)	15 (18.8)		
Education, n (%)			0.04 (2)[b]	.98

Characteristics	Intervention group (n=80)	Control group (n=80)	*t* test/chi-square (*df*)	*P* value
Junior high school or lower	44 (55)	43 (53.8)		
High school/technical secondary school	19 (23.8)	20 (25)		
College or higher	17 (21.3)	17 (21.3)		
Employment status, n (%)			0.03 (1)[b]	.87
Employed	34 (42.5)	35 (43.8)		
Not employed	46 (57.5)	45 (56.3)		
Household monthly income, RMB[c], n (%)			0.13 (3)[b]	.99
<3000	23 (28.8)	21 (26.3)		
3000-5000	30 (37.5)	31 (38.8)		
5000-8000	18 (22.5)	19 (23.8)		
>8000	9 (11.3)	9 (11.3)		
Tumor stage, n (%)			0.33 (3)[b]	.95[d]
1	9 (11.3)	11 (13.8)		
2	27 (33.8)	28 (35)		
3	41 (51.3)	38 (47.5)		
4	3 (3.8)	3 (3.8)		
Surgical method, n (%)			5.32 (2)[b]	.07
High anterior resection	6 (7.5)	16 (20)		
Low anterior resection	59 (73.8)	52 (65)		
Ultra-low anterior resection	15 (18.8)	12 (15)		
Temporary stoma, n (%)			0.15 (1)[b]	.70
Yes	18 (22.5)	16 (20)		
No	62 (77.5)	64 (80)		
Postoperative adjuvant therapy, n (%)			0.13 (2)[b]	.94
Chemotherapy	48 (60)	46 (57.5)		
Radiotherapy	7 (8.8)	8 (10)		
No	25 (31.3)	26 (32.5)		
Baseline outcome measures, mean (SD)			—[i]	
SCS[e] score	71.60 (12.22)	74.41 (12.49)	–1.44 (158)[a]	.15
CLS[f] score	21.49 (3.56)	20.48 (3.53)	1.81 (158)[a]	.07
GAD-7[g] score	7.44 (3.39)	8.39 (3.08)	–1.86 (158)[a]	.07
PHQ-9[h] score	9.98 (4.27)	10.40 (4.03)	–0.65 (158)[a]	.52

[a]*t* test.
[b]Chi-square test.
[c]RMB 1=US $0.15 as of February 27, 2026.
[d]The Pearson chi-square statistic is shown; the *P* value was obtained using the Fisher-Freeman-Halton exact test because of small expected cell counts.
[e]SCS: Self-Compassion Scale.
[f]CLS: Cancer Loneliness Scale.
[g]GAD-7: 7-item Generalized Anxiety Disorder Scale.
[h]PHQ-9: 9-item Patient Health Questionnaire.
[i]Not applicable.

Primary Outcome

As shown in Table 2, SCS scores in the intervention group increased from T0 to T1 and remained relatively stable through T3, whereas scores in the control group changed little over time. The GEE analysis showed a significant group-by-time interaction for SCS scores (Wald χ^2_3=54.6; *P*<.001). As shown in Table 3, the increase in SCS scores from T0 to each follow-up time point was greater in the intervention group than in the control group. The group-by-time interaction estimates were as follows: β was 6.13 (95% CI 4.44 to 7.82; *P*<.001), 5.25 (95% CI 3.60 to 6.90; *P*<.001), and 6.52 (95% CI 4.66 to 8.38; *P*<.001), respectively. At T3, the standardized effect size was Cohen *d*=0.53.

Table 2. Estimated marginal means (EMMs; SE) of primary and secondary outcomes over time by group.[a]

Outcome and time point	Intervention group, EMM (SE)	Control group, EMM (SE)
SCS[b]		
T0	71.60 (1.36)	74.41 (1.39)
T1	78.94 (1.35)	75.61 (1.37)
T2	79.35 (1.41)	76.91 (1.41)
T3	79.06 (1.33)	75.35 (1.50)
CLS[c]		
T0	21.49 (0.40)	20.48 (0.39)
T1	19.82 (0.41)	20.31 (0.44)
T2	19.38 (0.45)	20.25 (0.46)
T3	19.53 (0.45)	20.19 (0.44)
GAD-7[d]		
T0	7.44 (0.38)	8.39 (0.34)
T1	5.75 (0.34)	8.11 (0.34)
T2	5.27 (0.38)	7.99 (0.35)
T3	5.45 (0.36)	8.07 (0.34)
PHQ-9[e]		
T0	9.98 (0.48)	10.40 (0.45)
T1	7.83 (0.45)	9.97 (0.46)
T2	7.49 (0.45)	9.50 (0.47)
T3	7.64 (0.45)	9.98 (0.45)

[a]Values are EMMs (SEs) from the GEE models. T0 indicates baseline; T1: week 4 (end of the intervention); T2: week 8; and T3: week 12.
[b]SCS: Self-Compassion Scale.
[c]CLS: Cancer Loneliness Scale.
[d]GAD-7: 7-item Generalized Anxiety Disorder Scale.
[e]PHQ-9: 9-item Patient Health Questionnaire.

