

The Effect of Multimodal Standard Nursing Program (MSNP) on Self-Efficacy after Mastectomy in Patients with Breast Cancer

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Abstract

Background: since breast is an important part of women's body image, mastectomy surgery can have negative effects on physical, social and psychological health and may lead to decreased self-efficacy.

Aim: The aim of this study is to examine the effect of MSNP on self-efficacy after mastectomy surgery in patients with breast cancer.

Method: This randomized clinical trial was conducted on 102 patients with breast cancer who had undergone radical mastectomy and were referred to Omid Hospital in Mashhad. Participants were randomly assigned to the intervention and control groups. The intervention group received MSNP consisting of six sessions. Meanwhile, the control group received the hospital's routine educational care simultaneously. To evaluate the intervention, the Chronic Disease Self-Efficacy Scale (CDESES) and the Strategies Used by People to Promote Health (SUPPH) were administered to both groups at three time points: before the intervention, immediately after completion of the intervention, and two weeks after intervention. Data were analyzed using SPSS software (version 23).

Results: Before the intervention (pre-test), the mean and deviation of the intervention group were 5.90 ± 1.42 and the control group were 5.91 ± 1.15 , the time after the intervention (post-test), in the intervention group were 6.53 ± 1.65 and the control group were 5.31 ± 1.52 , and at follow-up in the intervention group were 7.23 ± 1.35 and the control group were 5.17 ± 1.23 . The results indicated that there was no statistically significant difference between the intervention and control groups in terms of mean self-efficacy scores at the pre-test stage ($p > 0.05$). However, at the post-test and follow-up assessments, the mean scores on CDESES and SUPPH Questionnaire were significantly higher in the intervention group than in the control group ($p < 0.001$).

Implications for Practice: This study demonstrated that MSNP was effective in improving self-efficacy after mastectomy among patients and enhancing their adherence to treatment.

Keywords: Breast Cancer, Mastectomy, Multimodal Nursing Program, Self-Efficacy

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Introduction

Breast cancer is the most prevalent malignancy among women, accounting for approximately 23% of all cancer cases worldwide (1, 2). In 2022, breast cancer represented 11.6% of all newly diagnosed cancers in the United States (3). Similarly, in Iran, breast cancer is the most common cancer among women, with a prevalence of 24.6%(4). Standard treatment modalities for breast cancer include a combination of surgery, radiotherapy, chemotherapy, and hormone therapy (5, 6). Among these treatments, mastectomy is still frequently performed, particularly in patients with advanced disease stages (7). Although advances in treatment have improved survival rates, women undergoing mastectomy commonly experience physical and psychological challenges after surgery. Complications such as pain, reduced upper-limb function, lymphedema, fatigue, anxiety, and altered body image may negatively affect patients' ability to manage their condition and adhere to treatment recommendations (8-10). These problems may ultimately reduce self-efficacy (11).

Self-efficacy is defined as an individual's belief in their ability to achieve specific goals and to effectively manage chronic conditions such as cancer over the long term (12). Evidence indicates that self-efficacy plays a critical role in patients' adaptation to cancer-related challenges, influencing symptom management, lifestyle modification, psychological adjustment, and overall health outcomes (13, 14).

Various interventions have been implemented to enhance self-efficacy among patients with breast cancer; however, many current approaches have limitations in comprehensively health problems in aspects of physical, psychological and social domains (15, 16). Studies indicate that interventions targeting both physical symptoms and emotional needs can result in significant improvements in self-efficacy and quality of life (15). For example, a quasi-experimental study conducted by Abd El Fatah et al. (2023) in Egypt examined the effects of a mobile-based educational program delivered via WhatsApp on self-efficacy and psychological distress among elderly women with breast cancer undergoing chemotherapy. The findings demonstrated a statistically significant improvement in self-efficacy related to side-effect management and a reduction in psychological distress in the intervention group compared with the control group (17). Nevertheless, the reliance on virtual education and the inclusion of only elderly patients were limitations of the study. Also, this study only addressed education in the field of psychological and social dimensions and did not consider physical symptoms and their impact on self-efficacy.

Similarly, Nihayati et al. (2021) investigated the effect of psycho-educational interventions on self-efficacy and motivation for treatment among 50 patients with breast cancer undergoing chemotherapy. Their results indicated that psycho-education significantly improved both self-efficacy and motivation for treatment adherence (18). However, the limited number of educational sessions, absence of follow-up to sustain intervention effect and lack of specific focus on physical, psychological, and social dimensions of patients were the study's limitations. The present study with considering, multimodal educational approach allows for a more targeted assessment of physical, psychological and social domains. Accordingly, MSNP based on the theoretical framework for the concept of self-efficacy of Bandura's Social Cognitive Theory was selected as the intervention to enhance patients' self-efficacy. MSNP encompasses structured exercise protocols," "nutritional counseling," or "cognitive-behavioral techniques (19, 20).

Although various interventions such as art therapy, exercise programs, psychological support, educational interventions, rehabilitation and physiotherapy have been applied in patients with breast cancer (20-22), multimodal programs that simultaneously address physical, psychological and social health domains offer a more comprehensive nursing strategy for enhancing self-efficacy (23). Moreover, previous educational interventions have not reached consensus regarding the optimal duration, timing, and number of sessions.

