

Effects of Acceptance and Commitment Therapy on Postoperative Patients with Colorectal Cancer: A randomized controlled trial

Na Liu

Shandong Provincial Hospital affiliated to Shandong First Medical University Jinan

Lingyu Yao

Shandong University

Fuxia Li

Shandong Provincial Hospital affiliated to Shandong First Medical University Jinan

Hongling Yin

Shandong Provincial Hospital affiliated to Shandong First Medical University Jinan

Aihua Zhang

zhangah818@163.com

Shandong First Medical University & Shan Dong Academy of Medical Sciences

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Abstract

Objective

This study evaluated a four-session acceptance and commitment therapy (ACT) intervention targeting the effects on health outcomes of postoperative patients with colorectal cancer.

Method

Participants were 100 adults (56% male; $M = 59.3$ years, $SD = 8.7$) with colorectal cancer who were randomized to the ACT intervention group or the usual care group. Psychological flexibility, stigma, disease acceptance, intestinal function, and quality of life were assessed at baseline and at 3 months and 6 months after the intervention.

Results

Of the 100 participants who started the intervention, 95% completed it and reported high satisfaction. Participants were randomized to four weekly sessions of acceptance and commitment therapy or routine nursing mode. Lost to follow-up cases were performed using a propensity score matching analysis. There was no significant difference at baseline between the intervention and control groups in terms of general information and various test indicators. Compared with the control group, the ACT group had a significant effect on psychological flexibility, stigma, disease acceptability, intestinal function, and quality of life.

Conclusions

ACT can improve the psychological flexibility and disease acceptance of postoperative patients with colorectal cancer, reduce stigma levels, improve intestinal function and quality of life.

1. INTRODUCTION

According to the latest global cancer report in 2020, there were more than 1.9 million new cases of colorectal cancer, ranking third in cancer incidence rate, and approximately 935,000 deaths, ranking second in cancer mortality rate.¹ Today, the clinical treatment of colorectal cancer is still dominated by surgery, chemotherapy, and radiotherapy; however, surgery, chemoradiotherapy, and even permanent colostomy brings patients great physical and mental pain. Furthermore, patients may have a strong psychological reaction and experience unpleasant emotions, which will seriously affect their treatment and rehabilitation, leading to a decline in patients' quality of life.

With the rise of positive psychology, the research paradigm of psychology has gradually turned to discussing the possible positive reactions of individuals after experiencing stress and trauma. In the face of setbacks, trauma, or life difficulties, some people are well adjusted and can successfully cope; however, others are maladjusted and are left with psychological trauma and may even find it difficult to return to society. Some studies have shown that individuals' psychological flexibility plays a decisive role in their response to a stress crisis.²⁻⁵ That is, the higher the level of individuals' psychological flexibility, the more they can show positive adaptation to pressure, promote subjective well-being, and improve their quality of life. Individuals with a low level of psychological flexibility tend to exhibit maladaptive behaviours, such as anxiety, depression, and substance abuse. For patients with colorectal cancer, the treatment aims to help them quickly recover from negative postoperative effects, accept the disease and its impact, reduce stigma, improve intestinal function, and improve psychological flexibility and quality of life. During this process, it is important to assist patients in establishing a positive protection mechanism, developing their own psychological potential, and promoting the development of their mental health. In psychology, 'psychological flexibility' is defined as the ability to adapt to a changing environment, flexibly allocate psychological resources, change perspectives, and balance various needs and life areas.⁶

Acceptance and commitment therapy (ACT) is one of the most representative treatments in the third wave of cognitive and behavioural therapy. It was founded in the 1980s by Steven C. Hayes.⁷ It is based on six principles that work together and support two goals: to effectively deal with painful thoughts and emotions, and to create a rich, fulfilling, and meaningful life. Based on the philosophy of functional contextualism and the theory of relational framing, this therapy incorporates Eastern philosophy and aims to improve psychological flexibility through self-acceptance and commitment to actions based on self-worth.⁸ There is considerable evidence that ACT may improve functional outcomes in patients, include anxiety and depression,⁹⁻¹² pain,¹³⁻¹⁶ fear,¹⁷⁻¹⁹ sleep disorders,^{11,20} stigma²¹⁻²⁴ and so on. however, this therapy has rarely been tested in physical and mental measurements coping with colorectal cancer.²⁵

2. METHODS

2.1 Participants

The patients who met the following inclusion criteria were involved: have scores less than 26 in Montreal Cognitive Assessment (MoCA), which indicates the presence of cognitive impairment; ≥18 years of age, able to read and write; and willing to participate. The study considered including both male and female patients. Exclusion criteria include (a) diagnosed with cognitive dysfunction or other mental illnesses; (b) combined with other vital organ dysfunction; (c). whose physical conditions were considered extremely weak or with a condition that was unstable or rapidly deteriorating.

2.2 Procedure

This study was registered on Chinese Clinical Trial Register (ChiCTR) (ChiCTR2000031177) on March 23rd, 2020 and was conducted in accordance with the Declaration of Helsinki. This study was approved by the Shandong First Medical University & Shan Dong Academy of Medical Sciences Institutional Review Board (2019114). Participants were recruited from the Second Affiliated Hospital of Shandong First Medical University (China) and Shandong Provincial Hospital Affiliated to Shandong First Medical University (China), recruitment took place from July 2020 until January 2022. They were recruited via outpatient oncology clinics by telephone or face-to-face invitation with oncologist approval. Participants were randomly assigned to the intervention or control group by a study coordinator, and they completed follow-up assessments at 3 and 6-months post-baseline. Informed consent was obtained for all participants. Figure 1 shows the procedural flow of this study.

2.3 Sample size and randomization

We calculated posthoc power of the study based on a mixed design repeated measures ANOVA test comparing average total symptoms frequency and severity scores pre and post intervention with comparison between two groups. This study finally included 100 patients with colorectal cancer after surgery who met the criteria, and randomly divided the subjects into the intervention group (n = 50) and the control group (n = 50) by using random number table method. The sample size was determined using G*Power.

2.4 Interventions

2.4.1 ACT group

The ACT intervention was developed based on the ACT psychotherapy model and the ACT reference books and training manuals for therapists^{26,27} and previous ACT trials with patients with cancer.^{11,18,28–30} On this basis, the intervention manual was modified based on the results of our qualitative interview of 15 patients with Colorectal Cancer. Finally, our study team members including two ACT experts, one nursing professor and two head nurses in the oncology ward.

The effectiveness of the ACT intervention was demonstrated in one-on-one conversations. The baseline data survey was completed before surgery. The first intervention began within one month after the surgery. The ACT interventions were divided into four sessions, each lasting 60 to 90 minutes and occurring once weekly for 4 weeks. Each session was followed by an instant evaluation and a 6-month follow-up. Table 1 provides a summary of the ACT intervention components. For acceptance, we inspire patients through the metaphor of "crossing the swamp" to make patients understand that everything has advantages and disadvantages, bad experience and painful memory are also an important part of life, acceptance rather than resistance is the best choice of life. Learn cognitive defusion techniques through metaphorical and experiential exercises, avoiding linking the adverse factors with the disease itself. Finally, patients share the changes that have occurred so as to further clarify their self-worth and build

confidence in accepting and coping with the disease. All the metaphors are quoted from ACT Made Simple:An Easy-to-Read Primer on Acceptance and Commitment Therapy. ³¹

