

Comparing the Efficacy of a Quality of Life Enrichment Package and Mindfulness-Based Cancer Recovery Intervention on Pain Self-Efficacy in Mastectomized Women Undergoing Chemotherapy

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ABSTRACT

Objective: The present study aimed to compare the efficacy of a Quality of Life Enrichment Package and a Mindfulness-Based Cancer Recovery (MBCR) intervention on pain self-efficacy in mastectomized women undergoing chemotherapy.

Methods and Materials: Methodologically, this applied study was designed as a randomized clinical trial with a pretest-posttest control-group design and a three-month follow-up. The statistical population consisted of patients referred to the MACSA Charity Institute (Iranian Cancer Control Center) in Mashhad in 1404 who met the inclusion criteria. Forty-five mastectomized women undergoing chemotherapy were selected purposively and randomly assigned to three groups: two experimental groups, consisting of the researcher-made Quality of Life Enrichment Package and the Mindfulness-Based Cancer Recovery intervention, and one control group. The Pain Self-Efficacy Questionnaire developed by Nicholas (1989) was used for data collection. Data were analyzed using repeated-measures analysis of variance in SPSS.

Findings: The findings showed that the mean difference in pain self-efficacy scores between the Mindfulness-Based Cancer Recovery group and the Quality of Life Enrichment Package group was not significant at either the posttest or follow-up stage ($p > .05$). This indicates that both interventions were effective in increasing pain self-efficacy among patients with cancer, with no statistically significant difference between the two intervention approaches.

Conclusion: Both the Quality of Life Enrichment Package and the Mindfulness-Based Cancer Recovery intervention may be recommended as psychological components of treatment protocols for improving pain self-efficacy in mastectomized women undergoing chemotherapy in psycho-oncology clinics.

Keywords: Quality of Life Enrichment Package; Mastectomy; Chemotherapy; Mindfulness-Based Cancer Recovery; Pain Self-Efficacy.

1. Introduction

Breast cancer is one of the most important health challenges affecting women worldwide and remains a major cause of cancer-related morbidity and mortality despite substantial advances in screening, diagnosis, systemic treatment, and survivorship care. Global cancer estimates continue to identify breast cancer as one of the most frequently diagnosed malignancies in women, illustrating both its epidemiological significance and the growing need to address not only survival but also the long-term psychological, functional, and quality-of-life consequences of the disease and its treatment (Bray, 2024). Improvements in medical treatment have increased the number of women living for prolonged periods after diagnosis; however, longer survival frequently entails continued exposure to complex treatment-related consequences, including pain, fatigue, emotional distress, fear of disease progression, alterations in body image, impaired sexual functioning, cognitive complaints, sleep disturbance, limitations in daily activities, and disruptions in family and social roles. For women who undergo mastectomy and chemotherapy, these challenges may occur simultaneously and interact with one another, making psychosocial rehabilitation an essential component of comprehensive breast cancer care rather than a secondary adjunct to biomedical treatment.

Mastectomy represents a particularly demanding phase of breast cancer treatment because the procedure affects not only physical integrity but also domains closely related to femininity, self-image, sexuality, interpersonal relationships, and social identity. Women may experience the loss or alteration of a breast as a visible reminder of illness and as a threat to previously established perceptions of their bodies and intimate selves. Evidence from Iranian breast cancer populations indicates that mastectomy may produce substantial physical, psychological, and social consequences, including negative body image, reduced confidence, changes in interpersonal interactions, emotional distress, and difficulties adapting to post-treatment life (Zarei, 2023). Sexual and relational functioning may also be negatively affected after surgery, and interventions directed toward psychosocial adjustment have been shown to be relevant for improving post-mastectomy sexual functioning and satisfaction (Bokaie et al., 2022). More recent evidence similarly suggests that psychological interventions such as mindfulness training and structured self-care can positively affect sexuality-related psychological outcomes among

women with breast cancer, demonstrating that the consequences of breast cancer extend well beyond disease control and require multidimensional rehabilitation strategies (Alishiri et al., 2026).

