

Article

Effect of psychological intervention on tumor patients during rehabilitation

Zhenyan Chen¹, Shujian Nie², Qianyin Pan³, Lan Bei⁴, Dezheng Yan⁵, Quanchen Peng^{1,5,*}, Jun Deng^{6,*}¹ Rehabilitation Medicine Department, The Third People's Hospital of Hubei Province Affiliated to Jiangnan University, Wuhan 430033, Hubei Province, China² Rehabilitation Medicine Department of the Third People's Hospital of Hubei Province, Wuhan 430033, Hubei Province, China³ Human resource Department of the Third People's Hospital of Hubei Province, Wuhan 430033, Hubei Province, China⁴ Publicity Department of the Third People's Hospital of Hubei Province, Wuhan 430033, Hubei Province, China⁵ Rehabilitation Department, Hubei Provincial Government Hospital, Wuhan 430033, Hubei Province, China⁶ Emergency Department, The Third People's Hospital of Hubei Province Affiliated to Jiangnan University, Wuhan 430033, Hubei Province, China* Corresponding author: Quanchen Peng, vwab604@163.com; Jun Deng, 15971446644@163.com

CITATION

Chen Z, Nie S, Pan Q, et al. Effect of psychological intervention on tumor patients during rehabilitation. *Psycho-Oncologie*. 2025; 19(4): 3674.
<https://doi.org/10.18282/po3674>

ARTICLE INFO

Received: 26 August 2025

Revised: 8 November 2025

Accepted: 20 November 2025

Available online: 23 December 2025

COPYRIGHT



Copyright © 2025 by author(s).

Psycho-Oncologie is published by PiscoMed Publishing Pte. Ltd. This work is licensed under the Creative Commons Attribution (CC BY) license.

<https://creativecommons.org/licenses/by/4.0/>

Abstract: Background: The study aims to observe the impact of psychological intervention on the psychological resilience, coping strategies, and quality of life of cancer patients during their rehabilitation period, in order to provide scientific reference for the nursing of many cancer patients in clinical practice and improve the overall benefit level of patients. **Aim:** To observe the influence of psychological intervention on resilience, coping style and quality of life of 100 tumor patients (50 in the control group and 50 in the study group, with a mean age of 38.15 ± 3.15 years in the control group and 38.32 ± 3.21 years in the study group) during rehabilitation, so as to provide scientific reference for the nursing of many tumor patients and improve the overall benefit level of patients. **Methods:** 100 tumor patients who were admitted to our hospital from January 2022 to December 2023 were randomly divided into two groups. 50 patients in the control group were treated with conventional nursing mode, and 50 patients in the research group were given psychological intervention. The patients' fear of recurrence [Fear of Progression Questionnaire-Short Form (FoP-Q-SF)], quality of life [European Organization for Research and Treatment of Cancer (EORTC QOL-C30)], psychological resilience [Connor-Davidson resilience scale (CD-RISC)], medical coping style [Medical Coping Modes Questionnaire (MCMQ)], self-perceived burden [Self-perceived burden Scale (SPBS)], and post-traumatic stress status [The PTSD Checklist-17 (PCL-17)] were compared between the two groups. **Results:** After the intervention, the scores of FoP-Q-SF and PCL-17 in both groups decreased, and the scores in the research group were lower than those in the control group, with statistical significance ($P < 0.05$); After the intervention, the scores of EORTC QOL-C30 and CD-RISC in the two groups increased, and the scores in the research group were higher than those in the control group, with statistical significance ($P < 0.05$); After the intervention, the scores of coping dimension in MCMQ scale in the two groups increased, while the scores of avoidance and yield dimensions decreased before the intervention ($P < 0.05$), and the scores of coping dimension in the research group were higher than those in the control group, while the scores of avoidance and yield dimensions were lower than those in the control group, with statistical significance ($P < 0.05$); After the intervention, the self-perceived burden of the research group was better than that of the control group, and the difference was statistically significant ($P < 0.05$). **Conclusion:** Choosing a psychological intervention model during the rehabilitation of oncology patients facilitates the reduction of patients' fear of relapse, improves quality of life, improves psychological resilience, helps patients to establish a positive mode of coping with the disease, reduces the burden of self-feeling, and relieves patients' post-traumatic stress, and it is recommended that a large-scale psychological intervention model be encouraged among clinical oncology patients with a view to increasing

the overall level of benefit for the patients and improving the quality of life during the survivorship period.

Keywords: psychological intervention; cancer rehabilitation; resilience; coping style; quality of life; post-traumatic stress