Table 1
Summary of core components of ACT intervention condition

Themes	Outline	ACT process targeted
Session 1:	(1) Patient self-introduction include the expectations of the intervention, clear intervention objectives and sign informed consent.	Accept the fact of cancer Contact with the present moment
Accept what cannot be changed	(2) Introductions and overview of the intervention (3) inspire patients through the metaphor of "crossing the swamp" (4) Introduce and practice mindfulness	
Session 2: Keeping a distance from your thoughts	(1) It included learning cognitive defusion techniques through metaphorical and experiential exercises (2) Help observe themselves in an objective way, treat the thoughts and feelings related to cancer objectively (3) Discuss how attempts to avoid thoughts, feelings and symptoms lead to actions not aligned with values and decreased quality of life (4) Consolidate strategies of acceptance and practice mindfulness	Contact with present moment and cognitive defusion Accepting the psychological pain of illness
Session 3: Observe yourself, living in the moment	(1) Experiential exercise to support patients in flexibly choosing their focus in the present moment (2) Through "sky and weather metaphor" and "chess board metaphor" to learn observe own emotions and consciousness (3) Consolidate strategies of acceptance and practice mindfulness	experience own emotions and consciousness
Session 4: Clarifying your values, Putting your values into action and living a meaningful cancer life	(1) Through the first few interventions, patients share the changes that have occurred, such as emotional pain, sense of worth, and sense of dignity (2) Clarify personal values and goals and share own values with others to promote their action (3) Patients are encouraged to live in the moment, be normal and follow their interests to live a meaningful and worthwhile life	Clarify values and build confidence in accepting and coping with the disease.

Themes	Outline	ACT process targeted
	(4)Summary and feedback.	

2.4.2 Control group

Participants randomized to the control group received nursing care as usual, which involved dietary guidance, exercise guidance, bowel function recovery process and complications guidance information during hospitalization, and reexamination recommendation after discharge.

2.5 Measures

2.5.1 Demographics

Demographic measures consisted of gender, age, nationality, educational level, occupation, source of medical expenses, monthly family income, post-sickness exercise, and disease-related characteristics such as disease type and stage.

2.5.2 Psychological flexibility

Psychological flexibility was measured using the Acceptance and Action Questionnaire-2nd Edition (AAQ-II).³² Defusion, acceptance, and commitment to action are three of the fundamental processes that the items focus on. Greater psychological inflexibility is indicated by higher scores, which fall within the 7 – 49 total score range that is determined from the sum of the item responses. The Cronbach's alpha was 0.88 in this study.

2.5.3 Stigma

Stigma was assessed using the Social Impact Scale (SIS) developed by Fife et al. in 2000 based on labelling theory to measure the social response or personal stigma associated with disease in patients with cancer and AIDS.³³ In 2007, Taiwanese scholars Pan et al.³⁴ synoecised the original scale. The Chinese version of the scale consists of a total of 24 items and includes four dimensions: nine items of social exclusion, three items of economic instability, five items of internal shame, and seven items of social isolation. A 4-point Likert scale was used as the scoring method in the scale: *4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree*. The total score of the scale was the sum of the scores of the four dimensions. The higher the score, the stronger the perceived sense of shame was. The Cronbach's alpha for the four dimensions range from 0.85 to 0.90.

2.5.4 Disease acceptance

Disease acceptance was measured using the Acceptance of Illness Scale (AIS).³⁵ The scale contains eight items and adopts a 5-point Likert-type scoring method. A total score of between 20 and 30 indicated moderate acceptance and a score of > 30 indicated full acceptance of one's condition. The higher the score, the higher the patient's degree of acceptance of the disease, suggesting that they can cope better with the disease and better adapt to the role of the patient. The lower the score, the worse

the patient was able to adapt to the disease, thus, could not accept their current situation and may experience emotional problems and strong psychological discomfort. This scale was applicable to adult patients with any disease.³⁶ and the Cronbach's alpha was 0.754 in this study.

2.5.5 Bowel function

Bowel Function was measured using the Memorial Sloan-Kettering Cancer Center Bowel Function Instrument (BFI).³⁷ BFI have been applied in England,³⁸ Italy³⁹ and other Countries. There were 18 items in this questionnaire. The higher the total score, the better the intestinal function of the patients. The Chinese version of the questionnaire included three factors: frequency and urgency of defecation, influence of diet on defecation, and paraesthesia of defecation. The Cronbach's alpha of the total score and each factor were measured to be 0.602 to 0.856.

2.5.6 Quality of life

Quality of life was measured using the Functional Assessment Cancer Therapy-Colorectal (FACT-C) developed by Cella et al.⁴⁰ FACT-C was divided into 36 items and assessed five areas: physical status (seven items), social/family status (seven items), emotional status (six items), functional status (seven items), and additional attention (nine items). Each item was a five-level item. Furthermore, there were both positive and negative items on the scale. The higher the score of the forward item, the better the quality of life; the lower the score of the reverse item, the worse the quality of life. The Cronbach's alpha was above 0.80 in all areas except for the additional focus area, which is 0.56.

2.6 Statistical analysis

SPSS software (version 25.0) was used for data analysis. Descriptive statistical analysis and a chi-square test was used to compare the general demographic data of the intervention and control groups. The Shapiro-Wilk was used to verify the normality of distribution of variables and t-test was used to compare baseline levels of psychological flexibility, stigma, disease acceptance, intestinal function, and quality of life between the intervention and the control groups. Student t-test was used to compare categories for normally distributed quantitative variables while paired t-test comparing between pre and post in each group. Additionally, repeated measures analysis was used to compare the effects of the two groups at different time points after the intervention using ANOVA. Significance of the obtained results was judged at the 5% level.

3. RESULTS

3.1 Characteristics of the participants.

The baseline characteristics of the study participants are shown in Table 2. The groups were balanced on demographic and disease-related characteristics. No statistical differences were found between the two groups across gender, age, educational level, occupational status, source of medical expenses, monthly family income, post-sickness exercise, disease stage, and disease type.

Table 2
Characteristics of the participants.

Demographic	category	Intervention(N = 50)	Control(N = 50)	χ^2	P value
Gender	Male	27(54%)	29(58%)	0.162	0.687
	Female	23(46%)	21(42%)		
Age	<40	3(6%)	3(6%)	2.201	0.333
	46–60	17(34%)	13(26%)		
	>60	30(60%)	34(68%)		
Education	Under middle school	22(44%)	19(38%)	0.404	0.817
	High school	12(24%)	14(28%)		
	College degree or above	16(32%)	17(34%)		
Employment status	Employed	12(24%)	11(22%)	0.392	0.822
	Retirement	5(10%)	7(14%)		
	Others	33(66%)	32(64%)		
Medical expenses	Medical insurance for urban residents	38(76%)	36(72%)	0.794	0.373
	Medical insurance for urban employees	12(24%)	14(28%)		
Family monthly income	2000–5000	15(30%)	15(30%)	0.059	0.971
	5000–10000	21(42%)	20(40%)		
	10000 above	14(28%)	15(30%)		
Exercise after illness	Every day	11(22%)	11(22%)	0.106	0.991
	5–6 days a week	8(16%)	9(18%)		
	3–4 days a week	20(40%)	20(40%)		
	1–2 days a week	11(22%)	10(20%)		
Disease stage	Tumour 1	4(8%)	6(12%)	0.586	0.900
	Tumour 2	15(30%)	16(32%)		
	Tumour 3	22(44%)	20(40%)		
	Tumour 4	9(18%)	8(16%)		

Demographic	category	Intervention(N = 50)	Control(N = 50)	χ^2	P value
Disease type	Colon cancer	21(42%)	17(34%)	0.679	0.410
	Rectal cancer	29(58%)	33(66%)		

3.2 Baseline scores of each scale between the intervention and control group

The baseline scores of each scale between the intervention and control groups are shown in Table 3. The baseline comparison of scores of the AAQ, SIS, AIS, BFI, and FACT-C were compared; the results showed that there was no statistically significant difference between the two groups in each evaluation index.