Chemotherapy can further intensify the burden experienced after mastectomy. In addition to systemic side effects such as fatigue, nausea, weakness, and cognitive complaints, patients may experience treatment-related pain or the exacerbation of persistent pain associated with surgery, tissue damage, musculoskeletal complications, neuropathy, and other cancer-related mechanisms. Pain in breast cancer is therefore not solely a sensory experience but a multidimensional phenomenon shaped by emotional distress, cognition, expectations, coping strategies, and perceived personal control. Psychological distress may amplify pain perception, reduce participation in daily activities, and contribute to functional restriction, whereas ineffective pain management can increase distress and diminish overall quality of life (Meireles, 2023). Consequently, understanding the psychological processes through which patients continue functioning despite pain has become increasingly important in oncology care.

Among these psychological processes, self-efficacy occupies a central position. Bandura conceptualized self-efficacy as an individual's belief in his or her capability to organize and execute the courses of action required to manage prospective situations and achieve desired outcomes (Bandura, 1997). Self-efficacy beliefs influence how individuals interpret challenges, how much effort they expend, how long they persist in the presence of obstacles, and how effectively they recover from setbacks. Within the context of chronic illness, self-efficacy may therefore determine whether patients perceive symptoms as overwhelming barriers or as difficulties that can be managed through adaptive behavior. In cancer care, where patients often confront persistent symptoms together with uncertainty and treatment demands, stronger self-efficacy may facilitate active coping, adherence to therapeutic recommendations, engagement in daily activities, and more adaptive emotional adjustment.

Pain self-efficacy is a more specific construct referring to an individual's confidence in the ability to perform activities and function effectively despite experiencing pain. Nicholas emphasized that pain self-efficacy should be conceptualized not simply as confidence in eliminating or reducing pain, but as confidence in continuing valued and necessary activities even when pain remains present (Nicholas, 2007). This distinction is clinically important because many cancer-

related pain experiences cannot be completely eliminated during active treatment. A woman who believes she can continue caring for herself, interacting socially, completing household responsibilities, engaging in appropriate physical activity, and managing treatment demands despite pain is likely to demonstrate a different functional trajectory from a patient who interprets pain as evidence that activity is impossible or unsafe. Pain self-efficacy thus shifts the focus from symptom eradication to functional capability in the presence of symptoms.

Empirical research supports the clinical significance of this construct. Pain self-efficacy beliefs have been associated with pain behavior and subsequent functioning, suggesting that beliefs concerning one's ability to act despite pain can predict important behavioral outcomes beyond pain severity alone (Asghari & Nicholas, 2001). Evidence from the broader chronic-pain literature likewise indicates that self-efficacy is an important prognostic factor associated with disability, psychological functioning, pain-related outcomes, and adjustment over time (Martinez-Calderon, 2018). In patients with cancer, pain self-efficacy may be especially important because the experience of pain occurs in a context characterized by threat perceptions, health anxiety, uncertainty, and concerns about recurrence or disease progression. Research examining psychological models in individuals with cancer has identified pain self-efficacy as an important component within broader networks involving health anxiety, spiritual health, positive emotional processes, and internal health locus of control (Suleimani Namaghi et al., 2021). These findings collectively suggest that strengthening patients' confidence in their ability to function despite pain may represent a meaningful target for psychological intervention.

Interventions that enhance self-management may be particularly relevant in this regard. Cancer pain requires patients to engage actively in symptom monitoring, medication management, behavioral coping, communication with healthcare providers, activity regulation, and psychological adaptation. A systematic review of randomized controlled trials examining self-management interventions for cancer-related pain demonstrated that structured self-management approaches can contribute to improved pain-related outcomes and strengthen patients' ability to participate actively in symptom control (Zhang et al., 2023). Similarly, personalized interventions designed for long-term breast cancer survivors have been developed to improve both quality of life and self-efficacy, emphasizing the importance of interventions that simultaneously address

functional, emotional, and behavioral adaptation (Soto-Ruiz et al., 2022). These findings indicate that self-efficacy is not merely an outcome of successful adaptation but can itself be deliberately strengthened through interventions that provide knowledge, experiential learning, coping skills, behavioral practice, and supportive feedback.

