

Meta-Analysis of the Intervention Effects of PERMA Model-Based Nursing Care on Breast Cancer Patients

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Abstract: Objective: Systematically evaluate the intervention effect of nursing based on PERMA mode on breast cancer patients, and provide evidence-based evidence for tumor psychological nursing. **Methods:** Computer searches were conducted to retrieve randomized controlled trials (RCTs) from databases such as PubMed, Cochrane Library, Web of Science, CINAHL, Embase, China Biomedical Literature Database, CNKI, Wanfang, and VIP (up to March 2025), and data was analyzed using Review Manager 5.4. A total of 7 studies (672 patients) were included. **Software:** A total of 7 studies (672 patients) were included. The meta-analysis results showed that compared with the control group, this nursing model can reduce patients' anxiety (SMD=-2.58), depression (SMD=-3.79), fear of disease progression (MD=-5.70), fatigue (SMD=-8.16), and improve their sense of happiness (SMD=1.63) and psychological capital (MD=17.12), all of which have statistical significance ($P < 0.05$, with fatigue $P = 0.030$). **Conclusion:** PERMA mode nursing can improve the negative emotion and fatigue of breast cancer patients, and enhance the sense of happiness and psychological capital, but it still needs large samples and high-quality RCT to verify its efficacy.

Keywords: PERMA Mode; Breast Cancer; Psychological Care; Meta-analysis.

1. Introduction

Breast cancer is one of the malignant tumors with the highest incidence rate among women in China [1], with an increasing annual incidence and a trend towards younger patients [2]. After undergoing comprehensive treatments such as surgery, radiotherapy, and chemotherapy, patients often experience psychological distress including anxiety, depression, cancer-related fatigue, and fear of disease progression [3], which severely undermines treatment adherence and reduces subjective well-being and psychological capital. The PERMA model [4], based on positive psychology theory, conducts psychological interventions from five dimensions: Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment.

Currently, multiple randomized controlled trials have explored the intervention effects of PERMA model-based nursing on breast cancer patients both domestically and internationally. However, individual studies often have small sample sizes [5], and intervention protocols and outcome measures are not uniform, leading to discrepancies in results and a lack of systematic integration and analysis. This study conducts a meta-analysis by pooling existing RCT data to evaluate the intervention effects of PERMA model-based nursing on breast cancer patients, which holds significant practical importance for optimizing nursing plans, improving patients' quality of life, and enhancing treatment outcomes [6].

2. Research Methods

2.1. Literature Search Strategy

A computerized search was performed in PubMed, Cochrane Library, Web of Science, Embase, CNKI, VIP, Wanfang, and CBM databases for literature on PERMA nursing interventions. The search period was from inception to March 2025. A combination of MeSH terms and free words was used. English search terms included: ("breast neoplasm"

OR "breast tumor " OR "breast cancer" OR "malignant neoplasm of breast" OR "breast carcinoma" AND "PERMA" OR "PERMA model" OR "happiness" OR "Positive Psychology" OR "well being intervention" OR "well-being model" OR "well-being theory"). Additionally, clinical trial registration websites were manually searched, and references of relevant studies were tracked.

2.2. Inclusion and Exclusion Criteria

Inclusion Criteria: 1) Patients aged ≥ 18 years with pathologically confirmed breast cancer; 2) Intervention: The experimental group received routine nursing care + PERMA model nursing, while the control group received routine nursing care; 3) Study type: Randomized Controlled Trial (RCT); 4) Outcome measures included at least one of the following: anxiety, depression, fear of disease progression, fatigue, well-being, or psychological capital; 5) Literature published in Chinese or English, with full text and complete statistical data available.

Exclusion Criteria: 1) Literature with incomplete data, inability to extract valid statistics, or unavailable full text; 2) Duplicate publications.

2.3. Literature Screening, Data Extraction, and Quality Assessment

Duplicates were removed using EndNote software and manual methods. Two researchers independently screened the literature, extracted data, and cross-checked the results. Disagreements were resolved through discussion with a third party. Two researchers independently assessed the literature quality using the Cochrane Risk of Bias tool (7 items). Studies meeting all criteria were graded as A, partially meeting as B, and not meeting as C. Kappa coefficient was used to test consistency.