1. Introduction

According to relevant reports [1], the number of new cancer cases and the number of cancer deaths in China are among the highest in the world. Cancer is a strong life stress event for patients. In addition to the clinical discomfort symptom clusters brought by the disease and its related treatment, these symptom clusters will have a coordinating effect on patients themselves, resulting in significant decline in their functional status and quality of life, and shortened survival time. In addition, patients often face physical discomfort, response to treatment, and a poor prognosis during hospitalization, and these factors may contribute to the prevalence of mental health problems such as depression, anxiety, and fear. Studies have shown that oncology patients are prone to higher psychological burdens due to the physical discomfort and uncertainty of the disease and treatment process. Psychological stress not only exacerbates patients' suffering, but also affects their immune function, which in turn negatively affects treatment outcomes. Therefore, the existence of depression, anxiety and other emotional problems not only seriously affects the psychological health of patients, but also significantly reduces the quality of life of patients and their families. In the past, clinical treatment for such cancer patients was mainly focused on physical symptoms, ignoring multi-dimensional psychological symptom analysis. However, as a persistent source of negative psychological stress, cancer will cause many adverse reactions during the treatment and rehabilitation, aggravating the negative emotions of patients and seriously affecting their disease recovery. Therefore, it is considered that compared with the physiological symptom group, the symptom management of the psychological symptom group is equally important, and positive psychological symptoms are an important guarantee for recovery of the physiological symptom group [2,3]. Psychological intervention aims to comprehensively evaluate the psychological state and actual needs of patients, develop personalized nursing intervention plans, help patients alleviate negative emotions, and enhance their psychological adaptability. This intervention measure can effectively support the treatment process of patients, improve their emotional state, promote the smooth progress of clinical treatment, and improve the overall health status of patients. In the past, patients with malignant diseases such as breast cancer and cervical cancer have achieved satisfactory results through timely psychological intervention [4,5]. Psychological intervention is a comprehensive psychological care measure aimed at helping cancer patients cope with the psychological stress caused by the disease and the treatment process. Common psychological interventions include Cognitive Behavioral Therapy (CBT), Positive Thought Meditation, psychological counselling and so on. Cognitive Behavioral Therapy (CBT) mainly helps patients identify and change negative thinking patterns, and reduce anxiety and depression symptoms through emotion regulation and Behavioral changes. Positive thinking meditation helps patients focus on the present moment, reduce stress, and improve psychological

resilience. Counselling helps patients express their emotions and adjust their mindset through communication and support, so that they can better cope with the challenges of treatment. Intervention is usually provided by professional psychologists, clinical psychologists, or trained nurses. Caregivers conduct regular psychological assessments and provide emotional support and guidance through daily contact with patients. The intervention process usually starts with an assessment of the patient's emotional state and needs, and a personalized intervention program is designed based on the assessment results, with regular follow-up and adjustments. By reducing negative emotions and enhancing patients' psychological adaptability, psychological intervention not only helps patients' emotional stability, but also effectively improves their treatment adherence and quality of life, thus playing an important role in the process of tumor treatment and rehabilitation. However, there are few studies related to the effect analysis of psychological intervention for tumor patients. In view of this, this study focused on observing the effects of psychological intervention on the psychological resilience, coping styles, and quality of life of tumor patients during rehabilitation, in order to provide scientific reference for the care of many patients with cancer diseases in clinic and improve the overall benefit level of patients.

2. Materials and methods

2.1. General data

This study was a single-center, randomized controlled nursing intervention study. After obtaining the consent of the Medical Ethics Committee of our hospital, 100 cases of tumor patients admitted to our hospital during the period from January 2022 to December 2023 were selected and divided into two groups by the random number table method, Randomization was performed using a random number table, and group allocation was completed by an independent nurse not involved in outcome assessment. 50 cases in the control group, of which 27 cases were male and 23 cases were female; their ages were 25–55 years old, with an average of (38.15 ± 3.15) years old; and the nature of the tumor was: benign in 20 cases and malignant in 30 cases. In the study group, there were 50 cases, including 25 males and 25 females, aged 23–58 years old, with an average of (38.32 ± 3.21) years old; the nature of the tumor was benign in 18 cases and malignant in 32 cases. Comparison of the above data between the two groups of patients was balanced and ideal ($P > 0.05$), and the two groups of patients were comparable. (Table 1)

Table 1. Comparison of two basic bata groups.

Indicator	Control group (n = 50)	Study group (n = 50)	P
Male	27	25	0.756
Female	23	25	0.756
Age range	25–55 years	23–58 years	
Mean range ($\pm$ SD)	38.15 ± 3.15	38.32 ± 3.21	0.812
Benign tumors	20	18	0.726
Malignant tumors	30	32	0.742

Note: Categorical variables were compared using the chi-square test, and continuous variables were compared using independent samples *t*-test.

Inclusion criteria: ① All tumor patients are confirmed by pathological tissues; ② all the patients successfully underwent tumor-related surgery, chemoradiotherapy and other therapeutic interventions in our hospital; ③ the enrolled subjects and their families knew the research contents and signed consent forms voluntarily before they were enrolled; ④ the estimated survival time was more than one year.

Exclusion criteria: ① Patients with metastasis of malignant tumor in other parts of the body; ② poor adherence, unable to complete the requirements of the study, poor adherence refers to those patients who are unable to complete the treatment or research tasks as required, the assessment criteria include the degree of compliance with the treatment, the rate of participation, and participation in the study such as filling out questionnaires; ③ with mental illness, unable to understand or cooperate with the study; with serious cardiovascular or cerebral dysfunction; ④ during the study period, ECOG score ≥ 4 , patients who cannot take care of themselves. Patients with ECOG score ≥ 4 , unable to take care of themselves ECOG score (Eastern Cooperative Oncology Group) is used to assess the patients' physical status and ability to perform daily life, and a score of ≥ 4 usually indicates that the patients' quality of life is severely limited and unable to take care of himself/herself, which may affect the conduct of the study and the participation of the patients, and thus was excluded.

3. Methods

Conventional nursing in the control group: Conducting routine nursing care: this includes instructing patients on reasonable diet, exercise guidance, medication guidance, etc., to ensure that patients can receive basic physiological support and health management during treatment. During this process, the care received by the patient mainly focuses on physiological care and does not include systematic psychological support. In routine care, the main task of the nursing staff is to provide basic health guidance and support without involving targeted psychological interventions.