Quality of life is another central construct in breast cancer survivorship and active treatment. Quality of life encompasses physical health, psychological well-being, social relationships, functioning, personal meaning, and the individual's subjective evaluation of life circumstances. In women with breast cancer, psychological adjustment is closely related to quality of life, and difficulties in accepting and adapting to cancer may negatively influence multiple dimensions of functioning (Fallah et al., 2023). This relationship is particularly relevant after mastectomy, when patients must adapt simultaneously to physical changes, altered body image, treatment side effects, uncertainty regarding the future, and changes in intimate and social relationships. Accordingly, interventions that aim to enrich quality of life may be especially valuable when they address several interacting dimensions rather than focusing narrowly on a single symptom.

A Quality of Life Enrichment approach can be conceptualized as a multidimensional intervention designed to strengthen adaptive functioning across emotional, cognitive, behavioral, interpersonal, physical, and existential domains. For women undergoing breast cancer treatment, such an approach may incorporate education about depression and anxiety, emotional awareness and expression, cognitive coping, management of concentration difficulties, adjustment to altered body image, intimate and sexual concerns, sleep regulation, meaning-making, spirituality, hope, and self-care. These domains are interconnected in cancer adjustment. For example, reduced body acceptance may influence intimate relationships, persistent anxiety may disrupt sleep, poor sleep may increase fatigue and pain sensitivity, depressive thinking may reduce activity, and impaired activity may further weaken self-efficacy. A comprehensive enrichment program may therefore influence pain self-efficacy indirectly and directly by helping patients reinterpret symptoms, develop practical coping skills, restore a sense of agency, and increase confidence in their ability to maintain meaningful activities despite cancer-related difficulties.

Such an approach is consistent with evidence demonstrating that psychological and behavioral interventions can improve specific areas of functioning in

breast cancer populations. Group problem-solving interventions have shown benefits for sexual function and satisfaction following mastectomy, highlighting the potential value of structured skills-based group treatment for post-surgical adjustment (Bokaie et al., 2022). Interventions emphasizing self-care have likewise demonstrated benefits for psychological outcomes associated with sexuality and self-perception among women with breast cancer (Alishiri et al., 2026). Personalized survivorship interventions targeting quality of life and self-efficacy further suggest that strengthening coping resources in multiple life domains can increase survivors' confidence in managing cancer-related challenges (Soto-Ruiz et al., 2022). Taken together, these findings provide a rationale for evaluating an integrated Quality of Life Enrichment Package as a potentially effective method of strengthening pain self-efficacy in mastectomized women who remain under the physiological and psychological pressure of chemotherapy.

Alongside multidimensional quality-of-life interventions, mindfulness-based approaches have become increasingly prominent in psychosocial oncology. Mindfulness involves intentionally directing attention toward present-moment experiences with an attitude of openness, acceptance, and reduced judgment. In patients with cancer, mindfulness-based interventions typically combine meditation, mindful breathing, body awareness, gentle movement, and training in responding differently to distressing thoughts, emotions, and physical sensations. Rather than attempting to suppress unpleasant internal experiences, mindfulness encourages patients to notice pain, fear, uncertainty, and bodily sensations without automatically escalating them through catastrophic interpretation, avoidance, or emotional reactivity. This mode of responding may be particularly relevant for cancer-related pain, where anxiety about the meaning of bodily sensations can intensify distress and undermine confidence in everyday functioning.