Despite the growing body of evidence regarding the impact of MSNP on Self Efficacy with breast cancer, most existing studies have been conducted in Western or developed contexts. There is a significant lack of empirical research exploring these effects within the unique lifestyle patterns and socio-cultural of the Iranian population, the findings from international studies may not be directly generalizable to this demographic. Therefore, given the high prevalence of breast cancer in IRAN and the limited number of studies evaluating the Multimodal Standard Nursing Program in this population (19, 23, 24), the present study was designed to address this research gap by investigating the effect of MSNP on self-efficacy in patients with breast cancer after mastectomy in IRAN.

Methods

This randomized clinical trial study was performed on patients with breast cancer who had undergone radical mastectomy and referred to Omid Hospital in Mashhad during the spring and summer of 2025. The inclusion criteria were: women diagnosed with breast cancer; history of radical mastectomy; two to three months after mastectomy; no diagnosis of lymphedema; age between 18 and 70 years; absence of upper-limb musculoskeletal disorders; no infection or open wounds in the upper extremities; and willingness to participate in the study. The exclusion criteria included: absence from one or more nursing educational sessions; failure to complete the research questionnaires; receiving active chemotherapy or radiotherapy during the study period and withdrawal from the study at any stage. Based on the study by Cal et al. (11), considering a confidence level of 80%, a significance level of 0.05, and an estimated 10% attrition rate, Ratio in the first group was 0.99 and the ratio in the second group was 0.829. The required sample size was calculated as 51 participants in each group.

A total of 108 patients were assessed for eligibility. Six patients were excluded: two did not meet the inclusion criteria, three declined to participate, and one was excluded for other reasons. Finally, 102 eligible patients were enrolled using convenience sampling after obtaining written informed consent. Participants were then randomly allocated to the intervention and control groups using time-based block randomization. Initially, the block size was determined based on the timing of hospital referrals (three blocks of 34 participants). Then, a list of blocks was written, and random variable numbers between 1-4 and 1-6 were used, and the numbers were placed in sealed opaque envelopes. Participants were randomly assigned to an envelope, and allocation continued until the final sample size was achieved. Odd numbers indicated assignment to the intervention group, while even numbers indicated assignment to the control group.