Table 3. Generalized estimating equations (GEE) estimates of between-group differences in change from baseline for primary and secondary outcomes.[a]

Outcome and contrast	β[b] (95% CI)	*P* value
SCS[c]		<.001
T1 vs T0	6.13 (4.44 to 7.82)	
T2 vs T0	5.25 (3.60 to 6.90)	
T3 vs T0	6.52 (4.66 to 8.38)	
CLS[d]		<.001
T1 vs T0	−1.50 (−2.02 to −0.97)	
T2 vs T0	−1.87 (−2.47 to −1.27)	
T3 vs T0	−1.67 (−2.23 to −1.11)	
GAD-7[e]		<.001
T1 vs T0	−1.42 (−1.72 to −1.12)	
T2 vs T0	−1.78 (−2.05 to −1.51)	
T3 vs T0	−1.68 (−2.03 to −1.34)	
PHQ-9[f]		<.001
T1 vs T0	−1.72 (−2.13 to −1.31)	
T2 vs T0	−1.59 (−2.01 to −1.17)	
T3 vs T0	−1.92 (−2.36 to −1.48)	

[a]Bonferroni correction was applied to the 12 time-specific group-by-time contrasts across the 4 outcomes and 3 follow-up assessments. The adjusted significance threshold was $P<.0042$ (.05/12).
[b]β represents the estimated difference in change from T0 between the intervention and control groups for each time-specific group-by-time contrast. Positive values indicate a greater increase in the intervention group, whereas negative values indicate a greater decrease. T0 indicates baseline; T1: week 4 (end of the intervention); T2: week 8; and T3: week 12.
[c]SCS: Self-Compassion Scale.
[d]CLS: Cancer Loneliness Scale.

[e]GAD-7: 7-item Generalized Anxiety Disorder Scale.
[f]PHQ-9: 9-item Patient Health Questionnaire.

Secondary Outcomes

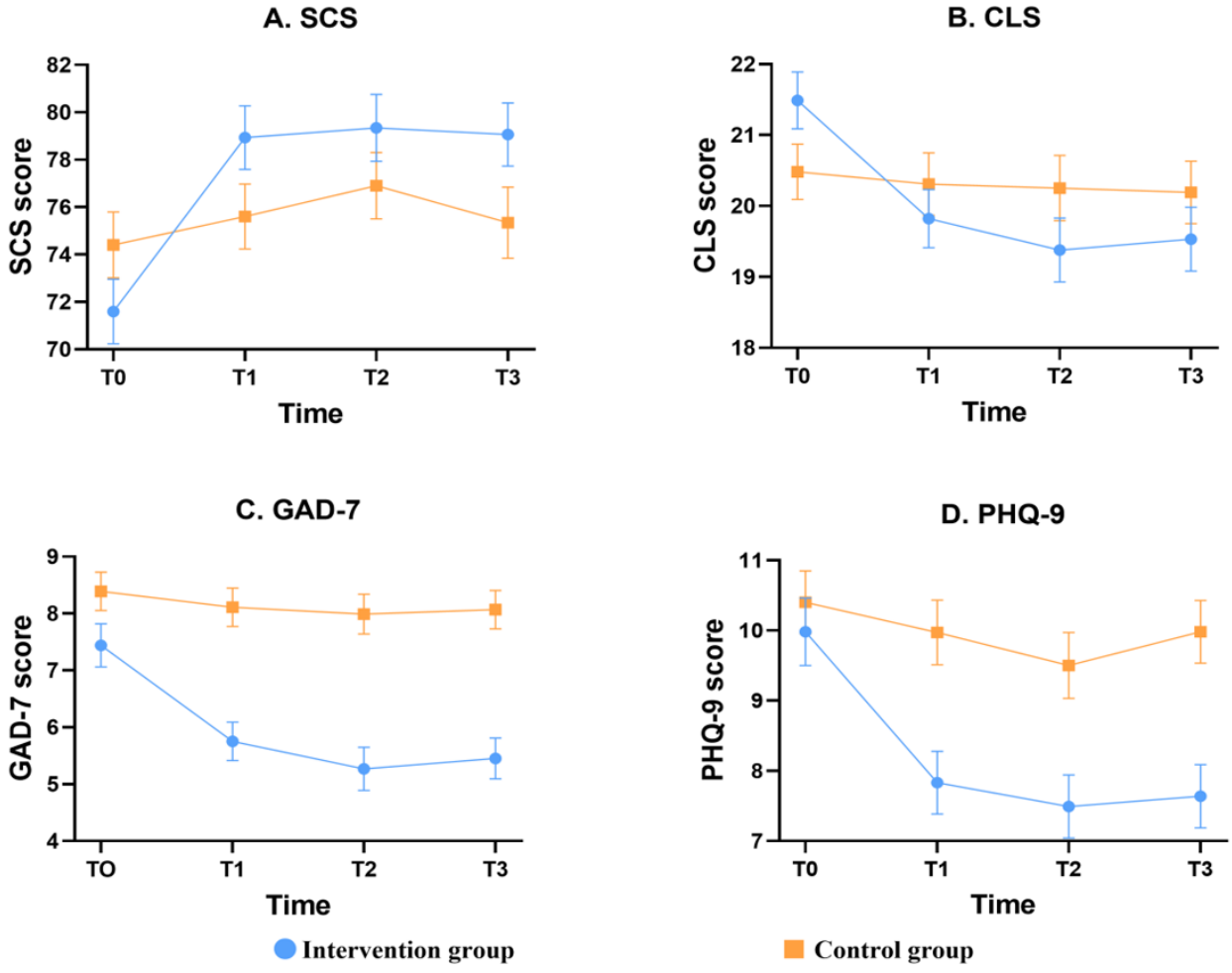
The estimated marginal means of the secondary outcomes at each time point are presented in Table 2. The GEE results are presented in Table 3.

A significant group-by-time interaction was observed for CLS scores (Wald χ^2_3=48.8; *P*<.001). Compared with T0, the decrease in CLS scores was greater in the intervention group than in the control group at T1, T2, and T3. The interaction estimates were as follows: β was −1.50 (95% CI −2.02 to −0.97), −1.87 (95% CI −2.47 to −1.27), and −1.67 (95% CI −2.23 to −1.11), respectively (all *P*<.001).

GAD-7 scores also showed a significant group-by-time interaction (Wald χ^2_3=194.2; *P*<.001). Compared with T0, the decrease in GAD-7 scores was greater in the intervention group than in the control group at T1, T2, and T3. The corresponding interaction estimates were as follows: β was −1.42 (95% CI −1.72 to −1.12), −1.78 (95% CI −2.05 to −1.51), and −1.68 (95% CI −2.03 to −1.34), respectively (all *P*<.001).