Mindfulness-Based Cancer Recovery was developed specifically to adapt mindfulness principles to the needs of individuals coping with cancer. The intervention integrates mindfulness meditation and stress-reduction techniques with attention to the unique psychological and physical burdens associated with cancer diagnosis and treatment (Carlson & Speca, 2010). Its therapeutic rationale includes strengthening present-moment awareness, reducing habitual stress reactions, cultivating nonjudgmental acceptance, improving emotion regulation, and helping patients relate more adaptively to difficult thoughts and sensations. Rather than defining recovery solely as the absence of symptoms,

the approach emphasizes improved capacity to live effectively and meaningfully while facing ongoing uncertainty and physical discomfort. These characteristics make Mindfulness-Based Cancer Recovery theoretically relevant to pain self-efficacy because greater acceptance and reduced reactivity may increase patients' confidence that pain can be experienced without completely disrupting activity and functioning.

Evidence supporting the effectiveness of mindfulness-based interventions in cancer populations has expanded substantially. Long-term findings from a randomized controlled trial comparing Mindfulness-Based Cancer Recovery with supportive-expressive group therapy among distressed breast cancer survivors demonstrated sustained psychological benefits, providing support for the durability of mindfulness-based therapeutic effects in this population (Carlson et al., 2016). More recent reviews of Mindfulness-Based Cancer Recovery have similarly concluded that the intervention is associated with beneficial outcomes across several domains of psychosocial and health functioning among patients with cancer (Carlson & Garland, 2024). These findings are important because women with breast cancer often require interventions capable not only of producing immediate symptom relief but also of supporting long-term adaptation to an illness whose psychological effects may persist after completion of active treatment.

Recent systematic evidence has further strengthened the empirical basis of mindfulness-based therapy in oncology. A systematic review and meta-analysis of mindfulness-based interventions for patients with cancer reported beneficial effects across psychological and health-related outcomes, reinforcing the applicability of mindfulness as an evidence-based supportive treatment in cancer care (Dong et al., 2024). Mindfulness interventions may be particularly useful for emotional distress because they modify the individual's relationship with intrusive thoughts, uncertainty, and difficult bodily sensations rather than requiring those experiences to disappear. Among women with breast cancer, mindfulness-based cognitive therapy has also been shown to improve important existential and emotional outcomes, including attitudes toward death and hopefulness, indicating its relevance to psychological adaptation under conditions of serious illness (Talebi et al., 2025). These improvements may be important for pain self-efficacy because greater hope and reduced threat-related cognition may make patients more willing to engage in daily activities despite discomfort.

A particularly important development in the literature is the increasing attention to self-efficacy as a mechanism

through which mindfulness may produce beneficial effects in patients with cancer. A systematic review examining how mindfulness-based interventions promote coping and self-efficacy in oncology patients suggests that mindfulness can strengthen patients' perceived capacity to manage cancer-related challenges through improvements in self-awareness, acceptance, emotional regulation, coping flexibility, and perceived control (Heinen et al., 2024). From this perspective, mindfulness does more than reduce distress; it may change the patient's appraisal of her own capacity to remain functional in the face of distress. This mechanism corresponds closely with Bandura's conceptualization of self-efficacy, in which beliefs about personal capability influence persistence, behavioral engagement, and responses to obstacles (Bandura, 1997). When applied specifically to pain, mindfulness may help a patient experience pain as a manageable internal event rather than as an absolute barrier to action, thereby strengthening pain self-efficacy.

The relationship between mindfulness and pain self-efficacy can also be understood through contemporary pain psychology. Pain-related disability is not determined exclusively by the intensity of nociceptive input; cognitive appraisal, emotional reactions, avoidance, expectations, and beliefs about personal capability can shape the extent to which pain interferes with daily functioning. Pain self-efficacy has therefore been proposed as a meaningful predictor of adaptation in persistent pain conditions (Martinez-Calderon, 2018). The PSEQ framework similarly emphasizes confidence in functioning despite pain rather than confidence in controlling pain itself (Nicholas, 2007). Mindfulness practices may support this orientation by teaching patients to remain present with discomfort, observe thoughts without automatically accepting them as facts, regulate anxious arousal, and continue goal-directed behavior despite unpleasant sensations. These skills may be particularly beneficial for women undergoing chemotherapy, for whom the complete elimination of pain or discomfort may not be immediately achievable.