Psychological intervention in the research group: Psychological intervention: ① Formation of a psychological intervention team: the team consisted of a psychiatrist, the head nurse, and three charge nurses. All team members received professional psychological intervention training before joining the team and passed the assessment before starting work to ensure that they had the necessary knowledge and skills to implement psychological intervention. The training included cognitive-behavioral therapy, relaxation therapy, imaginative dialogue therapy and other psychological intervention techniques. ② Health education: team members explained to patients and their families about oncological diseases, helping them to correctly understand the nature of the disease and improve patients' compliance with treatment. Through the distribution of publicity materials and follow-up manuals, patients and their families were instructed on how to use these materials so that the patients could keep abreast of the changes in their bodies. In response to the patients' level of disease cognition, the team members provide personalized health education to help them gain a deeper understanding of disease management and correct erroneous disease cognition. ③ Psychological assessment: Psychologists from the Department of Psychiatry will conduct regular psychological assessment of the patients to detect psychological

problems and take intervention measures in a timely manner. In addition, the team members will pay close attention to the patients' psychological status, listen patiently and answer their questions to help them build up confidence and maintain an optimistic state of mind, so as to promote the recovery of the disease. ④ Relaxation therapy: Provide patients with a comfortable and quiet environment for whole-body relaxation training (2 times a day, 10 min each time), including whole-body muscle segmentation relaxation training, deep breathing training, and so on. During the training process, light music is played to help patients relax, relieve anxiety and tension, and enhance patients' immune function. ⑤ Imagery dialogue therapy: on the basis of relaxation training, patients enter a state of relaxation through deep breathing and engage in imagery dialogue, such as imagining calm scenes or positive situations, to help patients eliminate their inner fear and anxiety. For patients with more serious emotional disorders, positive imagery guidance is adopted to change their emotions, while impedance treatment is carried out to promote their psychological recovery and disease rehabilitation. These interventions help to improve patients' psychological resilience, coping ability and quality of life, and the professional training of psychology and nursing staff ensures the effectiveness of the interventions. Through this comprehensive intervention, patients were able to better understand the disease, maintain a positive mindset, increase compliance with treatment, and ultimately promote physical recovery. (Figure 1)

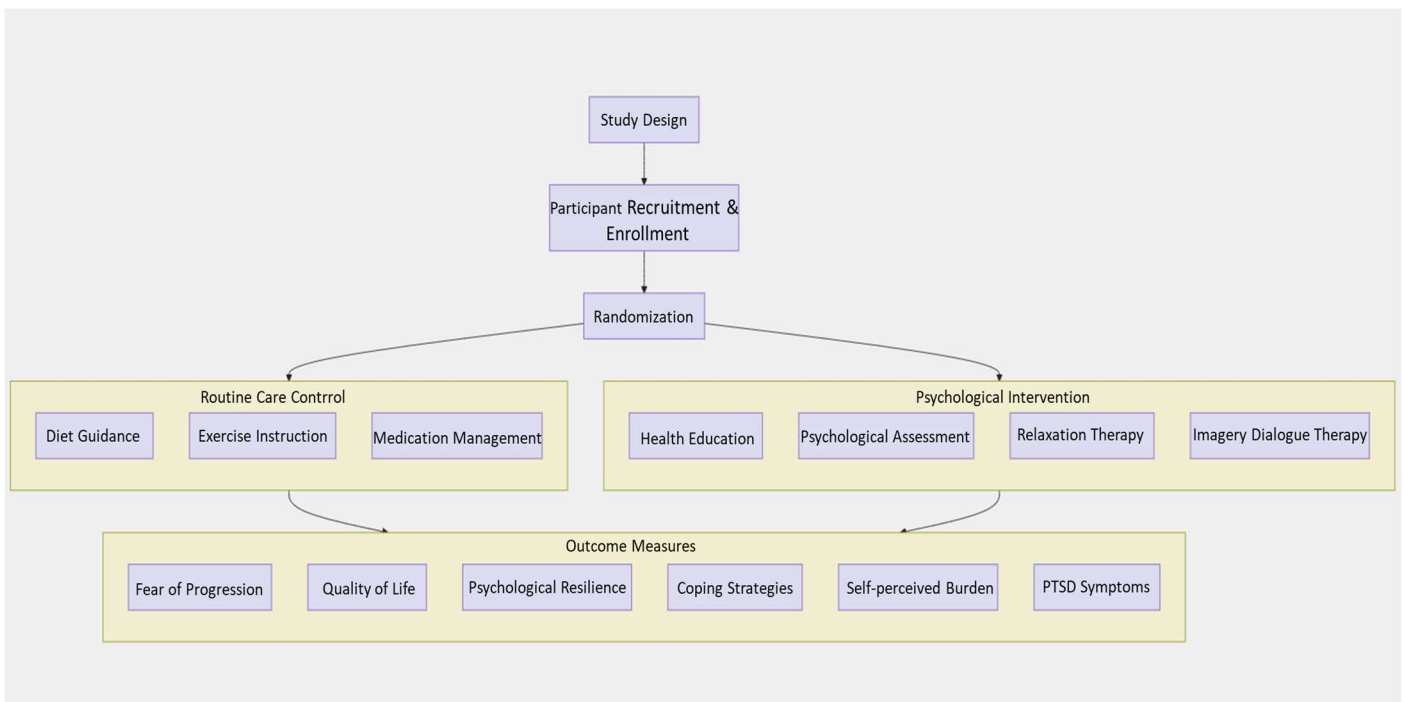


Figure 1. Flowchart of the study design and intervention process.