Table 3
Baseline Scores of Each Scale between the Intervention and Control Group

Outcome	Intervention(N = 50)	Control(N = 50)	t	p
AAQ total score	29.92 ± 9.396	27.78 ± 7.377	1.267	0.208
SIS total score	63.30 ± 10.328	62.08 ± 9.380	0.618	0.538
Social Exclusion	22.64 ± 4.355	22.06 ± 3.835	0.707	0.481
Economic uncertainty	8.82 ± 1.587	8.26 ± 1.397	1.873	0.064
• Inner shame	12.48 ± 2.957	13.00 ± 2.109	-1.012	0.314
Social isolation	19.36 ± 3.403	18.76 ± 3.526	0.866	0.389
AIS total score	21.36 ± 5.271	21.94 ± 5.069	-0.561	0.576
BFI total score	59.90 ± 9.157	61.30 ± 8.197	-0.806	0.422
Frequency and urgency of defecation	35.50 ± 6.500	36.28 ± 5.265	-0.659	0.511
• Defecation is affected by diet	12.34 ± 2.647	13.00 ± 2.650	-1.246	0.216
Abnormal sensation of defecation	12.06 ± 2.567	12.02 ± 2.511	0.079	0.937
FACT-C total score	70.66 ± 13.907	73.40 ± 13.378	-1.004	0.318
Physical condition	15.26 ± 5.114	16.02 ± 5.101	-0.744	0.459
Social/family status	16.62 ± 4.651	16.94 ± 4.744	-0.341	0.734
Emotional status	11.14 ± 4.522	11.68 ± 4.201	-0.619	0.538
Functional status	14.28 ± 5.079	14.90 ± 4.867	-0.623	0.535
Additional attention	13.36 ± 2.648	13.86 ± 2.532	-0.965	0.337

3.3 Intervention effects

3.3.1 Psychological flexibility

ANOVA revealed that the difference in time effect of the AAQ scale scores between the intervention and control groups was statistically significant ($P < 0.01$); that is, patients' psychological flexibility gradually increased with the extension of postoperative time. Further analysis showed that the difference in AAQ scores between the intervention and control group at 6 months after the intervention was statistically significant ($P < 0.01$); that is, the psychological flexibility of patients in the intervention group significantly improved compared with the control group at 6 months after the intervention. Figure 2 shows the changes in psychological flexibility scores.

3.3.2 Stigma

In comparing stigma scores, the difference in time effect in dimensions and total scores between the intervention and control groups were statistically significant ($P < 0.01$); stigma levels were reduced after the intervention. Furthermore, differences were found in the total scores of stigma, internal shame, and social isolation between the two groups. Further analysis revealed that 3 months after the intervention, the differences in the dimensions of internal shame and social isolation between the two groups were statistically significant ($P < 0.05$). Six months after the intervention, the social isolation dimension in the two groups was statistically significant ($P < 0.01$), with the social isolation dimension of the intervention group being significantly lower than the control group. Figure 3 shows the changes in stigma scores.

3.3.3 Disease acceptance

The difference in time effect between the intervention and control groups were statistically significant ($P < 0.01$), indicating that the disease acceptability of the two groups increased with time after surgery. The effect difference between the treatment and control groups was also statistically significant ($P < 0.01$), indicating that the disease acceptability in the two groups varied with time. The difference of disease acceptance between the intervention group and the control group at 3 months and 6 months after intervention was statistically significant ($P < 0.01$), and the disease acceptance of the intervention group was significantly higher than the control group. Figure 4 shows the changes in acceptance scores.

3.3.4 Bowel function

Analysis revealed that at 3 months after the intervention, the differences in the total score of intestinal function and the dimensions of bowel frequency, urgency, and defecation affected by diet between the two groups were statistically significant ($P < 0.05$); the intestinal function of the intervention group was generally higher than the control group. Six months after the intervention, no significant difference in intestinal function between the two groups was found. Figure 5 shows the changes in bowel function scores.

3.3.5 Quality of life

The difference in time effect between the intervention and control groups were statistically significant ($P < 0.01$), and the postoperative life quality of patients in both groups improved, especially in terms of

emotional status and functional status. Moreover, the effect difference between the two groups in physical and emotional conditions was statistically significant ($P < 0.01$, $P < 0.05$). Further analysis found that 3 months after the intervention, the differences in the total FACT-C score, physical status, and emotional status between the two groups were statistically significant, and the quality of life of the patients in the intervention group was significantly higher compared with the control group. At six months after the intervention, the differences in the total FACT-C score and the physical, family/social, emotional, and functional status scores between the two groups were statistically significant. The quality of life in the intervention group was significantly higher than that in the control group. Figure 6 shows the changes in quality of life scores.

4. DISCUSSION

Mental health is not to negatively maintain a normal state, prevent mental illness, but to consciously understand themselves, promote self-growth of the best psychological state. ACT focuses not on the symptoms themselves, but on improving the individual's mental flexibility and helping the individual achieve the goal value as the core treatment goal. The reduction or disappearance of symptoms is the possible phenomenon after the individual improves the mental flexibility.^{41–42}

In this study, although both groups showed improvement in psychological flexibility with the extension of postoperative time, the trend observed was different between the two groups. That is, 6 months after the intervention, the psychological flexibility of the patients in the intervention group significantly improved compared with the control group, indicating that the ACT intervention improved the psychological flexibility of patients with colorectal cancer after surgery. At 3 and 6 months after the intervention, the disease acceptability of the intervention group was significantly higher than the control group, suggesting that the ACT significantly improved patients' disease acceptability. Similarly, Anna et al.⁴³ found that in an intervention based on ACT for colorectal cancer patients, patients' psychological flexibility and disease acceptance level improved after the intervention. Ali et al.²⁵ also showed, in a study on patients with colorectal cancer, that ACT intervention can improve patients' level of psychological flexibility and reduce empirical avoidance, the research focuses on patients' mental health, including psychological flexibility and cognitive levels.

Based on the common factors affecting the psychological flexibility of patients with colorectal cancer after surgery, we ensured patients fully understood their own diseases by health education and other methods. Hereafter, the patients were encouraged to recognise and discuss current problems and ways to deal with them, guided to face the facts of their disease, and encouraged to reduce their avoidance behaviour. Concurrently, patients learnt cognitive defusion skills to dissociate the Unpleasant thoughts induced by the disease, were helped to correctly understand negative cognition in the mind to weaken its negative impact, and learnt to accept the disease; thus, improving psychological flexibility.

Stigma is widespread among cancer patients and it causes more emotional distress to people than the cancer itself. The level of stigma in the two groups was reduced after the intervention; however, there

were significant differences between the two groups which suggests that stigma level in patients after surgery was significantly reduced by the ACT intervention. Similarly, West et al.⁴⁵ showed that components of psychological flexibility can help prevent the effects of stigma, while value clarification can buffer its effects. Suyanti et al.⁴⁶ explored the effect of ACT on self-stigma and depression in AIDS patients and found that patients' self-stigma and depression levels significantly improved after the ACT intervention.

Patients with cancer are often stigmatised and discriminated against by the public and many patients internalise the stigma associated with the disease. To avoid the stigma caused by external evaluation, cancer patients usually adopt avoidance measures, which lead to empirical avoidance in the long-term. ACT, through acceptance and cognitive defusion techniques, enables patients to view the external world and their own evaluations of themselves as observers, and to adjust their relationship with these evaluations, rather than to associate themselves with them. Therefore, cognitive defusion techniques allow patients to understand that these assessments are linguistic symbols, not their true selves, and learn to distance themselves from them; thus, seeing themselves more authentically and reducing stigma levels over time.