A significant group-by-time interaction was also observed for PHQ-9 scores (Wald χ^2_3=99.4; *P*<.001). Compared with T0, the decrease in PHQ-9 scores was greater in the intervention group than in the control group at T1, T2, and T3. The interaction estimates were as follows: β was −1.72 (95% CI −2.13 to −1.31), −1.59 (95% CI −2.01 to −1.17), and −1.92 (95% CI −2.36 to −1.48), respectively (all *P*<.001). Figure 4 presents the trajectories of the estimated marginal means for all 4 outcomes over time.

Figure 4. Estimated marginal means of the primary and secondary outcomes over time by group. CLS: Cancer Loneliness Scale; GAD-7: 7-item Generalized Anxiety Disorder Scale; PHQ-9: 9-item Patient Health Questionnaire; SCS: Self-Compassion Scale.



Attrition and Sensitivity Analyses

At T3, 28 (35.0%) participants in the intervention group did not complete the T3 assessment, compared with 18 (22.5%) participants in the control group. The difference between the 2 groups was not statistically significant (χ_1^2=3.05; *P*=.08). Table 4 shows the baseline characteristics of participants who completed the T3 assessment (n=114) and those who did not

(n=46). Except for education level, no statistically significant differences were observed in the other demographic and clinical characteristics or in baseline SCS, CLS, GAD-7, and PHQ-9 scores. The distribution of education level differed between the 2 groups (*P*=.04).

Table 4. Baseline characteristics of participants who completed and did not complete the T3 assessment (N=160).

Characteristics	Completed T3 (n=114)	Did not complete T3 (n=46)	*t* test/chi-square (*df*)	*P* value
Age (y)	60.89 (12.45)	61.43 (10.70)	–0.26 (158)[a]	.80
Sex			0.1 (1)[b]	.72
Male	68 (59.6)	26 (56.5)		
Female	46 (40.4)	20 (43.5)		
Marital status			0.03 (1)[b]	.87
Married	98 (86.0)	40 (87.0)		
Not married	16 (14.0)	6 (13.0)		
Education level			6.3 (2)[b]	.04
Junior high school or lower	57 (50.0)	30 (65.2)		
High school/technical secondary school	27 (23.7)	12 (26.1)		
College or higher	30 (26.3)	4 (8.7)		
Employment status			0.6 (1)[b]	.45
Employed	47 (41.2)	22 (47.8)		
Not employed	67 (58.8)	24 (52.2)		
Surgical method			1.4 (2)[b]	.50
High anterior resection	15 (13.2)	7 (15.2)		
Low anterior resection	82 (71.9)	29 (63.0)		
Ultra-low anterior resection	17 (14.9)	10 (21.7)		
Temporary stoma			0.3 (1)[b]	.60
Yes	23 (20.2)	11 (23.9)		
No	91 (79.8)	35 (76.1)		
Baseline SCS[c] score	73.19 (12.44)	72.54 (12.40)	0.30 (158)[a]	.77
Baseline CLS[d] score	21.00 (3.78)	20.93 (3.01)	0.10 (158)[a]	.92
Baseline GAD-7[e] score	7.97 (3.37)	7.76 (3.03)	0.37 (158)[a]	.71
Baseline PHQ-9[f] score	10.18 (4.23)	10.20 (3.95)	–0.02 (158)[a]	.99

[a]*t* test.
[b]Chi-square test.
[c]SCS: Self-Compassion Scale.
[d]CLS: Cancer Loneliness Scale.
[e]GAD-7: 7-item Generalized Anxiety Disorder Scale.
[f]PHQ-9: 9-item Patient Health Questionnaire.

Table 5 presents the results of the multivariable logistic regression analysis of factors associated with T3 noncompletion. After adjustment for group, age, education level, and the 4 baseline outcome scores, group was not significantly associated with T3 noncompletion (adjusted odds ratio [OR] 1.88, 95% CI 0.89-3.98; *P*=.10). Education level was significantly associated with T3 noncompletion (*P*=.04). Using college education or higher as the reference category, participants with junior high school education or lower had an adjusted OR of 4.42 (95% CI 1.38-14.20; *P*=.01) for T3 noncompletion, whereas those with high school or technical secondary school education had an adjusted OR of 3.61 (95% CI 1.02-12.83; *P*=.05).

Table 5. Multivariable logistic regression analysis of factors associated with T3 noncompletion.[a]

Predictor	Adjusted OR[b] (95% CI)	*P* value
Intervention group vs control group	1.88 (0.89-3.98)	.10
Age	1.01 (0.98-1.04)	.67
Education level overall		.04
Junior high school or lower vs college or higher	4.42 (1.38-14.20)	.01
High school/technical secondary school vs college or higher	3.61 (1.02-12.83)	.05

Predictor	Adjusted OR[b] (95% CI)	*P* value
Baseline SCS[c] score	0.99 (0.95-1.03)	.60
Baseline CLS[d] score	0.96 (0.85-1.08)	.48
Baseline GAD-7[e] score	0.98 (0.85-1.14)	.82
Baseline PHQ-9[f] score	1 (0.90-1.11)	.98

[a]The multivariable logistic regression model included the randomized group, age, education level, and baseline SCS, CLS, GAD-7, and PHQ-9 scores. The control group and the college or higher education category were used as the reference categories.
[b]OR: odds ratio.
[c]SCS: Self-Compassion Scale.
[d]CLS: Cancer Loneliness Scale.
[e]GAD-7: 7-item Generalized Anxiety Disorder Scale.
[f]PHQ-9: 9-item Patient Health Questionnaire.