3.1. Outcome indicators

(1) Fear of recurrence: The Fear of Progression Questionnaire-Short Form (FoP-Q-SF) [6] was used for evaluation. The FoP-Q-SF scale included social family and physical health, with a total score of 6–30. The score is directly proportional to the degree of patients' fear of disease recurrence. According to previous validation

studies, the FoP-Q-SF was analyzed across social/family and physical health dimensions.

(2) Quality of life: The European Organization for Research and Treatment of Cancer (EORTC QOL-C30) [7] was used for evaluation. The scale included the overall health status, quality of life sub-scale, role and cognitive function, society, emotion and body. A 5-level scoring method was used with full scores of 100. The score is directly proportional to the quality of life. All EORTC QOL-C30 domain scores were linearly transformed to a 0–100 scale according to the EORTC scoring manual, with higher scores indicating better quality of life.

(3) Psychological resilience: The Connor-Davidson resilience scale (CD-RISC) [8] was used for evaluation. The scale included 25 items with three dimensions of optimism, self-improvement and resilience, and each item was assigned based on 0–4 score. The score is directly proportional to the degree of psychological resilience of patients.

(4) Medical coping style: Medical Coping Modes Questionnaire (MCMQ) [9] was used for evaluation. The MCMQ questionnaire included eight facing items, seven avoiding items and five yielding items, all of which were based on the 1–4 score system. The higher the total score of each scale was, the more inclined the patient to choose this kind of coping style.

(5) Self-perceived burden: Self-perceived burden Scale (SPBS) [10] was used for evaluation. The SPBS scale included 10 items of emotional, physical and economic dimensions. According to the 1–5 score system for each item, SPBS < 20 scores meant no significant burden, 20–29 scores meant mild burden, 30–39 scores meant moderate burden and ≥ 40 scores meant severe burden.

(6) Post-traumatic stress state: The PTSD Checklist-17 (PCL-17) [11] was used for evaluation. The PCL-17 scale included three dimensions of persistent numbness and avoidance, repeated trauma experience and high alertness, with a total of 17 items. The higher score indicated the more severe stress state of patients.

3.2. Statistical methods

SPSS24.0 was used to process the data. Measurement data is expressed as mean $\pm$ standard deviation ($\bar{x} \pm s$), count data is expressed as frequency and percentage, and intra group comparison is performed using t-test and chi square test (χ^2). All data have undergone normality testing, and data that conforms to a normal distribution are subjected to parameter testing. All statistical tests were conducted using a two-sided test, with $P < 0.05$ indicating statistically significant differences. For ordinal categorical variables, rank-sum tests were used for between-group comparisons.

4. Results

4.1. Basic information of participants

After obtaining the consent of the Medical Ethics Committee of our hospital, 100 tumor patients admitted to our hospital from January 2022 to December 2023 were selected and divided into two groups by random number table method, 50 cases in the control group, including 27 males and 23 females; Age ranged from 25 to 55 years,

with an average of (38.15 ± 3.15) years; Tumor nature: benign in 20 cases, malignant in 30 cases. 50 cases in the research group, including 25 males and 25 females; Age ranged from 23 to 58 years, with an average of (38.32 ± 3.21) years; Tumor nature: benign in 18 cases, malignant in 32 cases. The comparison of the above data between the two groups was ideally balanced ($P > 0.05$), and the study could be conducted.

4.2. Fear of recurrence

There was no significant difference in social family and physical health scores in the FoP-Q-SF scale between the two groups before intervention ($P > 0.05$). After intervention, the social family and physical health scores in the FoP-Q-SF of the two groups were all decreased, and the social family and physical health scores in the research group were all lower than those in the control group, with a statistically significant difference ($P < 0.05$) (Table 2).

Table 2. Comparison of recurrence fear (FoP-Q-SF) ($\pm$ s, score).

Group	Social family				Physical health			
	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>
Control group (n = 50)	23.45 $\pm$ 1.26	16.12 $\pm$ 2.43	18.935	<0.001	21.02 $\pm$ 2.61	17.09 $\pm$ 3.15	6.793	<0.001
Research group (n = 50)	23.48 $\pm$ 1.29	13.85 $\pm$ 2.30	25.822	<0.001	21.95 $\pm$ 2.57	15.30 $\pm$ 3.05	11.790	<0.001
<i>t</i>	0.118	4.797			1.795	2.887		
<i>P</i>	0.907	<0.001			0.076	0.005		

4.3. Quality of life

There was no significant difference in physical function, role function, social function, emotional function, cognitive function and total health status between the two groups before intervention ($P > 0.05$). After intervention, the scores of physical function, role function, social function, emotional function, cognitive function and total health status were increased in the two groups, and the scores of the above indicators in the research group were higher than those in the control group, with a statistically significant difference ($P < 0.05$) (Table 3).

Table 3. Comparison of quality of life (EORTC QOL-C30) ($\bar{x} \pm s$, score).