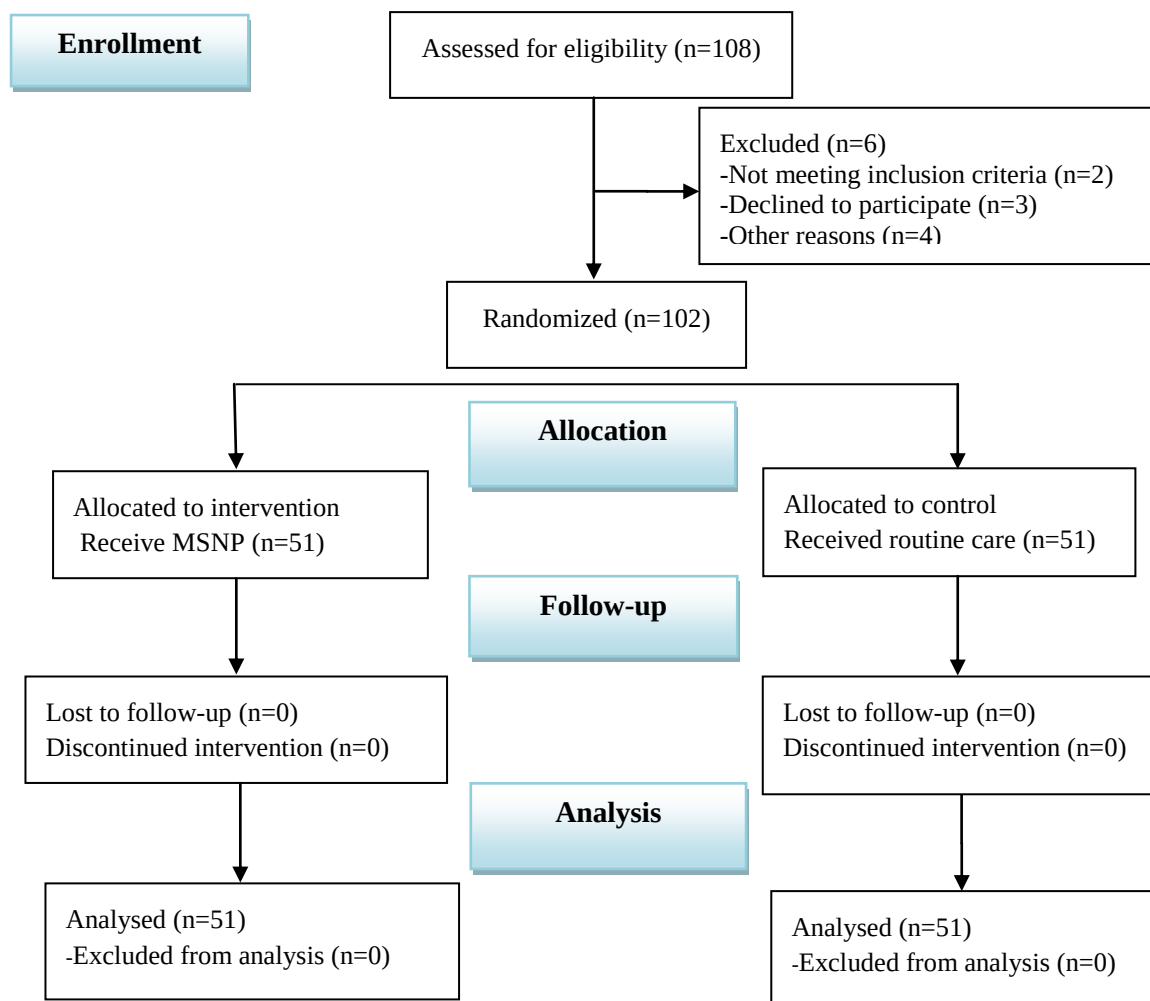


Figure 1. CONSORT flow diagram of participant enrollment, randomization, allocation, follow-up, and analysis of MSNP in patients with breast cancer after mastectomy

All patients entered the study on the morning times, and the order of visits had no effect on allocation. Due to the educational and behavioral nature of the intervention, blinding of participants and instructors was not feasible. However, questionnaire data were coded and analyzed anonymously to reduce potential assessment bias and the data analyst was blinded to the group allocation. The flow of participant enrollment, randomization, allocation, follow-up, and analysis is presented in Figure 1.

The intervention consisted of a multimodal nursing educational program delivered over six weekly sessions, each lasting 60 minutes (30 minutes of education followed by 30 minutes of question-and-answer discussion or practical exercise). To ensure intervention fidelity and consistency in the delivery of the educational content, all sessions were conducted by a single trained researcher using standardized PowerPoint presentations and a predetermined educational protocol. The educational materials and session contents were reviewed and shared with specialist educators from relevant disciplines, including a nutritionist, physiotherapist, and psychologist, to ensure multidisciplinary accuracy and consistency of the intervention content. A fixed session structure and standardized teaching materials were used throughout all sessions to maintain uniformity in the educational process. In addition, all sessions were audio-recorded for quality control and monitoring purposes. Before the commencement of the study, the trainer had received standardized training regarding the intervention protocol and educational procedures.

During the first week, a face-to-face introductory session was conducted, including explanations regarding the physiology and etiology of breast cancer, types of breast cancer treatments, surgical methods, adverse reactions to treatments, and complications following mastectomy. Additionally, information regarding the treatments received, surgical methods used, adverse reactions, and complications experienced by the participants was collected (23, 25). In the second week, the session focused on the physical dimension, providing information on the benefits of exercise for patients with breast cancer. During the second 30 minutes, bilateral Upper limb exercise training was conducted face-to-face, accompanied by an educational video. Participants were asked to perform these exercises initially in groups and subsequently at home 5 to 10 times per day (19, 25). During the third week, another session (physical aspect) was held, focusing on proper nutrition for patients with breast cancer and appropriate cooking methods. In the second half of the session, a standard nutritional program for patients with breast cancer was provided. Participants were instructed to adhere to the dietary plan and record their daily food intake and dietary regimen (26-28). In the fourth week, next session (psychological aspect) was conducted in person with the participation of a psychologist. Sessions included stress management, relaxation techniques, coping strategies, peer communication encouragement, and non-pharmacological supportive approaches for symptom management. To reduce pain, it is recommended to use non-pharmacological pain control methods such as patient-friendly music therapy twice a day (9 am to 11 am), (9 pm to 11 pm) for thirty minutes (19, 23, 29).

In the fifth week, the session focused on the social aspect. Information was provided on the patient's role transition from illness to social roles, utilizing psychological and social support from caregivers and family members. Topics included changes in self-image, effective communication skills, awareness of the core elements of communication and caregiver education regarding supervision of dietary plans, exercise, and rest, as well as coping with the negative impacts of cancer to enhance psychological and social support at home. In the sixth and final week, the session was conducted to evaluate patients' performance and adherence to the educational program (19, 20, 25). The content and structure of the six-week educational intervention are presented in Table 1.

The control group simultaneously received routine hospital educational programs, including monitoring of vital signs, postoperative nursing care, drain management, supervision, and methods for preventing complications, as routinely provided at the health clinics of Omid Hospital. To evaluate the effects of the intervention, the Chronic Disease Self-Efficacy Scale (CDSSES) and the Strategies Used by People to Promote Health (SUPPH) were administered at three time points: before the intervention, immediately after the intervention, and two weeks after completion of the intervention.

The Chronic Disease Self-Efficacy Scale (CDSSES) was developed by Lorig in 1996, with an internal consistency reliability of 0.92 and a test-retest reliability of 0.82 (30). The questionnaire originally consisted of 33 items across 10 domains; which, considering the cultural and religious differences of the Iranian people, with the relevant items in the instrument (such as the number of sexual partners, performing gardening services at home, etc.), during the validity and reliability process, it was reduced to 30 items for the first time by the faculty members reviewing the instrument. After

removing three items, the internal consistency reliability measured by Cronbach's alpha was reported as 0.95 (31).