In view of the intestinal function after colorectal cancer surgery, modern medicine believes that surgical trauma, anesthesia, gastrointestinal lesions, and systemic conditions will all have an impact on gastrointestinal function, which is likely to cause intestinal dilation, flora imbalance, abdominal distension, and even serious complications such as intestinal adhesion and anastomotic leakage.⁴⁷ Postoperative gastrointestinal dysfunction seriously affects the systemic nutritional status of patients, prolonging hospital stay, increasing additional hospitalization costs, bringing economic and mental pressure to patients, and seriously affecting postoperative rehabilitation and quality of life of patients.⁴⁸ Due to the complex etiology of postoperative intestinal dysfunction, there is still a lack of effective methods and drugs to promote postoperative gastrointestinal function. In clinical practice, fasting, gastrointestinal decompression and early functional exercise are mainly adopted for postoperative gastrointestinal dysfunction, but the effect is not satisfactory.⁴⁷

This study shows that ACT can improve the intestinal function of patients with colorectal cancer after surgery; however, the long-term effects of this improvement needs to be further verified. And after the ACT intervention, the overall quality of life of the intervention group improved significantly. Similarly, in a randomised controlled trial of breast cancer survivors, Shelley et al.⁴⁹ indicated that ACT intervention improve the quality of life of breast cancer patients. Additionally, after the intervention of Rose Michael R et al.⁵⁰ found that ACT could reduce anxiety and depression and significantly improve patients' quality of life in patients with chronic muscle disease.

Study limitations

First, a convenience sampling method was adopted in this study. The sample size was obtained from two tertiary hospitals. Thus, the selection of the study population was biased by region. Second, due to

time limitations, this study only observed the experimental effect 6 months after the intervention, the long-term effect of the intervention could not be verified. Third, only acceptance and action questionnaires were used to represent the intervention effect of ACT on psychological flexibility, which was not perfect. That is, ACT psychotherapy consists of six modules, AAQ-II only to avoid an empiric therapy effect. It is suggested to use a scale covering six modules of ACT psychotherapy in the future.⁵¹

5. CONCLUSIONS

This study supports a four-session ACT intervention for postoperative patients with colorectal cancer. The findings showed that ACT can improve the mental flexibility and disease acceptance of patients after colorectal cancer surgery, reduce the level of stigma, improve intestinal function and improve the quality of life of colorectal cancer patients.

Declarations

Conflicts of interest

There are no conflicts of interest.

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Author Contribution

Na Liu drafted the entire manuscript. Lingyu Yao performed part of the data analysis. Head nurses Fuxia Li and Hongling Yin were responsible for coordinating patients for data collection. Aihua Zhang reviewed and approved the overall paper.

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References

1. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin.* 2021;71(3):209-249.
2. Kamody R C , Berlin K S , Rybak T M , et al. Psychological Flexibility Among Youth with Type 1 Diabetes: Relating Patterns of Acceptance, Adherence, and Stress to Adaptation[J]. *Behavioral Medicine*, 2017:1-9.
3. Lin J, Klatt L I, Mccracken L M, et al. Psychological flexibility mediates the effect of an online-based acceptance and commitment therapy for chronic pain: an investigation of change processes[J]. *Pain*, 2017, c in press:1.
4. Leonidou C , Panayiotou G , Bati A , et al. Coping with psychosomatic symptoms: The buffering role of psychological flexibility and impact on quality of life[J]. *Journal of Health Psychology*, 2016.
5. Cassar G E , Knowles S , Youssef G J , et al. Examining the mediational role of psychological flexibility, pain catastrophizing, and visceral sensitivity in the relationship between psychological distress, irritable bowel symptom frequency, and quality of life[J]. *Psychology, Health & Medicine*, 2018:1-14.
6. Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy*, 44(1), 1–25. <https://doi.org/10.1016/j.brat.2005.06.006>
7. Hayes, SC, Strosahl, KD, Wilson KG. Acceptance and commitment therapy: An experiential approach to behavior change. 2003: The Guilford Press.
8. Headley S. Acceptance and commitment therapy: model, processes and outcomes. [J]. *Behaviour Research & Therapy*, 2006, 44(1):1-25.
9. Stergaard, Tom, Lundgren T, Zettle R , et al. Acceptance and Commitment Therapy preceded by an experimental Attention Bias Modification procedure in recurrent depression: study protocol for a randomized controlled trial[J]. *Trials*, 2018, 19(1):203.
10. Mathew A, Doorenbos AZ, Jang MK, Hershberger PE. Acceptance and commitment therapy in adult cancer survivors: a systematic review and cocmodel. *J Cancer Surviv.* 2021;15(3):427-451.
11. Rayner M , Muscara F , Dimovski A , et al. Take A Breath: study protocol for a randomized controlled trial of an online group intervention to reduce traumatic stress in parents of children with a life threatening illness or injury.[J]. *Bmc Psychiatry*, 2016, 16(1):1-12.
12. García-Torres, Francisco et al. "Efficacy of a Combined Acceptance and Commitment Intervention to Improve Psychological Flexibility and Associated Symptoms in Cancer Patients: Study Protocol for a Randomized Controlled Trial." *Frontiers in psychology* vol. 13 871929. 18 May. 2022.
13. Casey, Máire-Bríd, Smart K , Segurado R , et al. Exercise combined with Acceptance and Commitment Therapy (ExACT) compared to a supervised exercise programme for adults with chronic pain: study protocol for a randomised controlled trial[J]. *Trials*, 2018, 19(1):194.
14. Alonso-Fernández, Miriam, López-López, Almudena, Losada A , et al. Acceptance and Commitment Therapy and Selective Optimization with Compensation for Institutionalized Older People with Chronic Pain[J]. *Pain Medicine*, 2015:n/a-n/a.

15. Mccracken L M , Jones R . Treatment for Chronic Pain for Adults in the Seventh and Eighth Decades of Life: A Preliminary Study of Acceptance and Commitment Therapy (ACT)[J]. *Pain Medicine*, 2012, 13(7):860–867.
16. Godfrey E , Galea Holmes M , Wileman V , et al. Physiotherapy informed by Acceptance and Commitment Therapy (PACT): protocol for a randomised controlled trial of PACT versus usual physiotherapy care for adults with chronic low back pain[J]. *BMJ Open*, 2016, 6(6): e011548.
17. Gloster A T, Sonntag R, Hoyer J, et al. Treating Treatment-Resistant Patients with Panic Disorder and Agoraphobia Using Psychotherapy: A Rancized Controlled Switching Trial[J]. *Psychotherapy and Psychosomatics*, 2015, 84(2):100-109.
18. Mathew A, Doorenbos AZ, Jang MK, Hershberger PE. Acceptance and commitment therapy in adult cancer survivors: a systematic review and conceptual model. *J Cancer Surviv.* 2021;15(3):427-451.
19. Mathew A, Doorenbos AZ, Jang MK, Hershberger PE. Acceptance and commitment therapy in adult cancer survivors: a systematic review and conceptual model. *J Cancer Surviv.* 2021;15(3):427-451.
20. Wiklund T , Linton S J , Peter Alföldi, et al. Is sleep disturbance in patients with chronic pain affected by physical exercise or ACT-based stress management? – A randomized controlled study[J]. *Bmc Musculoskeletal Disorders*, 2018, 19(1):111.
21. Clarke S , Taylor G , Bolderston H , et al. Ameliorating Patient Stigma Amongst Staff Working With Personality Disorder: Randomized Controlled Trial of Self-Management Versus Skills Training[J]. *Behavioural and Cognitive Psychotherapy*, 2015, 43(06):692-704.
22. Masuda A, Hayes S C, Fletcher L B, et al. Impact of acceptance and commitment therapy versus education on stigma toward people with psychological disorders[J]. *Behaviour Research & Therapy*, 2007, 45(11):0-2772.
23. Clarke S , Taylor G , Bolderston H , et al. Ameliorating Patient Stigma Amongst Staff Working With Personality Disorder: Randomized Controlled Trial of Self-Management Versus Skills Training[J]. *Behavioural & Cognitive Psychotherapy*, 2015, 43(06):692-704.
24. Li T W , Fung P L , MatickaTyndale E , et al. Effects Of HIV stigma reduction interventions in diasporic communities: insights from the CHAMP study[J]. *AIDS Care*, 2017:1-7.
25. Ali EA, Khedr MA, Alabdullah AAS, Farghaly Abdelaliam SM, El-Ashry AM. Effect of acceptance and commitment therapy-based interventions on mental health and cognitive impairment for patients with advanced colorectal cancer. *Public Health Nurs.* 2024;41(4):745-759. doi:10.1111/phn.13333
26. Luoma JB, Hayes SC, Walser RD. Learning ACT: An Acceptance and Commitment Therapy Skills-Training Manual for Therapists. Oakland: New Harbinger; 2007
27. Stoddard JA, Afari N. The Big Book of ACT Metaphors. A Practitioner's Guide to Experiential Exercises & Metaphors in Acceptance and Commitment Therapy. Oakland, CA: NeHarbinger Publications; 2014.
28. S.A. Johns, P.V. Stutz, T.L. Talib, et al., Acceptance and commitment therapy for breast cancer survivors with fear of cancer recurrence: A 3-arm pilot randomized controlled trial, *Cancer* 126 (2020) 211–218.