Group	Physical function				Role function				Social function			
	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>
Control group (n = 50)	60.15 $\pm$ 3.55	85.15 $\pm$ 6.85	22.913	<0.001	50.25 $\pm$ 2.15	70.12 $\pm$ 2.50	42.611	<0.001	53.12 $\pm$ 2.05	72.15 $\pm$ 3.20	35.408	<0.001
Research group (n = 50)	60.12 $\pm$ 3.52	92.15 $\pm$ 3.05	48.628	<0.001	50.23 $\pm$ 2.13	89.50 $\pm$ 6.01	43.549	<0.001	53.10 $\pm$ 2.03	80.25 $\pm$ 4.15	41.555	<0.001

Table 4. (Continued).

Physical function					Role function				Social function			
<i>t</i>	0.042	6.601			0.047	21.053			0.049	10.930		
<i>P</i>	0.966	<0.001			0.963	<0.001			0.961	<0.001		
Emotional function					Cognitive function				Total health status			
Group	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>
Control group (n = 50)	45.25 ± 3.50	72.45 ± 5.50	29.503	<0.001	43.15 ± 2.45	74.15 ± 4.85	40.342	<0.001	52.12 ± 3.20	74.15 ± 4.25	29.281	<0.001
Research group (n = 50)	45.23 ± 3.42	85.15 ± 3.15	60.710	<0.001	43.10 ± 2.40	82.15 ± 3.20	69.031	<0.001	52.10 ± 3.16	80.02 ± 5.25	32.219	<0.001
<i>t</i>	0.029	14.169			0.103	9.376			0.031	6.145		
<i>P</i>	0.977	<0.001			0.918	<0.001			0.975	<0.001		

4.4. Psychological resilience

Before the intervention, there was no significant difference in the scores of CD-RISC scale between the two groups ($P > 0.05$). The scores of the two groups after intervention were higher than those before intervention ($P < 0.05$). The CD-RISC score of the research group was higher than that of the control group, and the difference was statistically significant ($P < 0.05$) (Table 4).

Table 5. Comparison of psychological resilience (CD-RISC) ($\pm$ s, score).

Group	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>
Control group (n = 50)	31.05 ± 2.58	61.25 ± 6.12	32.153	<0.001
Research group (n = 50)	31.01 ± 2.55	85.52 ± 7.50	48.657	<0.001
<i>t</i>	0.078	17.729		
<i>P</i>	0.938	<0.001		

4.5. Medical coping style

There was no significant difference in coping, avoidance and yield scores between the two groups in the MCMQ scale before intervention ($P < 0.05$). After intervention, the coping dimension scores of the two groups were increased, while the avoidance and yield dimension scores were decreased after intervention ($P < 0.05$). The coping scores of the research group were higher than those of the control group, and the avoidance and yield dimension scores were lower than those of the control group, with a statistically significant difference ($P < 0.05$) (Table 5).

Table 5. Comparison of medical coping styles (MCMQ) ($\bar{x} \pm s$, score).

Coping					Avoidance				Yield			
Group	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>	Pre-intervention	Post-intervention	<i>t</i>	<i>p</i>
Control group (n = 50)	15.10 ± 1.55	17.52 ± 2.52	5.784	<0.001	16.45 ± 2.61	15.10 ± 1.55	3.145	0.002	13.32 ± 1.70	12.20 ± 1.58	3.412	0.001

Table 5. (Continued).

	Coping				Avoidance				Yield			
Research group (n = 50)	15.11 ± 1.56	19.82 ± 3.52	8.650	<0.001	16.42 ± 2.58	14.02 ± 1.32	5.856	<0.001	13.30 ± 1.62	11.21 ± 1.42	6.860	<0.001
<i>t</i>	0.032	3.757			0.058	3.751			0.060	3.295		
<i>P</i>	0.974	<0.001			0.954	<0.001			0.952	0.001		

4.6. Self-perceived burden

Before intervention, there was no significant difference in the self-perceived burden between the two groups ($P < 0.05$). After intervention, the status of self-perceived burden of the research group was superior to that in the control group, and the difference was statistically significant ($P < 0.05$) (Table 6).

Table 6. Comparison of self-perceived burden (SPBS) n (%).

	Pre-intervention				Post-intervention			
Group	No obvious burden	Mild	Moderate	Severe	No obvious burden	Mild	Moderate	Severe
Control group (n = 50)	2(4.00)	6(12.00)	10(20.00)	32(64.00)	5(10.00)	10(20.00)	16(32.00)	19(38.00)
Research group (n = 50)	2(4.00)	5(10.00)	9(18.00)	34(68.00)	10(20.00)	20(40.00)	18(36.00)	2(4.00)
<i>Z</i>	0.411				3.807			
<i>P</i>	0.681				<0.001			

4.7. Post-traumatic stress status

There was no significant difference in the comparison of trauma repeat experience, persistent numbness and avoidance, and high vigilance in the PCL-17 scale of the two groups before intervention ($P > 0.05$). After intervention, the scores of trauma repeated experience, persistent numbness and avoidance as well as high vigilance in the PCL-17 scale of the two groups were decreased ($P < 0.05$). Besides, the scores of trauma repeated experience, persistent numbness and avoidance as well as high vigilance in the research group were lower than those in the control group, and the differences were statistically significant ($P < 0.05$) (Table 7).

Table 7. Comparison of post-traumatic stress status (PCL-17) ($\bar{X} \pm s$, score).