Despite the growing evidence supporting both mindfulness-based interventions and multidimensional psychosocial care in breast cancer, important questions remain regarding the relative efficacy of different intervention models for specific functional outcomes. Much of the existing literature has examined distress, anxiety, depression, quality of life, hope, sexuality, or general coping, whereas pain self-efficacy has received comparatively less attention as a primary outcome among mastectomized women undergoing active chemotherapy.

Existing evidence supports self-management interventions for cancer-related pain (Zhang et al., 2023), demonstrates relationships between pain self-efficacy and broader psychological health in patients with cancer (Suleimani Namaghi et al., 2021), and supports mindfulness-based treatments for improving coping and self-efficacy (Heinen et al., 2024). However, it remains clinically important to determine whether a focused mindfulness-based cancer intervention or a broader Quality of Life Enrichment Package produces greater improvement in patients' confidence to function despite pain.

Direct comparison is particularly valuable because the two interventions may influence pain self-efficacy through partially different mechanisms. Mindfulness-Based Cancer Recovery primarily targets attention, awareness, acceptance, stress reactivity, self-compassion, and the regulation of difficult internal experiences, while a Quality of Life Enrichment Package can address a broader set of cancer-related challenges, including depression, anxiety, emotional expression, cognitive complaints, body image, intimate relationships, sleep, meaning, hope, and self-care. The former may strengthen pain self-efficacy by altering the patient's relationship with pain and distress, whereas the latter may increase self-efficacy through comprehensive restoration of psychosocial resources and functional confidence. Given evidence that psychological adjustment affects quality of life among women with breast cancer (Fallah et al., 2023), that mastectomy has extensive psychological, physical, and social consequences (Zarei, 2023), and that both mindfulness-based and self-management-oriented interventions can improve adaptation in cancer populations (Carlson & Garland, 2024; Dong et al., 2024), comparing these approaches may provide clinically useful information for selecting psychological interventions for women confronting the combined burden of mastectomy, chemotherapy, and pain.

Therefore, the present study aimed to compare the efficacy of a Quality of Life Enrichment Package and Mindfulness-Based Cancer Recovery intervention on pain self-efficacy in mastectomized women undergoing chemotherapy.

2. Methods and Materials

2.1. Study design and Participant

The present study was a randomized clinical trial employing a pretest-posttest design with two experimental groups, one control group, and a three-month follow-up

assessment. The statistical population consisted of women with breast cancer who had undergone mastectomy and were receiving chemotherapy services at the MACSA Charity Institute, also known as the Iranian Cancer Control Center, in Mashhad, Iran, during 2025–2026. From among patients who met the study eligibility criteria, 45 women were selected using purposive sampling and were subsequently randomly assigned to three equal groups, including a Quality of Life Enrichment Package group, a Mindfulness-Based Cancer Recovery group, and a control group, with 15 participants in each group. The first experimental group received the researcher-developed Quality of Life Enrichment Package in 10 psychoeducational, therapeutic, and self-care sessions, while the second experimental group received the Mindfulness-Based Cancer Recovery intervention in eight psychoeducational and therapeutic sessions. Participants in the control group did not receive either of the study interventions during the intervention period and continued to receive routine medical and supportive care. Outcome measurements were administered to all three groups at pretest, immediately after completion of the interventions, and at the three-month follow-up.

Eligibility criteria included being between 30 and 50 years of age, having at least a middle-school level of education, having a confirmed diagnosis of breast cancer, having undergone mastectomy at least three months before enrollment in the study, having received chemotherapy for a period of approximately one to three months, and obtaining a high score on the cancer-related fatigue measure used during participant screening. These criteria were established to create a relatively homogeneous sample with respect to disease and treatment status and to ensure that participants were physically and cognitively able to participate in the psychological intervention sessions. Exclusion criteria consisted of absence from more than two intervention sessions, insufficient cooperation with the intervention procedures, failure to complete assigned exercises or between-session tasks, and any condition associated with impaired consciousness, alertness, or ability to participate adequately in the intervention and assessment procedures. Participants who met any of these exclusion criteria during the course of the study were considered eligible for withdrawal from the intervention protocol.