Given the missing outcome data during follow-up, we further conducted a multiple imputation sensitivity analysis. After repeating the GEE analyses in 50 imputed datasets, the directions and statistical significance of the group-by-time interaction effects for SCS, CLS, GAD-7, and PHQ-9 were consistent with those obtained in the primary analyses, and the effect estimates were also similar. Detailed results are presented in Multimedia Appendix 3.

Feasibility and Usability

Program Engagement

Intervention task completion and program use in the intervention group are shown in Table 6. Among the 80 participants assigned to the intervention group, 54 (67.5%) completed all intervention tasks, 62 (77.5%) completed at least 75% of the tasks, and 66 (82.5%) completed at least 50% of the tasks. During the intervention, participants completed a mean of 16.4 (SD 4.2) tasks, accessed the program for a mean of 13.1 (SD 5.6) days, and logged in a mean of 18.7 (SD 8.9) times.

Table 6. Intervention task completion and program use in the intervention group (N=80).

Indicator	Participants
Intervention task completion, n (%)	
Completed 100% of tasks	54 (67.5)
Completed ≥75% of tasks	62 (77.5)
Completed ≥50% of tasks	66 (82.5)
Program use, mean (SD)	
Number of completed tasks (out of 20)	16.4 (4.2)
Number of days the program was accessed	13.1 (5.6)
Number of log-ins per participant	18.7 (8.9)

Program Usability

At T3 (week 12), 52 participants in the intervention group who completed the follow-up assessment also completed the SUS. The mean SUS score among these participants was 74.13 (SD 8.00), which was above the benchmark of 68, indicating above-average usability. Detailed results are presented in Multimedia Appendix 4.

Discussion

Principal Findings

This study revealed that the intervention group showed greater increases in self-compassion and greater decreases in cancer-related loneliness, anxiety, and depressive symptoms than the control group. These between-group differences remained significant at the T2 and T3 follow-ups. In the intervention group, most participants completed at least 75% of the training tasks, and the mean SUS score among participants who completed T3 was above the benchmark for average usability.

The present results regarding changes in self-compassion were consistent with the findings of a previous study that used a 4-week, self-guided, web-based self-compassion program and reported increased self-compassion after the intervention, with the improvement maintained at follow-up [45]. This suggests that short-term digital training may help improve self-compassion. However, self-compassion interventions vary in duration, training frequency, and amount of practice, and no consensus has been reached regarding the optimal intervention duration or training dose [46]. A previous systematic review and meta-analysis of patients with cancer found that multisession interventions lasting 4 to 12 weeks were more effective in improving self-compassion

than a single brief intervention lasting approximately 30 minutes [25]. In this study, training was delivered continuously over 4 weeks, with learning and practice activities arranged throughout the intervention to ensure that patients could repeatedly engage with various self-compassion content. Repeated practice over several weeks provided patients opportunities to understand and use self-compassion, which may have contributed to the improvements that were observed at follow-up.

Furthermore, the intervention group exhibited a greater decrease in cancer-related loneliness than the control group. Similarly, a previous self-compassion intervention involving patients with colorectal cancer and their spouses found decreased social isolation among patients, along with improvements in the common humanity and isolation dimensions [47]. The improvements in social isolation and the isolation dimension reported in the previous study were similar in direction to the changes in cancer-related loneliness observed in the present study. The intervention used in this study included exercises related to common humanity. In addition, week 3 included a theme related to social activities, and the participants were encouraged to share their experiences with the exercises and interact with others in the discussion forum. These activities may help patients recognize that the difficulties they face after surgery are not unique to them. Moreover, interacting with other patients may allow them to see similar experiences, which may reduce the feeling that they must cope with the disease and postoperative problems alone [48].

Anxiety and depressive symptoms decreased in the intervention group, with greater reductions than those in the control group at T1, T2, and T3. This finding is consistent with previous studies of self-compassion interventions in patients with cancer [23,49]. In this study, self-compassion exercises were linked to issues that patients commonly faced, including bowel-related distress, changes in daily life after surgery, and self-worth. Exercises such as breathing awareness, self-dialogue, and meditation also provided patients with opportunities to practice reducing persistent worry and self-blame when dealing with symptoms and negative emotions. These exercises may have contributed to the improvements in anxiety and depressive symptoms. The control group also showed changes in all 4 outcomes during follow-up, although the overall changes were smaller. Previous intervention studies in patients with cancer have also reported some psychological improvement in control groups during follow-up [50]. During this period, patients were still recovering from surgery and readjusting to daily life. The control group also continued to receive rehabilitation guidance, follow-up reminders, inquiries about postoperative recovery, and telephone consultations when needed. These factors may also have influenced their psychological status during follow-up. However, the intervention group showed greater improvements in all 4 outcomes than the control group at each follow-up time point. These between-group differences may reflect the additional effect of the self-compassion training. Previous studies have reported minimal clinically important difference values of approximately 4 points for the GAD-7 and 5 points for the PHQ-9 [51,52]. However, the between-group differences in changes in GAD-7 and PHQ-9 scores were below the minimal clinically important difference values reported in previous studies. Therefore, although the between-group differences were statistically significant, the magnitude of improvement may have been limited. For the SCS and CLS, no minimal clinically important difference has been established for our study population [36,53], so it is not yet possible to determine whether the observed changes reached a clinically important level.

In the intervention group, 62 of 80 (77.5%) participants completed at least 75% of the training tasks. A previous study reported that 63% of head and neck cancer survivors completed at least 75% of the planned intervention tasks [54]. In another mobile health study involving patients with prostate cancer, 86% of participants completed at least 60% of the weekly assessment tasks [55]. These studies differed in intervention duration, task arrangements, and criteria for task completion, so the completion rates cannot be directly compared [56]. Jiang et al [57] also found that the use of digital health tools among patients with cancer may be associated with individual characteristics such as age and educational level. In our multivariable analysis, lower educational levels were associated with higher odds of T3 noncompletion. Among the 52 participants in the intervention group who completed the T3 follow-up, the mean SUS score was 74.13 (SD 8.00), which was above the benchmark of 68 and indicated above-average platform usability [43].