Table 1. Multimodal Standard Nursing Program (MSNP)

Session	Session Content	Follow-up
Session 1 (Introduction)	During the first 30 minutes, explanations were provided regarding breast cancer physiology and etiology of breast cancer, types of treatment, surgical methods used, adverse reactions to treatment, and complications arising from both treatment and mastectomy (23, 25). In the second half, patients were asked to provide detailed information about their treatments, surgical methods, and adverse reactions.	Patients were requested to bring their medical documents to the next session, if possible.
Session 2 (Physical Dimension)	During the first 30 minutes, information was provided regarding the benefits of exercise for breast cancer patients. Patients were also instructed to limit activities that increase circulation (such as heat, cold, and rapid arm movements) and the reasons behind these restrictions were explained. In the second half, Upper limb exercise (two-side) training was conducted face-to-face, accompanied by an educational video (19, 25).	Patients were requested to perform these exercises in a group setting and then 5 to 10 times per day at home (19, 25).
Session 3 (Physical Dimension)	During the first 30 minutes, information regarding proper nutrition and healthy cooking methods for breast cancer patients was provided. In the second half, a nutrition plan was presented (including maintaining ideal weight, a healthy diet rich in grains, fruits (berries), juices (natural and smoothies), vegetables (fresh and frozen), and legumes; consuming supplements such as Vitamins E and C; and limiting salt, red and processed meats (sausages, deli meats, smoked meats), alcohol, and high-energy/sugary foods) (26-28).	Patients were requested to follow the provided nutrition plan and bring a list of their consumed foods throughout the week to the next session.
Session 4 (Psychological Dimension)	Conducted in person with a psychologist. In the first half, explanations were provided regarding common patient problems and solutions were offered. For example: to reduce pain, non-pharmacological methods like music therapy (patient's preferred genre, twice daily from 9–11 AM and 9–11 PM for 30 minutes) and interactive distraction techniques were recommended. To reduce negative psychological impacts and improve body image, peer support and shared experiences were advised, and families were asked to provide adequate psychological support. For sleep disorders, instrumental music therapy before bed was recommended. In the second half, questions and exercises regarding these issues were conducted (19, 23, 29).	Patients were requested to use the mentioned methods if they experienced the described problems and to report their issues and the methods used during the week at the next session.
Session 5 (Social Dimension)	In the first half, information was provided regarding the patient's role transition from "patient" to "social role" through psychological and social support from caregivers and family. Topics included changing the patient's self-image, effective communication methods and core communication elements, training caregivers to monitor nutrition, exercise, and rest, and coping with the negative impacts of cancer to support patients at home. In the second half session questions and asks regarding these topics was held (19, 20, 25).	Caregivers were requested to monitor the patient's nutrition, exercise, and rest, and to support them in coping with the negative impacts of cancer.
Session 6 (Follow-up & Troubleshooting)	Conducted in person with the researcher and the patient to assess the patient's performance, how they adhered to the educational program, and to resolve any issues or answer questions (19, 20, 25).	Additionally, telephone follow-ups were conducted with the patients throughout the week.

Strategies Used by People to Promote Health (SUPPH) was developed by Lev in 1999 and has been used by Tsay and Hung, who reported a reliability coefficient of 0.93. In Iran, the questionnaire was validated by Motarian in 2012 with a Cronbach's alpha of 0.91 and by Ruyani in 2013 with a Cronbach's alpha of 0.93.(32-34). Accordingly, Motarian study, the questionnaire SUPPH was translated into Persian (Farsi) and back-translated into English to ensure its validity, which was further confirmed by a panel of experts. Next, the instrument was distributed to 30 representative patients for measurement of reliability. Cronbach's alpha for the overall questionnaire was 0.91 and for the dimensions of the instrument, it was as follows: stress reduction 0.79, decision making 0.8, and

positive attitude 0.87. Reliability of the original form in these dimensions was reported as 0.89 stress reduction, 0.83 decision making, and 0.92 positive attitude. Possible scores for the overall self-care self-efficacy questionnaire were 29-145. The ranges for the dimensions were: positive attitude 16- 80, stress 10- 50, and decision making 3-15. Higher scores reflect better outcomes (32).

In the present study, to establish content validity based on the research objectives, the questionnaire items were reviewed by seven faculty members from the School of Nursing at Mashhad University of Medical Sciences, and their corrective comments were applied.

After data entry into SPSS software (version 2023), descriptive statistics including frequency distribution tables, means, and standard deviations were used to describe the study sample. The normality of continuous variables was assessed using the Kolmogorov–Smirnov test as well as skewness and kurtosis indices. To assess homogeneity between the two groups and analyze the study objectives, the chi-square test was used for categorical variables, the independent t-test for normally distributed continuous variables, and the Mann–Whitney U test for non-normally distributed continuous variables. To evaluate the effect of the intervention, change analysis and analysis of Generalized Estimating Equation (GEE) were performed. In all analyses, a confidence level of 95% and a significance level of 0.05 were considered.

Ethical Consideration

This study was approved by the Committee for Ethics in Biomedical Researches, school of Nursing, Mashhad University of Medical Sciences, Mashhad, Iran (Ethical approval code: IR.MUMS.NURSE.REC.1403.086). The study protocol registered in the Iranian Registry of Clinical Trials (IRCT20241221064120N1).