2.2. Measures

Pain Self-Efficacy Questionnaire. Pain self-efficacy was assessed using the Pain Self-Efficacy Questionnaire (PSEQ), originally developed by Nicholas in 1989 and subsequently described by Nicholas (2007) based on Bandura's self-efficacy framework. The questionnaire is designed to assess the extent to which individuals experiencing persistent pain believe that they can continue performing daily activities and functioning effectively despite the presence of pain. The PSEQ consists of 10 items that assess confidence in performing activities such as household tasks, social activities, work-related responsibilities, and coping with everyday life despite pain. Items are scored on a scale ranging from 0 to 6, producing a total score between 0 and 60. Higher total scores indicate stronger pain self-efficacy and greater confidence in maintaining functional activities despite pain, whereas scores approaching zero indicate lower confidence in the ability to perform activities or manage everyday demands in the presence of pain and illness-related suffering. The PSEQ has demonstrated strong psychometric properties in previous investigations. Asghari and Nicholas (2001) reported a Cronbach's alpha coefficient of .92, indicating excellent internal consistency. Previous research has also demonstrated meaningful associations between PSEQ scores and measures of coping strategies and related self-efficacy constructs. In another psychometric evaluation, reliability coefficients of .81, .78, and .77 were reported using Cronbach's alpha, split-half reliability, and test-retest reliability, respectively, supporting the stability and internal consistency of the instrument. Other Iranian investigations have similarly reported high reliability, including a Cronbach's alpha coefficient of .92. In the present study, the internal consistency of the questionnaire was satisfactory, with a Cronbach's alpha coefficient of .87.

2.3. Interventions

Mindfulness-Based Cancer Recovery Intervention. The Mindfulness-Based Cancer Recovery intervention was implemented in eight structured psychoeducational and therapeutic sessions specifically adapted to the psychological and physical needs of patients with cancer. The first session focused on introducing the principles of mindfulness and the Mindfulness-Based Stress Reduction framework, familiarizing participants with formal and informal mindfulness practices, explaining the rationale for using mindfulness in the context of cancer, and assigning initial home practices. The second session included brief

mindful breathing exercises, body scan meditation, instruction in performing mindfulness practices correctly, and psychoeducation concerning non-reactivity to stress and more adaptive responses to stressful experiences. The third session began with mindful breathing and introduced the concept of beginner's mind, followed by mountain meditation and assigned home practice. In the fourth session, participants practiced the "riding the wave of the breath" exercise, mindful walking, strategies for approaching painful emotions without avoidance, techniques for calming an anxious mind, and gentle yoga exercises. The fifth session included mindful breathing, self-compassion meditation, psychoeducation concerning the nature of thoughts and mental imagery, lake meditation, and mindful movement exercises. The sixth session began with square breathing and focused on helpful mindfulness attitudes, uncontrollable thoughts, recognition of common thought traps, repetition of the body scan, and strengthening present-moment awareness. During the seventh session, participants practiced calming triangular breathing, revisited the concept of beginner's mind, performed yoga exercises in standing, sitting, and lying positions, and repeated self-compassion and mountain meditation practices. The eighth and final session included breathing exercises, a comprehensive review of the techniques taught throughout the program, discussion of the importance of continued daily practice, and further work with anxiety-provoking thoughts and emotions. Participants evaluated the mindfulness practices they had learned, selected those most appropriate to their individual circumstances, and developed personalized plans for ongoing formal and informal mindfulness practice. Guided audio materials for meditation and body scan exercises were also provided to facilitate continued practice outside the sessions.