2.4. Statistical Analysis

Meta-analysis was performed using RevMan 5.4. For

continuous data, Mean Difference (MD) (when the same tool was used) or Standardized Mean Difference (SMD) (when different tools were used) were used as effect measures, with 95% Confidence Intervals (CIs). Heterogeneity was assessed using the Chi-square test and I^2 statistic. If $I^2 \leq 50\%$ and $P \geq 0.1$, a fixed-effects model was used; otherwise, a random-effects model was used, and sources of heterogeneity were analyzed. Due to the inclusion of fewer than 10 studies, a funnel plot was used to test stability and publication bias.

3. Results

3.1. Literature Search Results

A total of 1465 potentially relevant articles were initially retrieved. Finally, 7 studies were included (4 in Chinese, 3 in English), comprising 336 patients in the experimental group and 336 in the control group.

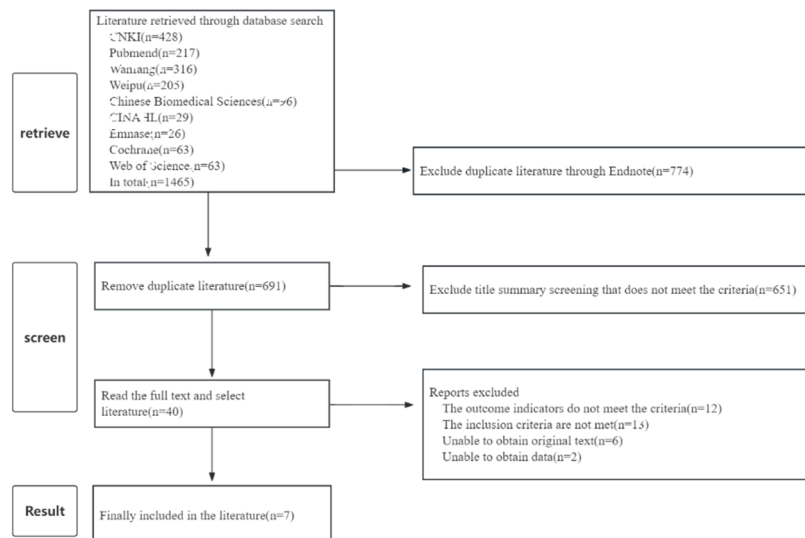


Figure 1. Literature Screening Flowchart

3.2. Basic Characteristics of Included Studies

Table 1. Basic Characteristics of Included Studies (n = 7)

Included Study (First Author + Year)	Study Population	Sample Size (T/C, n)	Intervention Duration	Intervention Method	Outcome Measures	Measurement Tools
Wang Jiajia 2021	Breast cancer chemotherapy patients	36/36	8 weeks, 30-50 min/session	One-on-one on-site guidance	Fear of progression, Well-being, Psychological capital	FoP-Q-SF, IWB, PPQ
Yu Lizhen 2024	Postoperative breast cancer patients	34/34	7 weeks, 40-50 min/session	Face-to-face intervention + Telephone/WeChat follow-up post-discharge	Anxiety, Depression	SAS,SDS
Gu Jiayi 2017	Perioperative AIDS-breast cancer patients	54/54	12 weeks, 30-50 min/session	Face-to-face intervention	Anxiety, Depression, Cancer-related fatigue	SAS,SDS,CFS
Zhu Ting 2020	Perioperative breast cancer patients	44/44	8 weeks, 30-50 min/session	Face-to-face group guidance + peer practice	Anxiety, Depression, Well-being	SAS,SDS,GWB
Zhang Shiyu 2023	Breast cancer patients	51/51	4 weeks, 40-60 min/session	Face-to-face guidance	Anxiety, Depression, Well-being, Psychological capital	SAS,SDS,IWB,PPQ
Lai2018	Breast cancer patients undergoing intraoperative radiotherapy	61/61	8 weeks, 30-40 min/session	Face-to-face intervention + positive experience exercises	Anxiety, Depression, Psychological capital	SAS,SDS,PPQ
Megan2019	Young and middle-aged breast cancer patients	56/56	8 weeks, 20-30 min/session	One-on-one interviews + goal setting	Fear of progression, Well-being	FoP-Q-SF,GWB

Note: T = Experimental Group, C = Control Group; FoP-Q-SF = Fear of Progression Questionnaire-Short Form, IWB = Index of Well-Being, PPQ = Positive Psychological Capital Questionnaire, SAS = Self-Rating Anxiety Scale, SDS = Self-Rating Depression Scale, GWB = General Well-Being Schedule, CFS = Cancer Fatigue Scale.

