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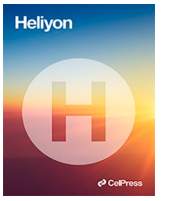

The effect of the PERMA model-based positive psychological intervention on the quality of life of patients with breast cancer

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A R T I C L E I N F O

Keywords:
PERMA model
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Positive psychology after chemotherapy
Negative emotions
Quality of life

A B S T R A C T

Objective: This research focused on exploring the impact of the PERMA model-based positive psychological intervention according to the negative emotions and quality of life of individuals with breast cancer.

Methods: A total of 82 individuals with breast cancer from our hospital were categorized into two groups randomly; the control group and the observation group (41 affected individuals each). The individuals in the control group underwent routine nursing intervention, while the ones in the observation group underwent PERMA nursing as per routine nursing intervention. Self-rating anxiety and depression scales along with Functional Assessment of Cancer Therapy-Breast were employed for the evaluation and analysis of patient status in both groups before and after the intervention.

Results: Following the intervention, the observation group's scores on self-rating anxiety and depression scales were considerably lower when compared with those in the control group ($P < 0.001$), and the physical, social, family, emotional, and functional statuses, along with additional attention and the total score of quality of Functional Assessment of Cancer Therapy-Breast in the observation group were considerably lower in comparison with those in the control group ($P < 0.001$).

Conclusion: The PERMA model-based positive psychological intervention program can ease the anxiety and depression of individuals with breast cancer, improve their quality of life, and has a good prospect of clinical application.

1. Introduction

Breast cancer is among the most widely known cancers that affect women in China as well as around the globe. In 2020, the most recent global cancer data by the International Agency for Research on Cancer of the World Health Organization (WHO) revealed that the number of new breast cancer cases worldwide was as high as 2.26 million, which was even more than the reported cases of lung cancer making breast cancer the highest morbidity causing malignant tumor in the world [1]. In China, the number of new breast cancer cases in 2020 exceeded 400,000 [2]. In recent years, an increasing number of studies have pointed out that patients with breast cancer often suffer from various physiological and psychological symptoms while prolonging their survival time [3]. Multiple symptoms are interlinked and have a synergistic reinforcing effect, predisposing patients to poor quality of life, functional status, and

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prognosis of the disease. At present, routine nursing focuses on the prominent symptoms, pays less attention to the psychological aspect, and seldom continues to intervene after patients return home, resulting in discontinued intervention measures. Therefore, it is particularly important to effectively improve the negative emotions, physical and mental health, and the quality of life of individuals treated with chemotherapy. At present, many scholars have carried out psychological intervention for cancer patients to promote patients to actively respond to the disease. Hanprasertpong et al. [4] used acceptance and commitment therapy to intervene in breast cancer patients. The results showed that acceptance and commitment therapy could reduce the fear of cancer recurrence, anxiety, depression and psychological stress of patients. Some scholars have also used information support and other methods to intervene, mostly from the perspective of traditional psychology to alleviate the negative emotions such as fear of cancer recurrence in breast cancer patients, did not guide patients to explore their own positive qualities and strengths, and ignored the positive psychological resources for breast cancer patients. Positive effects [5,6]. However, there is no systematic positive psychological intervention. Therefore, the study of fear of cancer recurrence in breast cancer patients should not only be limited to the diagnosis and treatment of mental illness, but also focus on solving psychological problems and realizing the transformation from traditional psychology to positive psychology on the basis of exploring patients' positive psychological quality and mobilizing positive emotions. Positive psychology was proposed by Professor Seligman of the University of Pennsylvania in 2000 [7]. Positive psychology is not simply to eliminate negative emotions, but to maximize the positive strength and excellent quality of people by discovering their internal resources.

PERMA Model (Positive emotion (P), Engagement (E), Relationship (R), Meaning (M), Achievement (A), also known as Happiness PERMA. Its proposition, self-management training, is more acceptable to patients than traditional symptom-centered treatments. Moreover, the model provides a continuous intervention on the patients' psychology, finds patients' hidden positive emotions, helps the patients face the disease, and self-corrects their wrong cognition. It improves the mental flexibility along with the quality of life of individuals with cancer and relieves their negative emotions [8]. At present, the positive psychological intervention based on the PERMA model has successfully achieved good clinical results in lung cancer chemotherapy patients [9], stroke patients [10]' and hemodialysis patients [11]. However, there are few reports on the applicability of this intervention model in breast cancer chemotherapy patients. In accordance with the above observations, this research was designed to investigate the application effect of the PERMA model based on positive psychological intervention on individuals with breast cancer after getting chemotherapy and to explore the impact of this program on their negative emotions and quality of life, in order to provide a reference for clinical nursing.