Results

This study aimed to determine the effect of a multimodal standard nursing program on self-efficacy in post-mastectomy patients with breast cancer. A total of 102 patients were enrolled in the study, with 51 in the intervention group and 51 in the control group.

To examine the assumption of normality of the variables SUPPH and CDESES, the Kolmogorov-Smirnov test was used. All study variables except the CDESES Score in the intervention group (pre-test period) are normal ($p < 0.01$). Other methods such as examining the skewness and kurtosis index have been used for this variable. If the skewness and kurtosis index are in the range of 2 and -2, it means that the data are normal. Based on these indices, the desired variable can also be considered normal ($p < 0.01$). Also, all study variables, except for the self-care self-efficacy score in the intervention group (post-test period) and the score of this variable in the control group (pre-test and follow-up), are normal ($p < 0.01$).

The results of the table 2 give an origin that the intervention and control groups were homogeneous in terms of age, ethnicity, education level, hospitalization and occupation history (Table 2).

Results presented in Table 3 indicate that, based on independent t-test, there were no significant differences in baseline questionnaire scores between the intervention and control groups ($p > 0.05$).

But, the average score of the CDESES and SUPPH questionnaire in the post-test and follow-up stages was higher in the intervention group than in the control group ($p < 0.001$).

Table 3 also showed, a statistically significant difference was observed in the two groups, so that in the intervention group, the average score of the CDESES and SUPPH Questionnaire increased compared to the control group in the post-test and follow-up period ($p < 0.001$). It can be said that the implementation of a MSNP was effective in increasing the score of the CDESES and SUPPH Questionnaire in medical patients ($p < 0.001$). MSNP was effective in 37% of breast cancer patients at post-test and 45% at follow-up based on the initial SUPPH score. MSNP was also effective in 22% of breast cancer patients at post-test and 61% at follow-up based on the initial CDESES score.

Table 2. Frequency Distribution of Patients with Breast Cancer Participating in the Study in the Intervention and Control Groups According to age, Occupation, Ethnicity, History of Hospitalization, Educational Level

Variable	Intervention Group n (%)	Control group n (%)	Test statistic	p-value
Age (year): Mean $\pm$ SD	10.38 $\pm$ 48.72	48.42 $\pm$ 12.98	0.89	-0.13*
Occupation				
Housewife	39 (78)	33(63.5)	1.81	0.19**
Self-employed	1 (2)	3 (5.8)		
Employed	6 (12)	9 (17.3)		
Ethnicity				
Persian	48 (96)	46 (88.5)	3.38	0.33***
Arab	0 (0)	2 (3.8)		
Kurdish	0 (0)	2 (3.8)		
Turkish	2 (4)	2 (3.8)		
History of Hospitalization				
Yes	32 (64)	29 (55.8)	0.72	0.42**
No	18 (36)	23 (44.2)		
Educational Level				
Under diploma	34 (68)	27 (51.9)	6.32	0.15***
Diploma	12 (24)	11 (21.2)		
Above diploma	4 (8)	14 (26.9)		

*Independent t-test; **Chi-square test; ***Fisher's test

Table 3. The changes CDESES and SUPPH questionnaire in Patients with Breast Cancer Participating in the Study by Group and Study Time Point

		Control group	Intervention group	Between groups p-value	Effect size
Chronic disease self-efficacy scale (CDESES)*	Pre-intervention (A)	1.15 $\pm$ 5.91	1.42 $\pm$ 5.90	0.98	
	Post-intervention (B)	1.52 $\pm$ 5.31	1.65 $\pm$ 6.53	<0.001	
	Two weeks after intervention (C)	1.23 $\pm$ 5.17	1.35 $\pm$ 7.23	<0.001	-
	A/B comparison	-0.59 $\pm$ 1.05	0.63 $\pm$ 1.30	<0.001	0.22
	A/C comparison	-0.73 $\pm$ 0.85	1.33 $\pm$ 0.92	<0.001	0.61
Strategies Used by People to Promote Health (SUPPH)*	Pre-intervention (A)	8.54 $\pm$ 69.22	9.85 $\pm$ 66.71	0.17	
	Post-intervention (B)	12.20 $\pm$ 62.0	11.58 $\pm$ 78.48	<0.001	
	Two weeks after intervention (C)	13.33 $\pm$ 63.38	12.81 $\pm$ 83.58	<0.001	-
	A/B comparison	-7.22 $\pm$ 11.76	11.77 $\pm$ 13/33	<0.001	0.37
	A/C comparison	-5.84 $\pm$ 11.99	16.86 $\pm$ 11.92	<0.001	0.45

*Independent t-test

Discussion

In the present study (MSNP) significantly improved self-efficacy among women after mastectomy. One important characteristic of the current intervention was its comprehensive and multimodal structure, which simultaneously addressed physical, psychological, and social dimensions of recovery through face-to-face education, exercise training, nutritional counseling, psychological coping strategies, and social support education. This multidimensional approach may explain the observed improvement in patients' confidence in symptom management, treatment adherence, and self-care behaviors.