All 7 included studies were RCTs. Study populations included breast cancer patients undergoing chemotherapy, post-surgery patients, patients undergoing intraoperative

radiotherapy, and young and middle-aged breast cancer patients. Intervention durations ranged from 4 to 12 weeks. Intervention methods primarily involved face-to-face

guidance, with some studies supplemented by telephone, WeChat follow-up, or one-on-one interviews. Outcome measurement tools utilized internationally recognized or domestically standardized scales, including the Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS), Fear of Progression Questionnaire-Short Form (FoP-Q-SF), Cancer Fatigue Scale (CFS), Index of Well-Being (IWB), and Positive Psychological Capital Questionnaire (PPQ). All studies reported means and standard deviations of outcome

measures before and after intervention, allowing for meta-analysis. See Table 1.

3.3. Quality Assessment of Included Studies

The methodological quality of the 7 included studies was moderate. All studies reported adequate randomization methods and had a low risk of bias. The overall quality grade for all included studies was B. See Table 2.

Table 2. Quality Assessment of Included Studies (n = 7)

Included Study	Random Sequence Generation	Allocation Concealment	Blinding of Participants/Personnel	Blinding of Outcome Assessment	Incomplete Outcome Data	Selective Reporting	Other Bias	Quality Grade
Wang Jiajia 2021	Low	Unclear	Unclear	Unclear	Low	Low	Low	B
Yu Lizhen 2024	Low	Unclear	Unclear	Unclear	Low	Low	Low	B
Gu Jiayi 2017	Low	Unclear	Unclear	Unclear	Low	Low	Low	B
Zhu Ting 2020	Low	Low	Low	Low	Low	Low	Low	B
Zhang Shiyu 2023	Low	Unclear	Unclear	Unclear	Low	Low	Low	B
Lai2018	Low	Unclear	Unclear	Unclear	Low	Low	Low	B
Megan2019	Low	Unclear	Unclear	Unclear	Low	Low	Low	B

3.4. Meta-Analysis Results

3.4.1. Impact on Anxiety Levels

Data from 4 studies [5, 7-9] showed that PERMA model nursing significantly reduced anxiety levels in breast cancer patients (High heterogeneity, $I^2 = 89\%$, random-effects model). The experimental group was superior to the control group [SMD = -2.58, 95% CI (-3.37, -1.79), $P < 0.001$], and the difference was statistically significant.

3.4.2. Impact on Depression Levels

Data from 4 studies [5, 8-10] showed that PERMA model nursing significantly reduced depression levels (High heterogeneity, $I^2 = 90\%$, random-effects model). The experimental group was superior to the control group [SMD = -3.79, 95% CI (-4.91, -2.66), $P < 0.001$]. The difference was statistically significant.

3.4.3. Impact on Fear of Disease Progression

Data from 2 studies [7, 11] showed that PERMA nursing significantly reduced fear of disease progression (Low heterogeneity, $I^2 = 0\%$, fixed-effects model). The experimental group was superior to the control group [MD = -5.70, 95% CI (-6.85, -4.56), $P < 0.001$]. The difference was statistically significant.

3.4.4. Impact on Fatigue Levels

Data from 2 studies [9, 12] showed that PERMA nursing significantly reduced cancer-related fatigue (Very high heterogeneity, $I^2 = 99\%$, random-effects model). The experimental group was superior to the control group [SMD = -8.16, 95% CI (-15.34, -0.98), $P = 0.030$]. The difference was statistically significant.

3.4.5. Impact on Well-being

Data from 3 studies [9, 11, 12] showed that PERMA nursing significantly enhanced well-being (High heterogeneity, $I^2 = 86\%$, random-effects model). The experimental group was superior to the control group [SMD = 1.63, 95% CI (0.88, 2.38), $P < 0.001$]. The difference was statistically significant.

3.4.6. Impact on Psychological Capital

Data from 2 studies [7, 12] showed that PERMA nursing significantly enhanced psychological capital (Low heterogeneity, $I^2 = 4\%$, fixed-effects model). The experimental group was superior to the control group [MD = 17.12, 95% CI (12.12, 22.13), $P < 0.001$]. The difference was statistically significant.