2. Materials and methods

2.1. Study subjects

From January 2022 to June 2022,82 patients with breast cancer who came to our hospital were studied. Double-blind research method was adopted. According to the random number table method, odd numbers were divided into control group (n = 41) and even numbers into observation group (n = 41). The Medical Ethics Committee of the hospital verified this research (Ethical Batch Number:2021zj36).

Table 1
Positive psychological intervention program of PERMA model.

Times of intervention	Theme of intervention	Concrete measures
The first time	Positive self-cognition	Patiently answered patients' doubts, established a good nurse-patient relationship, encouraged patients to tell their own thoughts, understood the true thoughts of patients and collected data; made use of positive cases to make patients face the disease positively, increased patients' confidence in disease treatment, and explained the basic knowledge of chemotherapy to patients to correct their misunderstandings.
The second time	Introduction of positive emotions	Introduced positive psychology, guided patients to look at the current situation of the disease with a positive perspective, made patients aware of the benefits of positive cognition to the disease; guided patients to recall events of gratitude, asked patients to speak up on positive events and encouraged patients to use more positive words to raise their own positive emotions.
The third time	establishing positive emotions	Asked patients to pay attention to adverse events, list their own adverse emotional events and thoughts after the events, find evidence to refute pessimistic thoughts and make optimistic explanations. Praise and support should be given in time when the patient showed positive emotions
The fourth time	Input	Designed activities for patients according to their interests, such as square dancing, flower cultivation, walking, listening to soothing music, Taijiquan, Five-Animal Exercise, yoga and other measures to disperse the pain caused by chemotherapy and encouraged them to cultivate their interests and hobbies.
The fifth time	Interpersonal relationship	Interviewed patients' interpersonal relationships, introduced communication skills, established positive interpersonal relationships; guided patients to practice positive responses and express gratitude to those who had helped or contributed to him/her.
The sixth time	Meaning	Interviewed patients' understanding of the meaning of life and guided them to maintain an optimistic attitude to face adversity when the side effects of chemotherapy occurred.
The seventh time	Goals and achievements	Interviewed patients about their achievements and goals to make patients do what they were good at to achieve a sense of achievement; set exercise goals according to their condition and ability, and gave patients support and encouragement.

2.2. Inclusion criteria

The following were the inclusion criteria: 1) Individuals who consented voluntarily to be a part of this research and also met the requirements of the *Declaration of Helsinki of the World Medical Association*; 2) Those who were pathologically diagnosed with breast cancer; 3) Those who were diagnosed by pathological examination, with international TNM stage III and IV, Karnofsky score $\geq$70 and expected survival time >3 months; 4) Patients with negative emotions such as anxiety or fear of recurrence; 5) Patients with a clear mind and good treatment compliance.

2.3. Exclusion criteria

The following were the setup exclusion criteria: 1) Patients with mental disorders who were unable to cooperate with treatment and nursing; 2) Patients with other diseases such as renal failure, respiratory failure, heart failure, etc.; 3) Patients who had received or were receiving other psychological intervention research projects.

2.4. Intervention methods

Routine nursing methods were used in the control group, including 1) Knowledge popularization for patients with breast cancer; 2) Adverse reactions to chemotherapy drugs for patients with breast cancer and treatment methods; 3) Guidance on a diet for individuals with breast cancer; 4) Psychological guidance for individuals with breast cancer; 5) Survival of individuals with breast cancer.

Patients in the observation group were given positive psychological intervention based on the PERMA model according to routine nursing. The intervention site was the demonstration room of the Department of Medical Oncology (see Table 1).