Strengths and Limitations

Digital self-compassion interventions have mainly been studied in other cancer populations, and research among patients during home-based recovery after SPS for rectal cancer remains limited. In addition to evaluating psychological outcomes, this study recorded training task completion, program use, and usability, providing information on both intervention outcomes and patients' actual use of the digital intervention during home-based recovery.

This study has several limitations. The study was conducted at a single tertiary hospital. Participants were required to be able to use a smartphone and WeChat and to have basic literacy and comprehension skills. The findings may therefore have limited applicability to other health care settings and to patients with limited digital skills or literacy, including some older patients. Follow-up completion decreased over time, and the proportion of participants who did not complete the T3 follow-up was higher in the intervention group than in the control group. Sensitivity analyses for missing data produced results that were generally consistent with the main analysis; however, differential attrition may still have affected the effect estimates. This study followed participants for 8 weeks after the intervention, and changes in the intervention effects over a longer period need to be further examined. Participants were aware of their group assignment, and all psychological outcomes were assessed using patient-reported measures, which may have influenced their responses. Self-compassion scores may have

been more susceptible to this influence because self-compassion was directly related to the intervention content. This study evaluated the overall effect of the self-compassion intervention compared with usual follow-up care. The training content, reminders, and interactions in the discussion forum were implemented together as part of the intervention; therefore, the effects of individual intervention components could not be assessed separately. The SUS was completed only by participants in the intervention group who completed the T3 follow-up. Therefore, the usability findings mainly reflect the experiences of these participants and may not be representative of the entire intervention group. Future studies could use strategies to improve follow-up retention, extend the follow-up period, examine the contribution of individual intervention components, and assess platform usability among a broader range of intervention participants.

Conclusions

In this study, the intervention group showed greater improvement in self-compassion than the control group. The intervention group also showed greater decreases in cancer-related loneliness, anxiety, and depressive symptoms, and these between-group differences remained significant during follow-up. Most participants (62/80, 77.5%) completed at least 75% of the training tasks， and among participants who completed the T3 follow-up, the SUS score indicated above-average platform usability. This intervention may provide a feasible option for psychological support during home recovery after SPS for rectal cancer. Further studies in different health care settings are needed to examine the applicability of the intervention.

Generative AI Use

During the preparation and revision of the English manuscript, we used ChatGPT (OpenAI) to assist with grammar checking and language polishing, mainly to revise sentences that were unclear or did not read naturally. All AI-assisted content was reviewed by the authors before being included in the manuscript. The ChatGPT prompts and responses related to language editing are provided in Multimedia Appendix 5.

Funding

This study was funded by the Research Fund of the Anhui Institute of Translational Medicine (grant number 2025zh-09), the Scientific Research Project of the Anhui Provincial Department of Education (grant number 2025AHGXZK20012), and the 2025 Graduate Qingmiao (Young Seedling) Training Program at the School of Nursing, Anhui Medical University (grant number Hlqm12025081). The funders had no role in the study design; data collection, analysis, or interpretation; manuscript preparation; or the decision to submit the manuscript for publication.

Data Availability

Study data are not publicly posted; however, deidentified datasets can be obtained from the corresponding author upon reasonable request.

Authors' Contributions

CW was responsible for study conceptualization and design, methodology, participant recruitment and follow-up, data collection and curation, statistical analysis, and drafting the manuscript. QH, YL, YH, JC, ZS, MH, TA, and BS assisted with participant recruitment and follow-up and contributed to data collection and manuscript revision. SH supervised the study, provided methodological guidance, acquired funding, and critically revised the manuscript. All authors read and approved the final manuscript.

Conflicts of Interest

None declared.

Multimedia Appendix 1

Usability testing feedback and corresponding refinements.
[DOCX File (Microsoft Word File), 33 KB-Multimedia Appendix 1]

Multimedia Appendix 2

Detailed content and timing of the self-compassion intervention.
[DOCX File (Microsoft Word File), 20 KB-Multimedia Appendix 2]

Multimedia Appendix 3

Multiple imputation sensitivity analysis.
[DOCX File (Microsoft Word File), 18 KB-Multimedia Appendix 3]

Multimedia Appendix 4

Item-level scores on the System Usability Scale.
[DOCX File (Microsoft Word File), 31 KB-Multimedia Appendix 4]

Multimedia Appendix 5

ChatGPT prompts and responses for language editing.
[DOCX File (Microsoft Word File), 21 KB-Multimedia Appendix 5]

Checklist 1

CONSORT-EHEALTH (V 1.6.1) checklist.
[PDF File (Adobe File), 1418 KB-Checklist 1]