29. Wells-Di Gregorio SM, Marks DR, DeCola J, et al. Pilot randomized controlled trial of a symptom cluster intervention in advanced cancer. *Psycho Oncol.* 2019;28(1):76–84.
30. Serfaty M, Armstrong M, Vickerstaff V, et al. Acceptance and commitment therapy for adults with advanced cancer (CanACT): a feasibility randomised controlled trial. *Psycho Oncol.* 2019;28(3):488–496.
31. Harris, R. (2019). ACT made simple: An easy-to-read primer on acceptance and commitment therapy (2nd ed.). New Harbinger Publications.
32. Fledderus M, Oude Voshaar MA, Ten Klooster PM, et al. Further evaluation of the psychometric properties of the Acceptance and Action Questionnaire-III[J]. *Psychol Assess*, 2012, 26(5):377-381.
33. Wright F E R . The Dimensionality of Stigma: A Comparison of Its Impact on the Self of Persons with HIV/AIDS and Cancer[J]. *Journal of Health and Social Behavior*, 2000, 41(1):50-67.
34. Pan AW, Chung L, Fife BL, Hsiung PC. Evaluation of the psychometrics of the Social Impact Scale: a measure of stigmatization. *Int J Rehabil Res.*2007;30(3):235-238.
35. Felton BJ, Revenson TA, Hinrichsen GA. Stress and coping in the explanation of psychological adjustment among chronically ill adults [J]. *Soc Sci Med* 1984; 18:10:889-898.
36. Wright F E R . The Dimensionality of Stigma: A Comparison of Its Impact on the Self of Persons with HIV/AIDS and Cancer[J]. *Journal of Health and Social Behavior*, 2000, 41(1):50-67.
37. Temple LK ,Bacik J ,Savatta SG, et al. The development of a validated instrument to evaluate bowel function after sphincter-preserving surgery for rectal cancer [J]. *Dis Colon Rectum* 2005 ,48:7:1353-1365.
38. Knowles G, Haigh R, McLean C, et al. Long term effect of surgery and radiotherapy for colorectal cancer on defecatory function and quality of life[J]. *Eur J Oncol Nurs* ,2013, 17:5:570-577.
39. Zotti P, Del BP, Serpentine S, et al. Validity and reliability of the MSKCC Bowel Function Instrument in a sample of Italian rectal cancer patients[J]. *Eur J Surg Oncol* ,2011 ,37 :7:589-596.
40. Ward W L, Hahn E A, Mo F, Hernandez L, Tulsy D S, Cella D. Reliability and validity of the Functional Assessment of Cancer Therapy-Colorectal (FACT-C) quality of life instrument.[J]. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation*,1999,8(3).
41. Hayes SC. Acceptance and commitment therapy—relational frame theory—and the third wave of behavioral and cognitive therapies [J]. *Behav Ther* 2004;35 (4): 639–665.
42. Hayes SC, Luoma JB, Bond FW, et al. Acceptance and commitment therapy: model, processes and outcomes[J]. *Behav Ther* 2006;44 (1): 1–25.
43. Hawkes AL, Pakenham KI, Chambers SK, Patrao TA, Courneya KS. Effects of a multiple health behavior change intervention for colorectal cancer survivors on psychosocial outcomes and quality of life: a randomized controlled trial. *Ann Behav Med.* 2014;48(3):359-370.
44. Qstergaard, Tom, Lundgren T , Zettle R , et al. Acceptance and Commitment Therapy preceded by an experimental Attention Bias Modification procedure in recurrent depression: study protocol for a

- randomized controlled trial[J]. *Trials*, 2018, 19(1):203.
45. West L M , Graham J R , Roemer L .Functioning in the face of racism: Preliminary findings on the buffering role of values clarification in a Black American sample[J].*Journal of Contextual Behavioral Science*, 2013, 2(1-2):1-8.
 46. Sri Suyanti T , Anna Keliat B , Catharina Daulima N H . Effect of logo-therapy, acceptance, commitment therapy, family psychoeducation on self-stigma, and depression on housewives living with HIV/AIDS[J]. *Enfermería Clínica*, 2018, 28:98-101.
 47. Lam D, Jones O. Changes to gastrointestinal function after surgery for colorectal cancer. *Best Pract Res Clin Gastroenterol*. 2020;48-49:101705. doi:10.1016/j.bpg.2020.101705
 48. Seow-En I, Chok AY, Matchar DB, Yoon S, Chong DQ, Tan EK. Long-term quality of life, sexual health and gastrointestinal function following colorectal cancer resection in an Asian cohort. *Colorectal Dis*. 2021;23(9):2348-2360. doi:10.1111/codi.15768
 49. Johns Shelley A,Stutz Patrick V,Talib Tasneem L,Cohee Andrea A,Beck-Coon Kathleen A,Brown Linda F,Wilhelm Laura R,Monahan Patrick O,LaPradd Michelle L,Champion Victoria L,Miller Kathy D,Giesler R Brian. Acceptance and commitment therapy for breast cancer survivors with fear of cancer recurrence: A 3-arm pilot randomized controlled trial.[J]. *Cancer*,2020,126.
 50. Rose Michael R,Norton Sam,Vari Chiara,Edwards Victoria,McCracken Lance,Graham Christopher D,Radunovic Aleksandar,Chalder Trudie. Acceptance and Commitment Therapy for Muscle Disease (ACTMus): protocol for a two-arm randomised controlled trial of a brief guided self-help ACT programme for improving quality of life in people with muscle diseases.[J]. *BMJ open*,2018,8(10).
 51. Rayner M , Muscara F , Dimovski A , et al. Take A Breath: study protocol for a randomized controlled trial of an online group intervention to reduce traumatic stress in parents of children with a life threatening illness or injury[J]. *Bmc Psychiatry*, 2016, 16(1):1-12.