①Setting up a group: the head nurse of the department served as the group leader, and the group was composed of one doctor in charge, one National Second-level Psychological Consultant, and three nurses. The group members made ward rounds together, strengthened communication with patients, encouraged patients to participate in treatment and nursing work, and gave targeted treatment and nursing measures according to the actual situation of patients.
②Formulation of the intervention program: the relevant literature, including chemotherapy, positive psychology, and the PERMA model, was reviewed to establish the active psychological intervention topic group, develop the first draft of the pretest intervention program, and collect feedback after the pretest.
③Implementation of the intervention: The intervention was conducted once a week; one item was completed each time, 40 to 50 min each time. After discharge, the two groups of patients would continue to be intervened through WeChat, telephone, and other means for a total of 7 weeks.
④Regular quality control (Once weekly): a meeting was held according to the results of quality control, and the whole staff used the brainstorming method to discuss the existing and potential problems in depth and to formulate predictive treatment and nursing program. According to the previous situation, timely adjust the specific measures for the next treatment, such as poor improvement of the activities held. After discussion, it is found that the problem lies in insufficient professional knowledge of medical staff and insufficient communication ability and skills. When carrying out the next intervention measures, relevant training will be given to medical staff in advance to ensure the quality of the study and the effect of improvement. Discharge guide cards and a WeChat group for patients discharged from the hospital were established to ensure continuity of treatment and nursing. Key points were regularly promoted in the WeChat group, and patients were encouraged to do functional exercises every day and improve their self-care ability.

Patients with negative results during the study were given symptomatic treatment with traditional Chinese medicine or western medicine, such as typical antipsychotic olanzapine, increased humanistic care, did not delay patient treatment, and provided individual targeted intervention to continue intervention.

2.5. Observation index

1) To assess the psychological status of patients both before and after the intervention, the Self-rating anxiety scale (SAS) [12] and Self-rating depression scale (SDS) [13] were utilized. SAS was developed by W. K. Zung and consisted of 20 items to evaluate the degree of anxiety. The scale was scored by Likert 4 Grade [14]; the SAS standard score was 50; higher scores denoted greater anxiety; the Cronbach's alpha coefficient for the scale was 0.872, and the validity was 0.840. The severity of anxiety and depressive symptoms increases with greater SAS and SDS scores.
2) To assess the quality of life of individuals with breast cancer over time, the Functional Assessment of Cancer Therapy-Breast (FACT-B) was created by Cella et al. [15] of the Center on Outcomes Research and Evaluation (CORE) in the United States. This tool was translated into Chinese by domestic scholars. The scale consisted of 36 entries in five dimensions, the main content concerning the physical part, social/family condition, emotional condition, functional condition, and additional concerns about breast cancer. The total score ranged from 0 to 144 points and was based on a 5-grade scoring system with five grades: not at all, a little, some, very, and very. The patient's quality of life improves as the score rises [16].

2.6. Statistical methods

The data were processed using SPSS 20.0 software. Measurement data in accordance with normal distribution were represented as ($\bar{x} \pm s$). Enumeration data are presented as number of cases. The quantitative data of the control group and the intervention group were compared by two independent samples *t*-test. The quantitative data of the two groups before and after intervention were compared by two paired samples *t*-test. Count data were tested by $\chi 2$. $P < 0.05$ indicated a significant difference.

3. Results

3.1. Baseline characteristics

The age of individuals in the observation group was 48.12 ± 8.24 years old, while the age of individuals in the control group was 48.67 ± 9.22 years old with no statistically significant difference ($P = 0.658$); Clinical stages (TNM staging) were also not observed in any of the two groups along with no statistically significant difference ($P = 0.414$) in comparison with the general data (see Table 2).

3.2. Psychological status

Following the intervention, the observation group's SAS and SDS scores were considerably lower than those of the control group ($P < 0.001$, Table 3). After the intervention, the SAS score was 54.63 ± 2.1 in the intervention group and 64.22 ± 2.78 in the control group; the SDS score was 7.73 ± 1.36 in the intervention group and 13.71 ± 1.84 in the control group (see Table 3).

3.3. Scores of quality of life

Following the intervention, the observation group's FACT-B scores were considerably higher than those of the control group ($P < 0.001$, Table 4). The FACT-B score was 122.43 ± 8.60 in the intervention group and 100.63 ± 7.43 in the control group after the intervention (see Table 4).

4. Discussion

Chemotherapy is currently one of the key ways to carry on with treatment for breast cancer patients following surgery. However, long-term continuous chemotherapy is prone to eliciting a range of unfavorable emotions, which can affect the nervous, endocrine, and immune regulatory functions of the human body, lead to immune defense system disorders, and increase the risk of tumor cell growth diffusion [17]. As a result, patients often have poorer levels of self-well-being and quality of life than normal people. The conventional

Table 2
Comparison of general data of the two groups [n].