References

1. Sung H, Filho AM, Laversanne M, et al. Global cancer statistics 2024: GLOBOCAN estimates of incidence and mortality worldwide for 34 cancers in 186 countries. CA Cancer J Clin. 2026;76(4):e70090. [doi: 10.3322/caac.70090B1] [Medline: 42417444]
2. Han B, Zheng R, Zeng H. Cancer incidence and mortality in China, 2022. J Natl Cancer Cent. Mar 2024;4(1):47-53. [doi: 10.1016/j.jncc.2024.01.006] [Medline: 39036382]
3. Qu R, Ma Y, Tao L, et al. Features of colorectal cancer in China stratified by anatomic sites: a hospital-based study conducted in university-affiliated hospitals from 2014 to 2018. Chin J Cancer Res. Aug 31, 2021;33(4):500-511. [doi: 10.21147/j.issn.1000-9604.2021.04.07] [Medline: 34584375]
4. Negro S, Bergamo F, Dell'Atti L, et al. Quality of life in rectal cancer treatments: an updated systematic review of randomized controlled trials (2013-2023). Cancers (Basel). Jul 11, 2025;17(14):2310. [doi: 10.3390/cancers17142310] [Medline: 40723194]
5. Hofheinz RD, Fokas E, Benhaim L, et al. Localised rectal cancer: ESMO Clinical Practice Guideline for diagnosis, treatment and follow-up. Ann Oncol. Sep 2025;36(9):1007-1024. [doi: 10.1016/j.annonc.2025.05.528] [Medline: 40412553]
6. Luo BJ, Zheng MC, Xia Y, et al. Assessment of defecation function after sphincter-saving resection for mid to low rectal cancer: a cross-sectional study. Eur J Oncol Nurs. Dec 2021;55:102059. [doi: 10.1016/j.ejon.2021.102059] [Medline: 34757270]
7. Koifman E, Armoni M, Gorelik Y, et al. Long term persistence and risk factors for anorectal symptoms following low anterior resection for rectal cancer. BMC Gastroenterol. Jan 12, 2024;24(1):31. [doi: 10.1186/s12876-023-03112-8] [Medline: 38216868]
8. Pieniowski EHA, Nordenvall C, Palmer G, et al. Prevalence of low anterior resection syndrome and impact on quality of life after rectal cancer surgery: population-based study. BJS Open. Oct 2020;4(5):935-942. [doi: 10.1002/bjs5.50312] [Medline: 32530135]
9. Keane C, Fearnhead NS, Bordeianou L, et al. International consensus definition of low anterior resection syndrome. Colorectal Dis. Mar 2020;22(3):331-341. [doi: 10.1111/codi.14957] [Medline: 32037685]
10. Sandberg S, Asplund D, Bisgaard T, et al. Low anterior resection syndrome in a Scandinavian population of patients with rectal cancer: a longitudinal follow-up within the QoLiRECT study. Colorectal Dis. Oct 2020;22(10):1367-1378. [doi: 10.1111/codi.15095] [Medline: 32346917]
11. Chen TYT, Wiltink LM, Nout RA, et al. Bowel function 14 years after preoperative short-course radiotherapy and total mesorectal excision for rectal cancer: report of a multicenter randomized trial. Clin Colorectal Cancer. Jun 2015;14(2):106-114. [doi: 10.1016/j.clcc.2014.12.007] [Medline: 25677122]
12. Moon J, Garfinkle R, Zelkowitz P, et al. Incidence and factors associated with mental health disorders in patients with rectal cancer post-restorative proctectomy. Dis Colon Rectum. Sep 1, 2023;66(9):1203-1211. [doi: 10.1097/DCR.0000000000002744] [Medline: 37399122]
13. Liu W, Xia HO. Can I control my bowel symptoms myself? The experience of controlling defaecation dysfunction among patients with rectal cancer after sphincter-saving surgery: a qualitative study. Int J Qual Stud Health Well-being. Dec 2022;17(1):2031832. [doi: 10.1080/17482631.2022.2031832] [Medline: 35156554]
14. Tsui H, Huang XY. Experiences of losing bowel control after lower anterior resection with sphincter saving surgery for rectal cancer: a qualitative study. Cancer Nurs. 2022;45(6):E890-E896. [doi: 10.1097/NCC.0000000000001036] [Medline: 34817418]
15. Pape E, Decoene E, Debrauwere M, et al. The trajectory of hope and loneliness in rectal cancer survivors with major low anterior resection syndrome: a qualitative study. Eur J Oncol Nurs. Feb 2022;56:102088. [doi: 10.1016/j.ejon.2021.102088] [Medline: 34942590]
16. Qaderi SM, van der Heijden JAG, Verhoeven RHA, de Wilt JHW, Custers JAE, PLCRC study group. Trajectories of health-related quality of life and psychological distress in patients with colorectal cancer: a population-based study. Eur J Cancer. Nov 2021;158:144-155. [doi: 10.1016/j.ejca.2021.08.050] [Medline: 34666216]