	Trauma repeat experience				Persistent numbness and avoidance				High vigilance			
Group	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>
Control group (n = 50)	17.92 ± 2.14	14.15 ± 1.78	9.577	<0.001	24.58 ± 2.22	19.45 ± 3.52	8.717	<0.001	18.53 ± 2.13	12.60 ± 1.86	14.828	<0.001
Research group (n = 50)	17.90 ± 2.10	12.60 ± 1.62	14.130	<0.001	24.55 ± 2.20	17.15 ± 2.58	15.433	<0.001	18.55 ± 2.15	10.05 ± 1.52	22.827	<0.001

Table 7. (Continued).

	Trauma repeat experience		Persistent numbness and avoidance		High vigilance	
<i>t</i>	0.047	4.554	0.068	3.727	0.047	7.507
<i>P</i>	0.963	<0.001	0.946	<0.001	0.963	<0.001

5. Discussion

The relatively marked improvement in quality-of-life scores observed in the intervention group may be attributed to the intensive, structured psychological intervention and the relatively young mean age of the participants, which may have enhanced psychological adaptability during rehabilitation. The emergence of psychological oncology reflects the progress of modern oncology and the attention paid to the spiritual and social attributes of tumor patients, which makes the clinical nursing and treatment of tumor more perfect, and ultimately improves the quality of life and overall health level of patients, and promotes the development of modern holistic medicine. The conventional nursing model involves the intervention and nursing of clinical symptoms and existing problems, only to improve the general condition of patients. However, the psychological problems caused by the disease itself and the surrounding environment have not been effectively solved [12–14]. Therefore, in addition to actively improving the general situation of tumor patients, psychological intervention is particularly important. The results of this study showed that after intervention, compared with the control group, the social family, physical health, avoidance and yield dimensions, trauma repeat experience, persistent numbness and avoidance, and high vigilance scores in the research group were lower, and the burden of self-perceived was reduced. The physical function, role function, social function, emotional function, cognitive function and total health status in the EORTC QOL-C30 scale, as well as the scores of CD-RISC scale and coping dimension in the MCMQ scale were higher in the research group, suggesting that psychological intervention could effectively improve the psychological resilience and quality of life of tumor patients, reduce the burden of self-perceived, fear of recurrence, and relieve stress state. The reasons were analyzed as follows: ① According to cognitive psychology, human cognition directly affects patients' emotions. The team members strengthened patients' disease cognition and corrected wrong disease cognition by issuing health education publicity manual and other means, helped patients to understand in a positive way and establish healthy disease cognition, and then adopted positive coping styles and cooperated with treatment and training [15–17]. ② Strengthen communication among patients, share coping skills, improve patients' coping skills, and reduce the negative impact of patients' psychological resilience due to lack of coping experience, so that they have enough sense of strength when facing with the disease, which in turn helps patients to actively face challenges and improve confidence in diagnosis and treatment; Encouraging patients to express their inner thoughts and troubles and confide in their psychological experience was beneficial for patients to vent their bad emotions, and positively significant for reducing patients' self-perceived burden [18–20]. ③ To guide family members and patients to adopt more sympathetic expression, improve their emotional support, discuss more topics of interest with patients, and provide an emotional

evacuation environment for patients. In addition, a good family atmosphere can provide patients with space for emotional expression and feelings, which is conducive to reducing patients' fear of relapse and improving the quality of life during the survival period [21–23]. ④ The team members can eliminate the negative emotions through establishing good communication doctor-patient relationship with the patients and active communication, and at the same time guide the patients to face the disease correctly and actively and enhance the confidence to overcome the disease, which is particularly necessary to alleviate the stress state of patients after trauma [24–26]. ⑤ Deep breathing, relaxation therapy, and segmental muscle relaxation training are adopted to help patients to relieve stress, maintain a pleasant mood at all times, improve the quality of life, and reduce the fear of relapse [27–29]. ⑥ Theme content of imagery is set according to different questions. By inducing patients to use positive imagery, the patient can be helped to dredge negative emotions while developing correct coping and behavior styles, promoting the regulation of neuroendocrine system, affecting the synthesis and secretion of related hormones of the body, and helping patients to improve immune function and enhance resistance. This is particularly crucial for patients to establish positive coping styles and relieve post-traumatic stress [30–32]. These results are directly and closely related to the measures used in psychological interventions. First, cognitive psychology suggests that the way patients perceive themselves directly affects their emotions and behavior. Through health education, the intervention team helped patients to understand the disease correctly, correct misunderstandings and cope positively, which promoted their psychological adaptability and reduced the fear of relapse. Secondly, the psychological intervention reduced negative psychological resilience due to lack of coping skills by encouraging patients to share their coping experiences and emotions, and enhanced their confidence and sense of strength in facing the disease. Meanwhile, effective communication with family members also provided patients with the necessary emotional support to reduce anxiety and post-traumatic stress. Relaxation therapy and imagery dialogue therapy, on the other hand, relieved patients' tension and improved immune function through physiological and psychological adjustment mechanisms, further enhancing patients' quality of life and disease resistance. Deep breathing and relaxation training help patients maintain a relaxed state, reduce psychological burden and promote positive coping. Imagery therapy, on the other hand, helped patients improve their emotional and psychological coping styles through the guidance of positive contexts, and enhanced psychological resilience and immunity. Psychological interventions effectively improved patients' psychological resilience and quality of life by improving their emotions, cognition and behaviors, and reduced the fear of relapse and post-traumatic stress.