Item		Observation group (n = 41)	Control group (n = 41)	$\chi 2$	*P*
Age				0.196	0.658
	≤45 years	20	18		
	> 45 years old	21	23		
Marital status				0.054	0.457
	Married	36	38		
	divorced or others	5	3		
Religious belief				0.213	0.644
	Have	2	3		
	Have not	39	38		
Degree of education				0.220	0.641
	Junior high school and below	13	15		
	Senior high school and above	28	26		
Family medical history				0.285	0.594
	Have	10	8		
	Have not	31	33		
Payment method				0.346	0.556
	At one's own expense	2	1		
	Medical insurance	39	40		
Clinical stages (TNM staging)				0.067	0.414
	I、II	31	34		
	III、IV	10	7		
Monthly household income per capita				0.040	0.817
	5000	15	14		
	≥5000	26	27		
Obese degree				0.497	0.481
	Normal or emaciation	29	26		
	Overweight or obese	12	15		

Table 3

Comparison of psychological status of two groups before and after intervention ($\bar{x} \pm s$) .

Item		Observation group (n = 41)	Control group (n = 41)	*t*	*P*
SAS	Before intervention	64.22 ± 2.87	64.20 ± 2.76	0.039	0.969
	After intervention	54.63 ± 2.1*	64.22 ± 2.78	17.895	< 0.001
SDS	Before intervention	14.12 ± 2.12	14.41 ± 1.69	0.691	0.492
	After intervention	7.73 ± 1.36*	13.71 ± 1.84	16.763	< 0.001

Note: *: The comparisons of indexes within-group was statistically significant. $P < 0.05$. SAS: Self-rating anxiety scale, SDS: Self-rating depression scale.

Table 4

Comparison of quality-of-life scores before and after the intervention between the two groups ($\bar{x} \pm s$) .

Item		Observation group	Control group	*t*	*P*
Physiological condition	Before intervention	18.34 ± 1.49	18.21 ± 1.64	0.353	0.725
	After intervention	22.68 ± 1.60*	20.24 ± 1.88*	6.424	< 0.001
social/family condition	Before intervention	18.46 ± 1.89	19.76 ± 1.71	3.248	0.002
	After intervention	23.41 ± 1.00*	19.39 ± 1.53	10.232	< 0.001
emotional condition	Before intervention	18.10 ± 1.56	18.41 ± 1.41	0.964	0.038
	After intervention	22.05 ± 1.60*	19.34 ± 1.85	7.09	< 0.001
functional condition	Before intervention	17.93 ± 2.62	17.48 ± 1.87	0.873	0.385
	After intervention	24.43 ± 2.39*	19.12 ± 1.94	11.068	< 0.001
additional concerns	Before intervention	21.39 ± 3.99	21.90 ± 3.06	0.652	0.516
	After intervention	29.85 ± 2.35*	22.54 ± 2.09	14.903	< 0.001
FACT-B	Before intervention	94.34 ± 10.49	96.02 ± 8.40	0.082	0.425
	After intervention	122.43 ± 8.60*	100.63 ± 7.43*	12.284	< 0.001

Note: *: The comparisons of indexes within-group was statistically significant. $P < 0.05$. FACT-B：Functional Assessment of Cancer Therapy-Breast.

nursing model can only meet the basic needs of patients but cannot make patients satisfied. Therefore, in order to ensure a good quality of life for patients following surgery, assist patients in reducing negative emotions, enhance the quality of life and effectively complete chemotherapy, it is quite important to find a suitable nursing intervention model.

Recently, with the in-depth application of positive psychology research, patients' self-well-being and quality of life have become important indicators to evaluate the individual's spiritual level and quality of life after treatment. PERMA model specifies the definition of happiness and summarizes the five elements of happiness. Starting from the five elements, it formulates targeted psychological intervention programs to help patients pay attention to the good things in life, actively face their own disease conditions, imperceptibly change their negative thinking, enhance their own well-being and face up with difficulties. In addition, clinical studies have shown that the PERMA model is based on patient self-management, with little assistance from intervention personnel, and patients have less resistance. The enthusiasm of patients and their families can be fully aroused in the process, which is more easily accepted by patients [18]. The most prevalent psychological disorders in individuals with malignant tumors are anxiety, depression, and other negative emotions, which have a significant detrimental impact on their treatment and rehabilitation [19].