17. Maalouf MF, Wang A, Robitaille S, et al. Patient perspective on adapting to bowel dysfunction after rectal cancer surgery. Colorectal Dis. Sep 2024;26(9):1701-1710. [doi: 10.1111/codi.17118] [Medline: 39099084]
18. Austin J, Drossaert CHC, Sanderman R, Schroevers MJ, Bohlmeijer ET. Experiences of self-criticism and self-compassion in people diagnosed with cancer: a multimethod qualitative study. Front Psychol. 2021;12:737725. [doi: 10.3389/fpsyg.2021.737725] [Medline: 34721209]
19. Shahar G, Bauminger R, Zwerenz R, Brähler E, Beutel M. Centrality of self-criticism in depression and anxiety experienced by breast cancer patients undergoing short-term psychodynamic psychotherapy. Psychiatry. 2022;85(3):215-227. [doi: 10.1080/00332747.2021.2004786] [Medline: 35138986]
20. Neff K. Self-compassion: an alternative conceptualization of a healthy attitude toward oneself. Self and Identity. Apr 2003;2(2):85-101. [doi: 10.1080/15298860309032]
21. Pinto-Gouveia J, Duarte C, Matos M, Fráguas S. The protective role of self-compassion in relation to psychopathology symptoms and quality of life in chronic and in cancer patients. Clin Psychol Psychother. Jul 2014;21(4):311-323. [doi: 10.1002/cpp.1838] [Medline: 23526623]
22. Chen Y, Liu R, Xiao J, et al. Effects of online mindful self-compassion intervention on negative body image in breast cancer patients: a randomized controlled trail. Eur J Oncol Nurs. Oct 2024;72:102664. [doi: 10.1016/j.ejon.2024.102664] [Medline: 39059197]
23. Campo RA, Bluth K, Santacroce SJ, et al. A mindful self-compassion videoconference intervention for nationally recruited posttreatment young adult cancer survivors: feasibility, acceptability, and psychosocial outcomes. Support Care Cancer. Jun 2017;25(6):1759-1768. [doi: 10.1007/s00520-017-3586-y] [Medline: 28105523]
24. Brooker J, Julian J, Millar J, et al. A feasibility and acceptability study of an adaptation of the Mindful Self-Compassion program for adult cancer patients. Pall Supp Care. Apr 2020;18(2):130-140. [doi: 10.1017/S1478951519000737] [Medline: 31595861]
25. Fan YC, Hsiao FH, Hsieh CC. The effectiveness of compassion-based interventions among cancer patients: a systematic review and meta-analysis. Palliat Support Care. Jun 2023;21(3):534-546. [doi: 10.1017/S1478951522001316] [Medline: 36397274]
26. Signorelli C, Høeg BL, Asuzu C, et al. International survey of psychosocial care for cancer survivors in low-/middle- and high-income countries: current practices, barriers, and facilitators to care. JCO Glob Oncol. May 2024;10(10):e2300418. [doi: 10.1200/GO.23.00418] [Medline: 38781550]
27. Ju A, White K, Campbell R, et al. The future of supportive care interventions for colorectal cancer survivors following primary treatment: clinicians' opinions and current practices. Cancer Survivorship Res Care. Jan 2023;1(1). [doi: 10.1080/28352610.2023.2279094]
28. Husebø ALM, Søreide JA, Kørner H, et al. eHealth interventions to support colorectal cancer patients' self-management after discharge from surgery—an integrative literature review. Support Care Cancer. Jan 2023;32(1):11. [doi: 10.1007/s00520-023-08191-7] [Medline: 38055087]
29. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implement Sci. Apr 23, 2011;6(1):42. [doi: 10.1186/1748-5908-6-42] [Medline: 21513547]
30. Duan L, Wang T, Guo Y, et al. Barriers and facilitators to shared decision-making for patients with cancer and health care providers based on the COM-B model: a systematic review. BMC Med Inform Decis Mak. Oct 10, 2025;25(1):369. [doi: 10.1186/s12911-025-03194-2] [Medline: 41074036]
31. Guo X, Chen H, Xin R, Huang J, Long T, Li M. Barriers and facilitators to physical activity adherence in people with type 2 diabetes: a mixed-methods systematic review using the COM-B model and theoretical domains framework. IntJ Behav Med. Apr 2026;33(2):158-178. [doi: 10.1007/s12529-025-10400-y] [Medline: 41094318]
32. Zhang M, Guo L, Namassevayam G, et al. Factors associated with health behaviours among stroke survivors: a mixed-methods study using COM-B model. J Clin Nurs. Jun 2024;33(6):2138-2152. [doi: 10.1111/jocn.17103] [Medline: 38590015]
33. Gonzalez-Hernandez E, Romero R, Campos D, et al. Cognitively-Based Compassion Training (CBCT) in breast cancer survivors: a randomized clinical trial study. Integr Cancer Ther. Sep 2018;17(3):684-696. [doi: 10.1177/1534735418772095] [Medline: 29681185]
34. Neff KD. The Development and Validation of a Scale to Measure Self-Compassion. Self and Identity. Jul 2003;2(3):223-250. [doi: 10.1080/15298860309027]
35. Chen J, Yan L, Zhou L. Reliability and validity of Chinese version of the Self-Compassion Scale [Article in Chinese]. Chin J Clin Psychol. 2011;19(6):734-736. [doi: 10.16128/j.cnki.1005-3611.2011.06.006]
36. Adams RN, Mosher CE, Rand KL, et al. The cancer loneliness scale and cancer-related negative social expectations scale: development and validation. Qual Life Res. Jul 2017;26(7):1901-1913. [doi: 10.1007/s11136-017-1518-4] [Medline: 28236266]