Mohammed Hashem et al. (2020) also reported positive effects of a nursing educational program on self-efficacy among women undergoing mastectomy (35). However, unlike the present study, their intervention mainly focused on routine postoperative education and self-care instructions. In contrast, the MSNP used in the current study incorporated multiple complementary components including supervised exercise training, psychological coping techniques, nutritional guidance, and caregiver

involvement. According to Bandura's Social Cognitive Theory, self-efficacy is strengthened not only through knowledge acquisition but also through mastery experiences, verbal encouragement, behavioral rehearsal, and emotional regulation. Therefore, the multimodal nature of MSNP may have provided participants with repeated opportunities to practice self-care behaviors, receive feedback, and gain emotional support, resulting in a stronger and more sustained improvement in self-efficacy compared with conventional educational approaches.

Similarly, Rastgar et al. (2020) demonstrated that counseling sessions combined with telephone follow-up improved self-care and self-efficacy among women after mastectomy (36). Although the delivery methods differed from the current study, both interventions shared an important feature: continuous patient engagement beyond routine hospital education. In Rastgar et al.'s study, telephone follow-up likely reinforced behavioral adherence and provided ongoing emotional reassurance after discharge, whereas in the present study, repeated face-to-face sessions allowed direct interaction, individualized feedback, practical skill training, and active patient participation. These findings suggest that continuity of support and repeated patient-provider interaction may be more influential in improving self-efficacy than the specific educational format itself. Furthermore, both studies emphasize that interventions extending beyond a single educational encounter are more likely to produce meaningful behavioral and psychological changes in patients with breast cancer.

The findings of the present study are also supported by the study of Imani et al. (2021), which showed that self-care education improved self-efficacy and quality of life in patients with colorectal cancer undergoing chemotherapy (25). Although the disease context differed, both studies highlight the importance of empowering patients through structured self-management education. In the current study, this empowerment may have occurred through active patient involvement in exercise performance, symptom monitoring, dietary adherence, and coping strategies, all of which can increase patients' perceived control over their condition. This interpretation is consistent with evidence suggesting that interventions promoting active participation and behavioral practice can strengthen self-efficacy in patients with chronic diseases.

In contrast, Mack et al. (2015) reported that an educational intervention improved knowledge and self-care behaviors related to febrile neutropenia prevention but did not significantly improve self-efficacy among patients with breast cancer (37). Several methodological and intervention-related differences may explain this discrepancy. First, the intervention in Mack et al.'s study primarily focused on infection-prevention knowledge and handwashing skills, whereas the present study targeted broader psychosocial and behavioral dimensions of recovery after mastectomy. Second, their educational program emphasized information transfer and technical skill acquisition rather than ongoing behavioral reinforcement or emotional support. In contrast, the MSNP incorporated repeated interactive sessions, practical exercises, psychological coping strategies, and social support components, which are known contributors to self-efficacy enhancement according to social cognitive theory. Additionally, self-efficacy generally develops through repeated successful experiences and sustained support; therefore, a narrowly focused educational intervention may improve knowledge without necessarily changing patients' confidence in managing their overall health condition.

Another study conducted by Charos et al., entitled "Self-Efficacy in Breast Cancer Patients: A Pre- and Post-Intervention Study of a Short-Term Digital Psychosocial Intervention," involved 58 patients with breast cancer hospitalized in oncology centers in Athens. The results showed no statistically significant difference in patient self-efficacy after the intervention, although positive effects were observed in maintaining social relationships and improving communication and problem-solving abilities. One possible reason for the inconsistency with the present study is the short duration of the intervention; in that study, the intervention lasted only ten minutes and was delivered digitally in a single session, which may not have been sufficient to induce meaningful changes in self-efficacy. In contrast, the present study, through a greater number of sessions, longer intervention duration, and comprehensive coverage of physical, psychological, and social aspects, demonstrated the positive impact of a multimodal educational program on improving self-efficacy in patients (38).

Finally, several limitations should be considered when interpreting the findings of the present study. First, the follow-up period was limited to two weeks after the intervention, which may not adequately reflect the long-term sustainability of self-efficacy improvements. Second, the study was conducted in a single referral center, which may limit the generalizability of the findings to other clinical settings. Third, due to the nature of the educational intervention, participant blinding was not feasible and may

have introduced performance bias. In addition, self-efficacy outcomes were assessed using self-report questionnaires, which may be subject to recall or social desirability bias. Finally, convenience sampling may have limited the representativeness of the study population.

Implications for practice

The findings of this study demonstrated MSNP, by covering physical, psychological and social aspects, effectively improved self-efficacy in patients after mastectomy. In clinical settings, to ensure successful implementation in clinical practice, the MSNP should be incorporated into routine post-mastectomy follow-up pathways rather than delivered as a stand-alone intervention. Oncology nurses can serve as the main providers of the program, delivering structured educational sessions during outpatient visits and coordinating with other members of the multidisciplinary team when specialized support is required. To improve feasibility and consistency, the intervention should be standardized through a package of educational tools, including a manualized protocol, exercise demonstration videos, nutritional guidance, and self-care booklets. The most important challenges are limited staff time, workload pressure in oncology units, and the cost of repeated sessions or multidisciplinary involvement. These issues can be addressed by embedding the program into existing follow-up appointments, offering group-based education when appropriate, and using blended delivery methods such as prerecorded or digital educational content. In addition, a train-the-trainer model may help disseminate the program efficiently across clinical sites.