Compared with previous studies, this study simultaneously evaluated psychological resilience, coping styles, self-perceived burden, fear of recurrence, and post-traumatic stress symptoms in tumor patients during rehabilitation, providing a more comprehensive psychological profile and practical evidence for nursing-led psychological interventions.

6. Conclusion

Psychological intervention during tumor rehabilitation can effectively reduce fear of recurrence, enhance psychological resilience, improve quality of life, promote positive coping styles, and alleviate self-perceived burden and post-traumatic stress symptoms. This intervention model is worthy of wider clinical application.

Author contributions: Conceptualization, ZC and QP (Quanchen Peng); methodology, ZC; software, SN; validation, ZC, DY and JD; formal analysis, SN and QP (Qianyin Pan); investigation, QP (Qianyin Pan) and LB; resources, QP (Quanchen Peng); data curation, QP (Qianyin Pan); writing—original draft preparation, SN, QP (Qianyin Pan) and LB; writing—review and editing, DY and JD; visualization, LB; supervision, QP (Quanchen Peng) and JD; project administration, QP (Quanchen Peng); funding acquisition, DY. All authors have read and agreed to the published version of the manuscript.

Ethics approval: The procedures for both T1 and T2 surveys adhered to the (i) Declaration of Helsinki, and (ii) ethical principles for medical, psychological, and sociological research involving human participants. The Medical Ethics Committee of the Third People's Hospital of Hubei Province, affiliated with Jiangnan University, approved the research plan. All participants: signed the informed consent in this study.

Availability of data and materials: No additional data are available.

Acknowledgments: The authors are grateful to Dr. Quan-Chen Pen for her help with the preparation of figures in this paper.

Conflict of interest: The authors declare that they have no conflict of interest to report regarding the present study.

References

1. Johnson KJ, Bauchet L, Francis SS, et al. Pediatric brain tumors: Origins, epidemiology, and classification-The 2022 Brain Tumor Epidemiology Consortium meeting report. *Clinical Neuropathology*. 2023; 42(2): 74. doi: 10.5414/NP301520
2. Roshanov PS, Khanna R. Continuation of Tumor Necrosis Factor Antagonists for Inflammatory Bowel Diseases During Pregnancy. *Gastroenterology*. 2023; 164(7): 1336–1337. doi: 10.1053/j.gastro.2022.12.035
3. Zhu A, Bruketa E, Svoboda T, et al. Respiratory infectious disease outbreaks among people experiencing homelessness: a systematic review of prevention and mitigation strategies. *Annals of Epidemiology*. 2023; 77: 127–135. doi: 10.1016/j.annepidem.2022.03.004
4. Wang H, Li Y. A pilot controlled trial of a combination of electroacupuncture and psychological intervention for post-stroke depression. *Complementary Therapies in Medicine*. 2022; 71: 102899. doi: 10.1016/j.ctim.2022.102899
5. Peng Y, Bai Z, Guo Y, et al. Effect of cognitive behavior oriented psychological intervention on the psychological status of depressed facial acne scar patients undergoing fractional photothermolysis. *Journal of Craniofacial Surgery*. 2022; 33(5): 1493–1496. doi: 10.1097/SCS.00000000000008448
6. Kwakkenbos L, van Lankveld WGJM, Vonk MC, et al. Disease-related and psychosocial factors associated with depressive symptoms in patients with systemic sclerosis, including fear of progression and appearance self-esteem. *Journal of Psychosomatic Research*. 2012; 72(3): 199–204. doi: 10.1016/j.jpsychores.2011.12.005
7. Kao NH, Iyer NG, Chua A, et al. Early quality of life outcomes after surgery in head and neck cancer survivors with EORTC QLQ-C30 and EORTC QLQ-HN35 in an Asian tertiary centre. *Supportive Care in Cancer*. 2022; 30(5): 4537–4546. doi: 10.1007/s00520-022-06871-4
8. Sexton MB, Byrd MR, Von Kluge S. Measuring resilience in women experiencing infertility using the CD-RISC: Examining