37. Cui H, Sun Z. Chinese version of Cancer Loneliness Scale and Cancer-related Negative Social Expectations Scale and its reliability and validity test [Article in Chinese]. Chin Nurs Res. 2020;34(15):2676-2679. [doi: 10.12102/j.issn.1009-6493.2020.15.011]
38. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med. May 22, 2006;166(10):1092-1097. [doi: 10.1001/archinte.166.10.1092] [Medline: 16717171]
39. He X, Li C, Qian J, Cui HS, Wu WY. Reliability and validity of a generalized anxiety disorder scale in general hospital outpatients [Article in Chinese]. Shanghai Arch Psychiatry. 2010;22(4):200-203. [doi: 10.3969/j.issn.1002-0829.2010.04.002]
40. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med. Sep 2001;16(9):606-613. [doi: 10.1046/j.1525-1497.2001.016009606.x] [Medline: 11556941]
41. Wang W, Bian Q, Zhao Y, et al. Reliability and validity of the Chinese version of the Patient Health Questionnaire (PHQ-9) in the general population. Gen Hosp Psychiatry. 2014;36(5):539-544. [doi: 10.1016/j.genhosppsych.2014.05.021] [Medline: 25023953]
42. Brooke J. SUS—a quick and dirty usability scale. In: Jordan PW, Thomas B, Weerdmeester B, McClelland IL, editors. Usability Evaluation in Industry. CRC Press; 1996:189-194. URL: https://www.taylorfrancis.com/chapters/edit/10.1201/9781498710411-35/sus-quick-dirty-usability-scale-john-brooke [Accessed 2026-11-10]
43. Hyzy M, Bond R, Mulvenna M, et al. System usability scale benchmarking for digital health apps: meta-analysis. JMIR Mhealth Uhealth. Aug 18, 2022;10(8):e37290. [doi: 10.2196/37290] [Medline: 35980732]
44. Wang Y, Lei T, Liu X. Chinese system usability scale: translation, revision, psychological measurement. Int J Hum-Comput Interact. Jun 14, 2020;36(10):953-963. [doi: 10.1080/10447318.2019.1700644]
45. Finlay-Jones AL, Parkinson A, Sirois F, Perry Y, Boyes M, Rees CS. Web-based self-compassion training to improve the well-being of youth with chronic medical conditions: randomized controlled trial. J Med Internet Res. Sep 13, 2023;25:e44016. [doi: 10.2196/44016] [Medline: 37703081]
46. Randhawa AK, Vella-Brodrick DA. Online self-compassion interventions and wellbeing outcomes: a systematic review of RCTs. Mindfulness (N Y). Jul 2025;16(7):1795-1820. [doi: 10.1007/s12671-025-02606-8]
47. Yang X, Sun Z, Chen X, et al. Feasibility and acceptability of a couple-based self-compassion intervention for couples living with colorectal cancer: a pilot study. Eur J Oncol Nurs. Aug 2025;77:102899. [doi: 10.1016/j.ejon.2025.102899] [Medline: 40466522]
48. Lathren C, Bluth K, Campo R, Tan W, Futch W. Young adult cancer survivors' experiences with a mindful self-compassion (MSC) video-chat intervention: a qualitative analysis. Self Identity. 2018;17(6):646-665. [doi: 10.1080/15298868.2018.1451363] [Medline: 30774563]
49. Çetiner E, Turan Kavradım S. Online self-compassion-based interventions on patient outcomes in patients with cancer: a systematic review. Support Care Cancer. Apr 23, 2026;34(5):457. [doi: 10.1007/s00520-026-10660-8] [Medline: 42020858]
50. Wright H, Martin F, Clyne W, et al. A digital self-management program (help to overcome problems effectively) for people living with cancer: feasibility randomized controlled trial. J Med Internet Res. Nov 5, 2021;23(11):e28322. [doi: 10.2196/28322] [Medline: 34738912]
51. Toussaint A, Hüsing P, Gumz A, et al. Sensitivity to change and minimal clinically important difference of the 7-item Generalized Anxiety Disorder Questionnaire (GAD-7). J Affect Disord. Mar 15, 2020;265:395-401. [doi: 10.1016/j.jad.2020.01.032] [Medline: 32090765]
52. Löwe B, Un??tzer J, Callahan CM, Perkins AJ, Kroenke K. Monitoring depression treatment outcomes with the Patient Health Questionnaire-9. Med Care. Dec 2004;42(12):1194-1201. [doi: 10.1097/00005650-200412000-00006] [Medline: 15550799]
53. Neff KD. Self-compassion: theory, method, research, and intervention. Annu Rev Psychol. Jan 18, 2023;74(1):193-218. [doi: 10.1146/annurev-psych-032420-031047] [Medline: 35961039]
54. Teckie S, Solomon J, Kadapa K, et al. A mobile patient-facing app for tracking patient-reported outcomes in head and neck cancer survivors: single-arm feasibility study. JMIR Form Res. Mar 19, 2021;5(3):e24667. [doi: 10.2196/24667] [Medline: 33739291]
55. Tran C, Dicker A, Leiby B, Gressen E, Williams N, Jim H. Utilizing digital health to collect electronic patient-reported outcomes in prostate cancer: single-arm pilot trial. J Med Internet Res. Mar 25, 2020;22(3):e12689. [doi: 10.2196/12689] [Medline: 32209536]
56. Warrington L, Absolom K, Conner M, et al. Electronic systems for patients to report and manage side effects of cancer treatment: systematic review. J Med Internet Res. Jan 24, 2019;21(1):e10875. [doi: 10.2196/10875] [Medline: 30679145]

57. Jiang Y, West BT, Barton DL, Harris MR. Acceptance and use of eHealth/mHealth applications for self-management among cancer survivors. Stud Health Technol Inform. 2017;245:131-135. [doi: 10.3233/978-1-61499-830-3-131] [Medline: 29295067]

Abbreviations

CLS: Cancer Loneliness Scale
COM-B: capability, opportunity, motivation–behavior
CONSORT-EHEALTH: Consolidated Standards of Reporting Trials of Electronic and Mobile Health Applications and Online Telehealth
GAD-7: 7-item Generalized Anxiety Disorder Scale
GEE: generalized estimating equations
LARS: low anterior resection syndrome
OR: odds ratio
PHQ-9: 9-item Patient Health Questionnaire
SCS: Self-Compassion Scale
SPS: sphincter-preserving surgery
SUS: System Usability Scale

Edited by Matthew Balcarras; peer-reviewed by Chasity Brimeyer, Shamnad Mohamed Shaffi; submitted 21.Feb.2026; initial comments to author 13.Aug.2026; final revised version received 07.Oct.2026; accepted 20.Oct.2026; published 27.Nov.2026

Please cite as:
Wu C, Hong Q, Liang Y, Hao Y, Chen J, Shu Z, Hu M, A T, Song B, Hu S
Effectiveness of a WeChat-Based Self-Compassion Intervention for Patients After Sphincter-Preserving Surgery for Rectal Cancer: Randomized Controlled Trial
J Med Internet Res 2026;28:e93835
URL: https://www.jmir.org/2026/1/e93835
doi: 10.2196/93835

© Chuanqin Wu, Qingqing Hong, Yuanyuan Liang, Yang Hao, Jiaqian Chen, Zhijun Shu, Min Hu, Tingting A, Beibei Song, Shaohua Hu. Originally published in the Journal of Medical Internet Research (https://www.jmir.org), 27.Nov.2026. This is an open-access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work, first published in the Journal of Medical Internet Research (ISSN 1438-8871), is properly cited. The complete bibliographic information, a link to the original publication on https://www.jmir.org/, as well as this copyright and license information must be included.