Figures

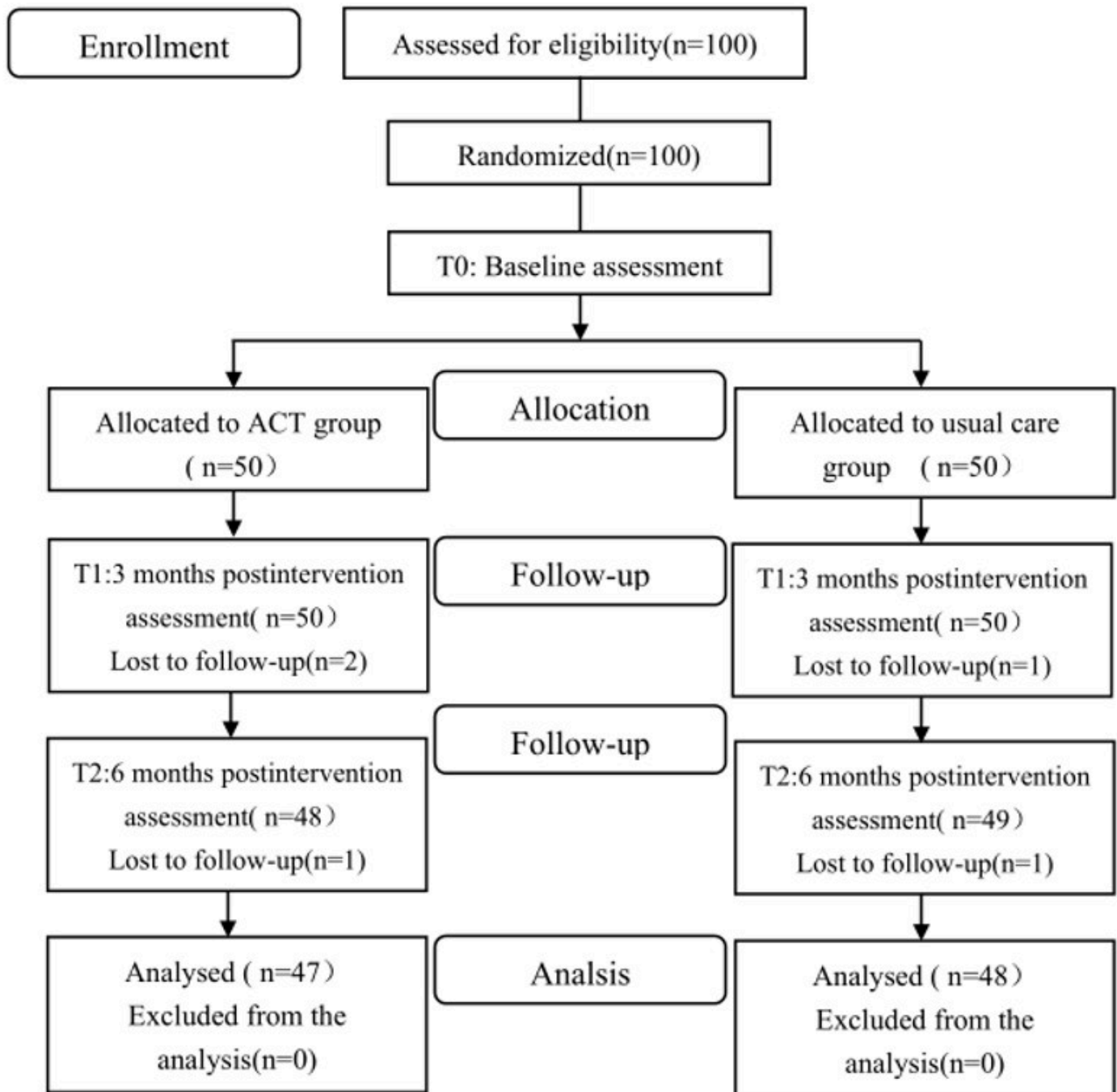


Figure 1

Flow diagram of this study

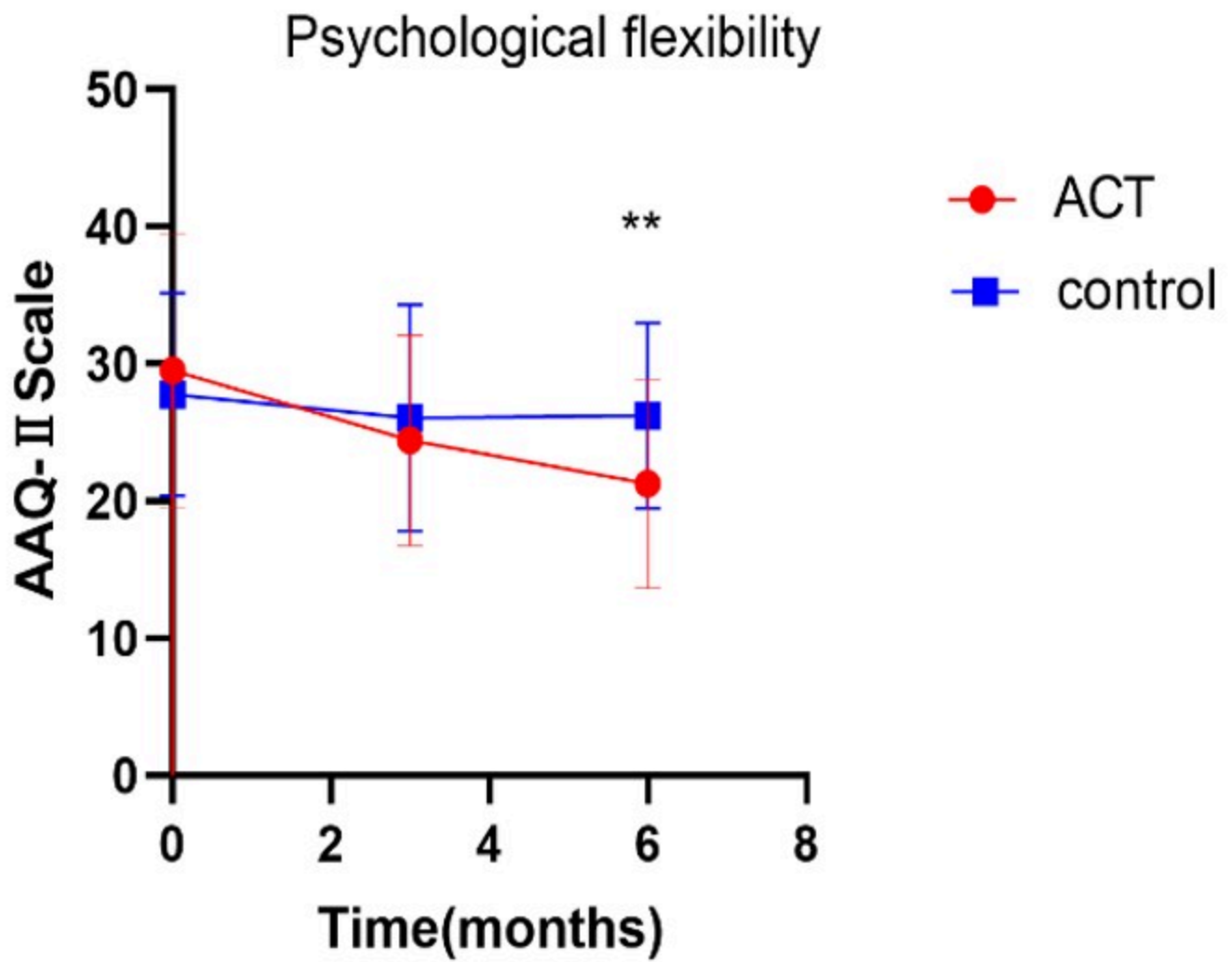


Figure 2

Changes in psychological flexibility scores