- infertility-related stress, general distress, and coping styles. *Journal of Psychiatric Research*. 2010; 44(4): 236–241. doi: 10.1016/j.jpsychires.2009.06.007
9. Zhang X, Liu J, Zhu H, et al. Effect of psychological intervention on quality of life and psychological outcomes of colorectal cancer patients. *Psychiatry*. 2020; 83(1): 58–69. doi: 10.1080/00332747.2019.1672440
10. Simmons LA. Self-perceived burden in cancer patients: validation of the Self-perceived Burden Scale. *Cancer Nursing*. 2007; 30(5): 405–411. doi: 10.1097/01.NCC.0000290816.37442.af
11. Cheng P, Xu LZ, Zheng WH, et al. Psychometric property study of the posttraumatic stress disorder checklist for DSM-5 (PCL-5) in Chinese healthcare workers during the outbreak of corona virus disease 2019. *Journal of Affective Disorders*. 2020; 277: 368–374. doi: 10.1016/j.jad.2020.08.038
12. Gandy M, Karin E, McDonald S, et al. A feasibility trial of an internet-delivered psychological intervention to manage mental health and functional outcomes in neurological disorders. *Journal of Psychosomatic Research*. 2020; 136: 110173. doi: 10.1016/j.jpsychores.2020.110173]
13. Johns SA, Stutz PV, Talib TL, et al. Acceptance and commitment therapy for breast cancer survivors with fear of cancer recurrence: a 3-arm pilot randomized controlled trial. *Cancer*. 2020; 126(1): 211–218. doi: 10.1002/cncr.32518
14. Yen HY. Smart wearable devices as a psychological intervention for healthy lifestyle and quality of life: a randomized controlled trial. *Quality of Life Research*. 2021; 30(3): 791–802. doi: 10.1007/s11136-020-02680-6
15. Wu L, Zou Y. Psychological nursing intervention reduces psychological distress in patients with thyroid cancer: a randomized clinical trial protocol. *Medicine*. 2020; 99(38): e22346. doi: 10.1097/MD.00000000000022346
16. Wen H, Feng C, Zhang S, et al. Supportive psychological intervention on psychological disorders in clinical medicine students with English Learning Difficulties: A protocol of systematic review. *Medicine*. 2020; 99(47): e23196. doi: 10.1097/MD.00000000000023196
17. Renjun G, Ziyun L, Xiwu Y, et al. Psychological intervention on COVID-19: a protocol for systematic review and meta-analysis. *Medicine*. 2020; 99(21): e20335. doi: 10.1097/MD.00000000000020335
18. Luo H, Li Y, Yang BX, et al. Psychological interventions for personal stigma of patients with schizophrenia: A systematic review and network meta-analysis. *Journal of Psychiatric Research*. 2022; 148: 348–356. doi: 10.1016/j.jpsychires.2022.02.010
19. Vignaud P, Lavallé L, Brunelin J, et al. Are psychological debriefing groups after a potential traumatic event suitable to prevent the symptoms of PTSD? *Psychiatry Research*. 2022; 311: 114503. doi: 10.1016/j.jpsychires.2022.02.010
20. Peng Y, Bai Z, Guo Y, et al. Effect of cognitive behavior oriented psychological intervention on the psychological status of depressed facial acne scar patients undergoing fractional photothermolysis. *Journal of Craniofacial Surgery*. 2022; 33(5): 1493–1496. doi: 10.1097/SCS.00000000000008448
21. Farver-Vestergaard I, Danielsen JTT, Løkke A, et al. Psychosocial intervention in chronic obstructive pulmonary disease: meta-analysis of randomized controlled trials. *Psychosomatic Medicine*. 2022; 84(3): 347–358. doi: 10.1097/PSY.0000000000001043
22. Wang M, Huang M, Hong Y. Psychological intervention in children with transfusion-dependent β -thalassaemia. *Vox Sanguinis*. 2022; 117(3): 386–392. doi: 10.1111/vox.13201
23. Nicolucci A, Haxhi J, D’Errico V, et al. Effect of a Behavioral intervention for adoption and maintenance of a physically active lifestyle on psychological well-being and quality of life in patients with type 2 diabetes: The ides_2 randomized clinical trial. *Sports Medicine*. 2022; 52(3): 643–654. doi: 10.1007/s40279-021-01556-0
24. Myers E, Drees ET, Cain J. An intervention utilizing the salience principle to reduce pharmacy students’ psychological attraction to smartphones. *American Journal of Pharmaceutical Education*. 2022; 86(4): 8717. doi: 10.5688/ajpe8717
25. Hui CLM, Wong AKH, Ho ECN, et al. Effectiveness and optimal duration of early intervention treatment in adult-onset psychosis: a randomized clinical trial. *Psychological Medicine*. 2023; 53(6): 2339–2351. doi: 10.1017/s0033291721004189
26. Kredentser MS, Graff LA, Bernstein CN. Psychological comorbidity and intervention in inflammatory bowel disease. *Journal of Clinical Gastroenterology*. 2021; 55(1): 30–35. doi: 10.1097/MCG.0000000000001463
27. Wu C, Zhou T, Wu LP, et al. Analysis of psychological status and effect of psychological intervention in quarantined population during the epidemic of SARS-CoV-2. *Medicine*. 2021; 100(19): e25951. doi: 10.1097/MD.00000000000025951
28. Zhao MC, Yang K, Yang BH, et al. Prognosis of C4 dislocation with spinal cord injury following psychological intervention. *Journal of International Medical Research*. 2021; 49(4): 3000605211004520. doi: 10.1097/md.00000000000025951

29. Konsztowicz S, Gelencser CR, Otis C, et al. Self-concept and Engagement in LiFe (SELF): a waitlist-controlled pilot study of a novel psychological intervention to target illness engulfment in enduring schizophrenia and related psychoses. *Schizophrenia Research*. 2021; 228: 567–574. doi: 10.1016/j.schres.2020.11.028]
30. Fraguell-Hernando C, Limonero JT, Gil F. Psychological intervention in patients with advanced cancer at home through Individual Meaning-Centered Psychotherapy-Palliative Care: a pilot study. *Support Care Cancer*. 2020; 28(10): 4803–4811. doi: 10.1007/s00520-020-05322-2
31. Li N, Liu D, Zhang L, et al. Music intervention on physiological and psychological responses of patients with cancer: A protocol for meta-analysis. *Medicine*. 2021; 100(8): e24865. doi: 10.1097/MD.00000000000024865
32. Jung SJ, Jun JY. Mental health and psychological intervention amid COVID-19 outbreak: perspectives from South Korea. *Yonsei Medical Journal*. 2020; 61(4): 271–272. doi: 10.3349/ymj.2020.61.4.271