The outcomes of this study demonstrated that the scores of SAS (54.63 ± 2.1 vs 64.22 ± 2.78) and SDS (7.73 ± 1.36 vs 13.71 ± 1.84) in the observation group were significantly lower than those in the control group after intervention and the difference was significant ($P < 0.05$), indicating that the positive psychological intervention program based on PERMA model could alleviate the physical and mental harm caused by anxiety and depression for individuals with breast cancer receiving chemotherapy, help patients to receive treatment in a healthy and positive psychological state and complete the chemotherapy. Clinical studies have found that cortisol secretion, an end product of the hypothalamic-pituitary-adrenal axis, could be increased in humans by stimulating the prefrontal activity in the inner side of the brain, thereby exerting a regulatory effect on mood, arousing positivity, blocking negative thinking, guaranteeing the nervous system to maintain a state of balance, maintaining the body's physical and mental health, receiving active treatment and improving social function [20]. Under the PERMA model, team members' active communication with patients during chemotherapy could make them understand the emotional changes and true inner thoughts of patients in time. Team members might guide patients with breast cancer to cultivate their interests and hobbies by practicing yoga, playing chess, dancing, and exercising Taijiquan. It could not only alleviate the pain caused by chemotherapy complications but also help patients divert attention, find the beauty in life, gradually accept the treatment program, reduce negative emotions, increase optimistic and positive qualities, and improve their level of happiness. The research of Dong Shuxian et al. [21] also showed that the nursing intervention program based on PERMA theory could significantly reduce the fear of patients with breast cancer so that they could have an optimistic attitude toward facing the disease. As a positive psychological state, learning to be grateful was of great significance to broadening the mental model and meeting the psychological needs of patients, which was conducive to enhancing well-being. At the same time, actively helping patients to strive for family support and setting up service hot-lines could meet the psychological needs of patients who left the hospital during the intermission of chemotherapy, effectively track the psychological state of patients with severe negative emotions and help to give timely psychological assistance measures to avoid accidents.

Secondly, this study also found that after the intervention, the observation group's FACT-B scores (122.43 ± 8.60 vs 100.63 ±

7.43) were considerably higher in comparison to those of the control group, showing that the self-care skills and quality of life during breast cancer chemotherapy might be significantly improved by the positive psychological intervention of the PERMA model. Under the PERMA model, systematic and continuous health education of team members was helpful to improve the subjective initiative and chemotherapy compliance of patients and to promote their active participation in the self-care process of chemotherapy. Tian Ruijie et al. [22] applied the PERMA model's positive psychological intervention to patients with breast cancer receiving chemotherapy on the basis of routine nursing, and it was found that the compliance behavior of patients was significantly enhanced. Chen J et al. applied the same intervention to elderly diabetic patients, and the results showed that the patient's physical and mental health, as well as their quality of life, were shown to have greatly improved [8]. Medical staff paid attention to the communication of eyes, gestures, and limbs during the interview, which could stabilize the emotional state of patients, keep them in a good mood and then improve their quality of life [23]. However, because there were significant differences in the social family status and emotional status between the two groups before the intervention, the results after the intervention may not truly explain the improvement effect of PERMA model on the family and emotional aspects of patients, and the reason for the differences before the intervention may be because there are large differences in the scores of individuals in the two groups, or there may be confounding factors, we will further discuss and find that the existing problems are improved. However, through the huge change of scores before and after the intervention, we can still see that the PERMA model can better adjust the social function and emotional state of patients to improve the quality of life of patients. Luo et al. [24] also showed that the PERMA model was able to increase social communication, regulate interpersonal relationships, promote the generation of positive emotions, and help patients correctly view negative emotions in breast cancer patients.

Existing interventions focus more on the elimination of negative emotions and do not consider how to explore potential positive qualities. Therefore, this study applied positive psychology to improve the patient's psychological capital (optimism, hope, resilience, self-efficacy), benefit discovery level, in order to alleviate psychological pressure, reduce the negative emotions of breast cancer patients, and enhance happiness. However, our research still had some limitations. Due to human, financial, and time constraints, this study only involved patients in one hospital, had a small number of cases, and the intervention time was brief. As for the long-term efficacy of positive psychological intervention of the PERMA model, we hope to carry out extended follow-up time and multi-center and large sample follow-up studies in future studies to further verify the objectivity and reliability of this method.

5. Conclusion

In summary, the positive psychological intervention of the PERMA model can effectively reduce the negative emotions of breast cancer patients undergoing chemotherapy, help patients reshape their cognition of the disease, actively face pain, enhance their confidence in overcoming the disease, establish their own happiness, and improve their quality of life. Its promotion in the treatment environment is worth it.

Author contribution statement

Huijuan Fang; Yonglei Zeng: Conceived and designed the experiments; Performed the experiments; Wrote the paper.

Yuanyuan Liu; Chaolin Zhu: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Data availability statement

Data included in article/supp. material/referenced in article.

Additional information

No additional information is available for this paper.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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