3.5. Subgroup Analysis

Table 3. Subgroup Analysis Summary for PERMA Model Nursing on Negative Emotions in Breast Cancer Patients

Analysis Factor	Subgroup	Number of Studies	SMD (95%CI)	I^2 (%)	Within-group P-value	Between-group χ^2	Between-group P-value
Intervention Duration	≤ 8 weeks	5	-2.42(-3.10,-1.74)	88	<0.001	1.63	0.20
	>8 weeks	2	-1.89(-2.54,-1.24)	76	<0.001		
Treatment Stage	Chemotherapy/Postoperative	4	-2.65(-3.38,-1.92)	90	<0.001	0.97	0.34
	Perioperative/Radiotherapy	3	-2.21(-2.86,-1.56)	84	<0.001		
Intervention Format	One-on-one guidance	4	-2.51(-3.22,-1.80)	87	<0.001	0.18	0.67
	Group intervention + Online follow-up	3	-2.33(-2.98,-1.68)	82	<0.001		

Given the high heterogeneity among the included studies, subgroup analyses were conducted on negative emotion indicators, using intervention duration, patient treatment stage, and intervention delivery format as stratification variables. Results are presented in Table 3.

Stratified analysis showed that short-term (≤ 8 weeks) and medium-to-long-term (> 8 weeks) interventions, interventions for chemotherapy/postoperative patients and perioperative/radiotherapy patients, and both one-on-one guidance and group intervention combined with online

follow-up significantly improved patients' negative emotions. There were no statistically significant differences between the stratified groups ($P = 0.20, 0.34, 0.67$, respectively). Results indicated that intervention duration, treatment stage, and delivery format were not the main sources of heterogeneity, and the effect of PERMA model nursing on improving negative emotions in breast cancer patients was stable.

3.6. Publication Bias Assessment

As the number of included studies was less than 10, publication bias was assessed using a funnel plot. The results showed that the scatter points of the 7 studies were roughly symmetrically distributed on both sides of the combined effect size. Most studies were located in the upper part of the funnel plot, suggesting relatively high study precision and a low risk of publication bias.

4. Discussion

4.1. Effective Improvement of Negative Emotions, Alleviation of Cancer-Related Fatigue, and Enhancement of Positive Psychological States in Breast Cancer Patients

The trauma of surgery, side effects of radiotherapy and chemotherapy, and changes in body image can easily lead to long-term anxiety, depression, and fear of recurrence in patients. Cancer-related fatigue often accompanies these negative emotions and is not easily relieved by rest alone. The PERMA model encompasses five dimensions: Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment. Through methods like positive journaling, peer support, and stepwise crafts/rehabilitation exercises, it helps regulate emotions, strengthen social support, and rebuild self-worth. This not only enhances patients' sense of engagement and achievement, rebuilds meaning in life, and improves psychological resilience but also alleviates physical fatigue by stabilizing a positive mindset, thus creating a virtuous psycho-physical cycle.

4.2. Study Heterogeneity and Limitations

The high heterogeneity among the included studies likely stems from differences in intervention duration, delivery formats, and patient treatment stages. The included studies were all of moderate quality; blinding was difficult to implement; short-term interventions lacked long-term follow-up data; and the total sample size was relatively small, limiting the generalizability of the conclusions.

4.3. Clinical Implications and Future Perspectives

The PERMA model nursing approach is simple to implement, non-invasive, and can be integrated into routine oncology nursing workflows, making it suitable for promotion across various hospital levels. Future research should focus on conducting multi-center, large-sample RCTs, developing localized and standardized intervention protocols, integrating online follow-up and digital health technologies to extend intervention periods, and exploring phased, individualized PERMA nursing plans to determine long-term rehabilitation benefits.

5. Conclusion

The PERMA model nursing approach is simple to implement, non-invasive, and can be integrated into routine oncology nursing workflows, making it suitable for promotion across various hospital levels. Future research should focus on conducting multi-center, large-sample RCTs, developing localized and standardized intervention protocols, integrating online follow-up and digital health technologies to extend intervention periods, and exploring phased, individualized PERMA nursing plans to determine long-term rehabilitation benefits.

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