Training for oncology nurses is a critical prerequisite. Nurses should receive focused education on self-efficacy-enhancing strategies, patient counseling, symptom assessment, psychological support, and practical use of the MSNP materials. Competency-based workshops and refresher sessions can support fidelity of implementation. Although the program requires an initial investment in staff preparation and educational resources, it is likely to be cost-effective in the longer term by improving adherence, self-management, and early detection of complications, thereby reducing avoidable healthcare utilization and re-hospitalization.

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Conflicts of interest

The authors declare that there were no conflicts of interest in this study.

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Authors' Contributions

A.H, E. RT and El.S contributed to the study's conception and design. El.S, E. RT, A.H performed material preparation and analysis. El.S and El.H.S performed data collection. The first draft of the manuscript was written by El.S, El.H.S and E.R.T. All authors read and approved the final manuscript.

Artificial Intelligence statement

The authors did not use artificial intelligence in this article.

References

1. Katsura C, Ogunmwonyi I, Kankam HK, Saha S. Breast cancer: presentation, investigation and management. *British Journal of Hospital Medicine (London)*. 2022;83(2):1-7.
2. Ganjivatan K, Koshan M, Magdavifar N. Evaluation Of Sexual Self-Efficacy And Subjective Body Image After Mastectomy And Lampectomy In Women With Breast Cancer. *International Journal of Medical Investigation*. 2023;12(3):11-8.
3. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics

- 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: A Cancer Journal for Clinicians. 2024;74(3):229-263.
4. ANSARIFAR T, KARIMI MH, Ranjbar H, SADEGHI M. Evaluating the Effect of Education based on the Health Belief Model in taking the preventive behaviors for breast cancer among female health workers. *Journal of Torbat Heydariyeh University Of Medical Sciences*.2020;8(2):14-22.
 5. Hosseini Bereshneh A, Soltani D, Veisi N, Khademi M, Modarressi MH. Horizons of personalized medicine in breast cancer treatment. *Tehran University of Medical Sciences Journal*. 2016;74(9):607-13.
 6. Waks AG, Winer EP. Breast cancer treatment: a review. *JAMA*. 2019;321(3):288-300.
 7. Ozturk CN, Ozturk C, Soucise A, Ahsan N, Kuhn J, Platek M, et al. Bilateral immediate two-stage breast reconstruction in patients with unilateral breast cancer: Outcomes analysis and risk assessment. *Journal of Plastic, Reconstructive & Aesthetic Surgery*. 2021;74(3):480-485.
 8. Khoshnazar T, Mohammadi F, Khankeh H, Haghighat S. The effect of home based rehabilitation on volume edema, activity daily in breast cancer survivor's. *Iranian journal of breast diseases*. 2010;3(3):34-42.
 9. Babaii Roochi G, Feyzi A, Keshavarz M. Effects of different therapeutic and surgical methods on survival of patients with breast cancer. *Daneshvar Medicine*. 2005;13(59):19-28.
 10. Soroush M, Hejazi E, Shoakazemi M, Gheranpayeh L. Body Image Psychological Characteristics and Hope in Women with Breast Cancer. *Iranian Journal of Breast Diseases*. 2014;7(4):52-63.
 11. Cal A, Bahar Z, Gorken I. Effects of Health Belief Model based nursing interventions offered at home visits on lymphedema prevention in women with breast cancer: a randomised controlled trial. *Journal of Clinical Nursing*. 2020;29(13-14):2521-34.
 12. Salimian S, Esmaili R, Dabirian A, Mansoorin S, Anboohi SZ. The survey of factors related to self-efficacy based on Orem's theory in patients with coronary artery bypass surgery in Tehran in 2014. *Advances in Nursing & Midwifery*. 2015;25(90):9-16.
 13. Mollaoğlu MC, Akın EB, Mollaoğlu M, Karadayı K. Investigation of symptom management and functional state of women who underwent breast cancer surgery. *Revista da Associação Médica Brasileira*. 2024;70(1):e20230954.
 14. Shoakazemi M. Comparison of Self-Efficacy and Competence Levels between Women with Breast Cancer and Healthy Women. *Iranian Journal of Breast Diseases*. 2012;5(1).
 15. Hemati M, Khademian Z, Rivaz M, Tahmasebi S. Impact of a self management mobile application on quality of life and limb circumference in women with breast cancer related lymphedema. *Scientific Reports*. 2025;15(1):30172.
 16. DiSipio T, Rye S, Newman B, Hayes S. Incidence of unilateral arm lymphoedema after breast cancer: a systematic review and meta-analysis. *The lancet oncology*. 2013;14(6):500-515.
 17. Abd El Fatah NK, ElMessiery MS, Awade AR. Effect of Mobile Based Educational Program through WhatsApp on Self-Efficacy and Psychological Distress among Female Geriatric Patients with breast cancer Undergoing Chemotherapy. *International Egyptian Journal of Nursing Sciences and Research*. 2023;4(1):328-51.
 18. Nihayati HE, Nurhanifah L, Krisnana I. The effect of psychoeducation on self-efficacy and motivation for taking treatment in breast cancer patients (Ca Mammar). *Jurnal Ners*. 2021;16(1):96-97.
 19. Zhou K, Wang D, He X, Huo L, An J, Li M, et al. Effectiveness of a multimodal standard nursing program on health-related quality of life in Chinese mainland female patients with breast cancer: protocol for a single-blind cluster randomized controlled trial. *Bmc Cancer*. 2016;16(1):698-699.
 20. Boehm K, Cramer H, Staroszynski T, Ostermann T. Arts therapies for anxiety, depression, and quality of life in breast cancer patients: a systematic review and meta-analysis. *Evidence-Based Complementary and Alternative Medicine*. 2014;2014:103297.
 21. Zeng Y, Huang M, Cheng AS, Zhou Y, So WK. Meta-analysis of the effects of exercise intervention on quality of life in breast cancer survivors. *Breast Cancer*. 2014;21(3):262-274.
 22. Hagstrom AD, Marshall PW, Lonsdale C, Cheema BS, Fiatarone Singh MA, Green S. Resistance training improves fatigue and quality of life in previously sedentary breast cancer survivors: a randomised controlled trial. *European journal of cancer care*. 2016;25(5):784-794.
 23. Zhao N, Yin F, Wu X, Zhong Y. The effectiveness of a WeChat-based multimodal nursing program for women with breast cancer: A randomized controlled trial protocol. *Medicine (Baltimore)*.