Stigma

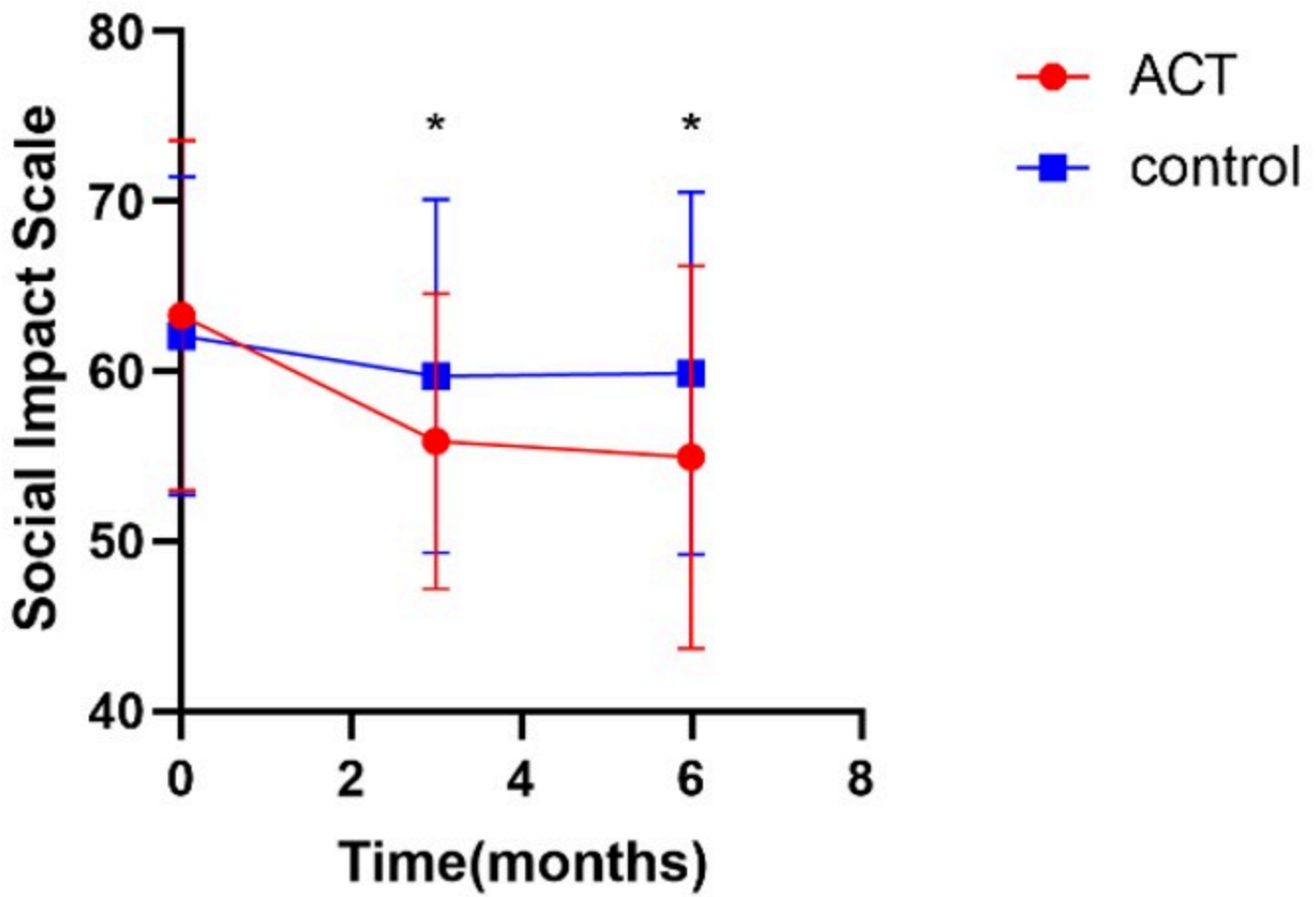


Figure 3

Changes in stigma scores

Illness Acceptance

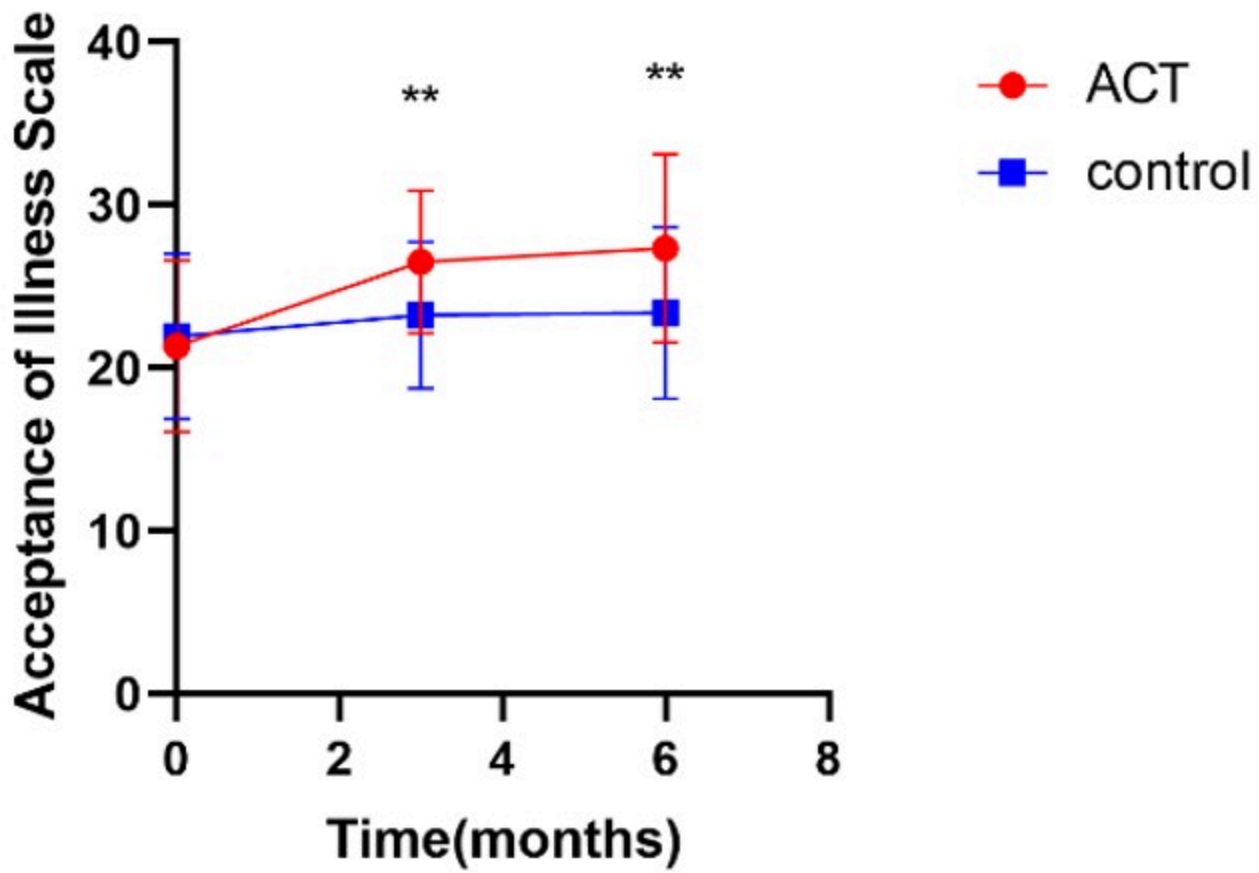


Figure 4

Changes in Acceptance scores

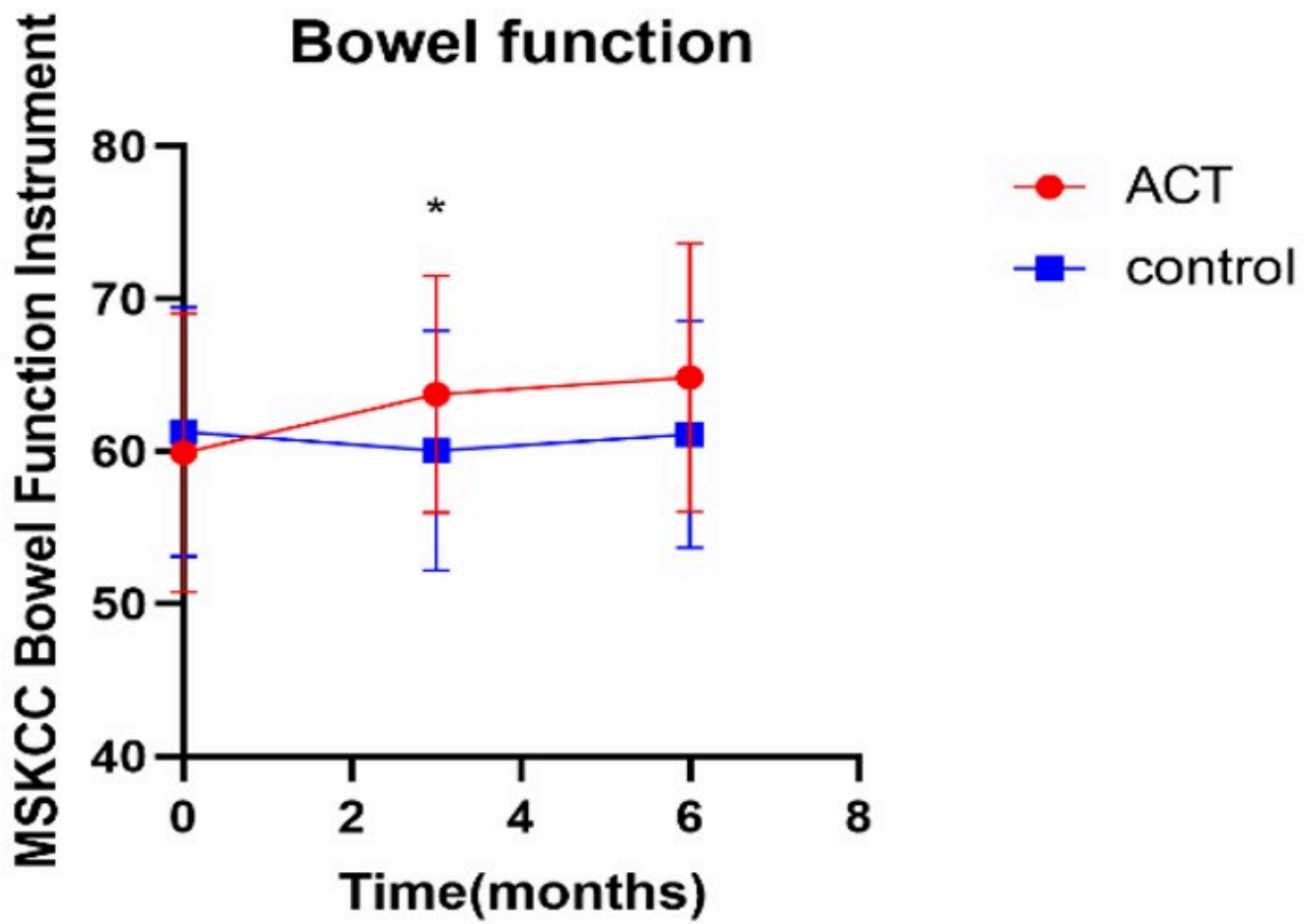


Figure 5

Changes in Bowel function scores

Quality of life

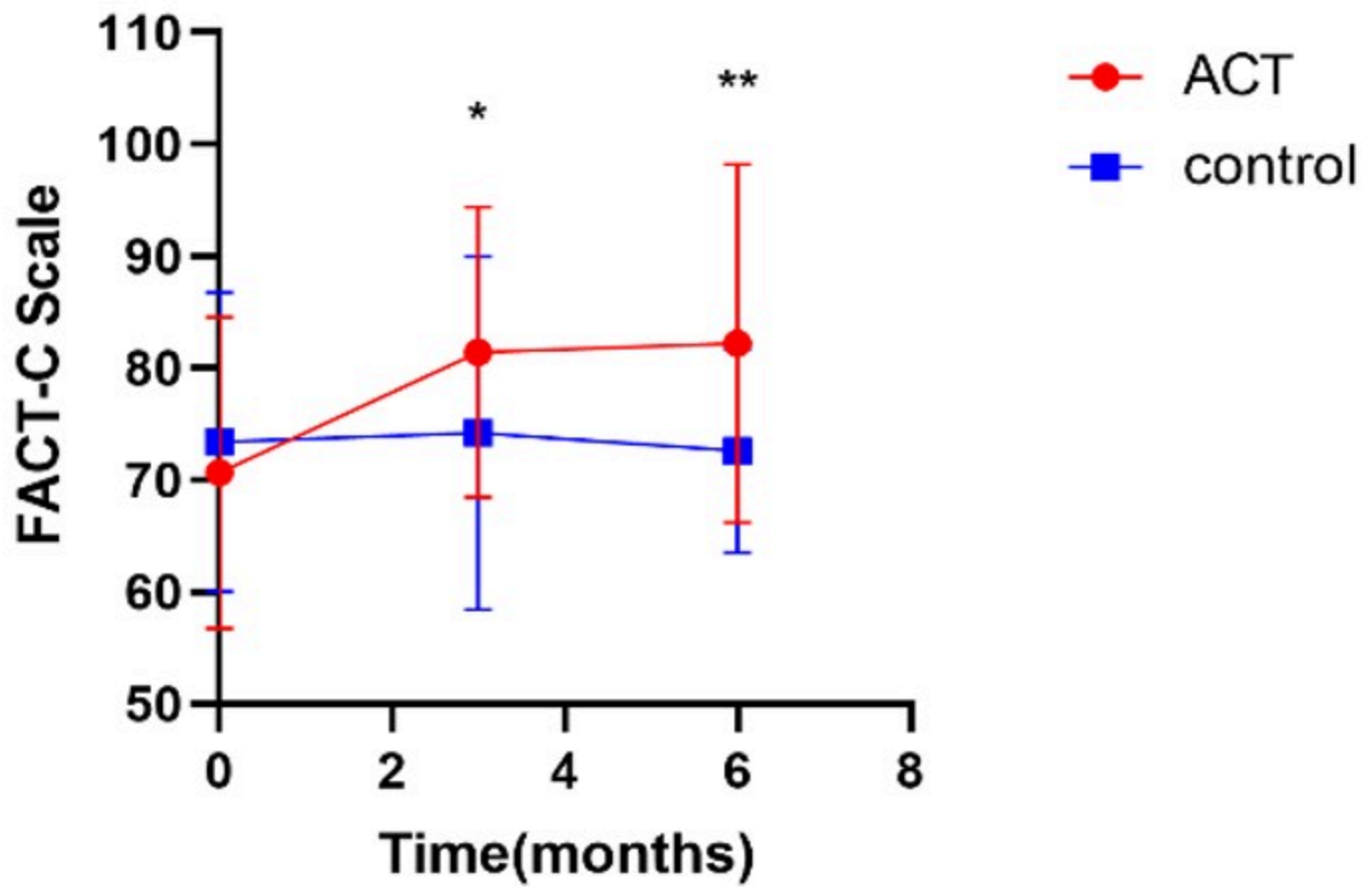


Figure 6

Changes in quality of life scores