2020;99(52):e23526.

24. Pudkasam S, Polman R, Pitcher M, Fisher M, Chinlumprasert N, Stojanovska L, et al. Physical activity and breast cancer survivors: Importance of adherence, motivational interviewing and psychological health. *Maturitas*. 2018;116:66-72.
25. Imani E, Karimi Haji Khademi MA, Hosseini Tasnizi S, Shafizad A. The effect of self-care education program on self-efficacy and quality of life of patients with colorectal cancer undergoing chemotherapy. *Journal of Preventive Medicine*. 2021;8(2):82-72.
26. Limon-Miro AT, Lopez-Teros V, Astiazaran-Garcia H. Dietary Guidelines for Breast Cancer Patients: A Critical Review. *Advances in Nutrition*. 2017;8(4):613-623.
27. Shaharudin SH, Sulaiman S, Shahril MR, Emran NA, Akmal SN. Dietary changes among breast cancer patients in Malaysia. *Cancer Nursig*. 2013;36(2):131-138.
28. De Cicco P, Catani MV, Gasperi V, Sibilano M, Quaglietta M, Savini I. Nutrition and Breast Cancer: A Literature Review on Prevention, Treatment and Recurrence. *Nutrients*. 2019;11(7):1513-1514.
29. Breitbart WS, Butow PN, Jacobsen PB. *Psycho-oncology*. 4th ed. New York, NY: Oxford University Press; 2021.
30. Lorig K, Stewart A, Ritter P, Laurent D and et all. Outcome measures for health education and other health care interventions. Thousand Oaks, CA: Sage Publications; 1996.
31. Parsa-Yekta Z, Shahsavari H, Ramezanzade Tabriz E, Yekaninejad M. Relationship between Emotional Needs and the Level of Self-Efficacy of Cancer Patients Admitted to Omid Hospital in Mashhad in 2014. *Journal of Rafsanjan University of Medical Sciences*. 2016;15(8):727-738.
32. Moattari M, Ebrahimi M, Sharifi N, Rouzbeh J. The effect of empowerment on the self-efficacy, quality of life and clinical and laboratory indicators of patients treated with hemodialysis: a randomized controlled trial. *Health and Quality of Life Outcomes*. 2012;10:115-116.
33. Royani Z, Rayyani M, Behnampour N, Arab M, Goleij J. The effect of empowerment program on empowerment level and self-care self-efficacy of patients on hemodialysis treatment. *Iranian Journal of Nursing and Midwifery Research*. 2013;18(1):84-87.
34. Lev EL, Eller LS, Kolassa J, Gejerman G, Colella J, Lane P, et al. Exploratory factor analysis: strategies used by patients to promote health. *World Journal of Urology*. 2007;25(1):87-93.
35. Mohammed E, Mohammed Z, Youssef S, Ayoub M. Effect of Educational Nursing Program on Performance and Self-efficacy of Females Undergoing Mastectomy. *Assiut Scientific Nursing Journal*. 2020;8(21):74-83.
36. Rastegar M, Mahmoodi Z, Esmaelzadeh Saeieh S, Sharifi N, Kabir K. The Effect of Health Literacy Counselling on Self-Care in Women after Mastectomy: a Randomized Clinical Trial. *Journal of Caring Sciences*. 2020;9(1):39-45.
37. Mak WC, Yin Ching SS. Effect of an education program on knowledge, self-care behavior and handwashing competence on prevention of febrile neutropenia among breast cancer patients receiving Doxorubicin and Cyclophosphamide in Chemotherapy Day Centre. *Asia Pacific Journal of Oncology Nursing*. 2015;2(4):276-288.
38. Charos D, Andriopoulou M, Kyrkou G, Deltsidou A, Vaina G, Vivilaki V. Self-Efficacy in Breast Cancer Patients: A Pre-Post Study of a Brief Digital Psychosocial Intervention. *Diseases*. 2025;13(7):198-199. doi:10.3390/diseases13070199.