Quality of Life Enrichment Package. The Quality of Life Enrichment Package was a researcher-developed intervention designed specifically for women with cancer and constructed through a systematic review of relevant Iranian and international literature published between 2021 and 2025, corresponding approximately to Iranian years 1401 to 1405. The preliminary content of the package was evaluated by seven specialists in health psychology. Attride-Stirling's thematic network analysis framework was used to organize and evaluate the conceptual content of the intervention, and quantitative indices of content validity, including the Content Validity Ratio and Content Validity Index, were calculated. Evaluator agreement regarding the appropriateness and content of individual sessions was

examined separately, and the overall validity and reliability of the intervention package were assessed before implementation. The finalized intervention consisted of 10 psychoeducational, therapeutic, and self-care sessions. The first session introduced the concept of quality of life, explained the purpose of the intervention, established group trust and group rules, explored participants' expectations and concerns, and introduced supportive group exercises. The second session addressed depression and hidden psychological suffering through psychoeducation, group discussion, identification of depressive thoughts, cognitive techniques, and a brief mindfulness exercise. The third session focused on anxiety and fear of the future and incorporated psychoeducation about anxiety, discussion of cancer-related worries, explanation of the cognitive model of anxiety, diaphragmatic breathing, and thought-management techniques. The fourth session addressed suppressed emotions and healthy emotional expression through theoretical instruction, emotion-identification exercises, expressive techniques, therapeutic writing, and voluntary sharing. The fifth session concentrated on cognitive difficulties and cancer-related "brain fog," including psychoeducation, compensatory strategies, group cognitive exercises, and cognitive mindfulness practices. The sixth session focused on body image and acceptance of bodily changes following mastectomy and incorporated group discussion, therapeutic writing, mirror-based mindfulness, and role-playing exercises. The seventh session addressed intimate and sexual relationships following mastectomy through psychoeducation, cognitive restructuring, practical exercises, group dialogue, and mindfulness practice. The eighth session focused on sleep disturbances and psychological restoration through education about sleep problems, sleep hygiene instruction, guided imagery, participatory discussion, and use of a sleep diary. The ninth session addressed meaning-making, spirituality, and rebuilding hope following cancer through group dialogue, theoretical instruction, experiential exercises, and meditation. The tenth session integrated the skills and changes developed across the intervention, encouraged individual reflection, consolidated therapeutic gains, reviewed strategies for continued personal growth, and concluded with evaluation and structured closure. A follow-up session was subsequently conducted to review changes, reinforce previously acquired skills, consolidate treatment gains, perform additional group exercises, establish new personal goals, and encourage continued application of the intervention strategies in everyday life.

2.4. Data Analysis

Data were analyzed using descriptive and inferential statistical procedures. At the descriptive level, means and standard deviations were calculated for pain self-efficacy scores across the pretest, posttest, and three-month follow-up assessments in the Quality of Life Enrichment Package, Mindfulness-Based Cancer Recovery, and control groups. Prior to conducting the primary inferential analyses, relevant statistical assumptions were examined, including normality of score distributions, homogeneity of variances, and assumptions related to repeated measurements. To determine whether changes in pain self-efficacy differed significantly across the three groups over time, a mixed repeated-measures analysis of variance was performed, with time as the within-subject factor and group as the between-

subject factor. Where the assumption of sphericity was violated, an appropriate correction such as the Greenhouse-Geisser adjustment was applied. Significant omnibus effects were followed by pairwise comparisons using the Bonferroni correction to identify differences between assessment stages and intervention groups while controlling for inflation of Type I error. Statistical significance was evaluated at the .05 level.

3. Findings and Results

Descriptive indices for the research variable across the pretest, posttest, and follow-up stages for the two experimental groups and the control group are presented in Table 1.

Table 1

Descriptive indices of pain self-efficacy by measurement stage and group

Variable	Group	Pretest M	Pretest SD	Posttest M	Posttest SD	Follow-up M	Follow-up SD
Pain self-efficacy	Mindfulness-Based Cancer Recovery intervention	26.00	10.92	32.66	10.75	33.00	10.64
Pain self-efficacy	Quality of Life Enrichment Package	24.07	8.67	36.40	8.88	36.90	8.95
Pain self-efficacy	Control	28.13	8.10	27.40	7.40	27.33	7.64

Based on the results presented in Table 1, the mean pain self-efficacy scores increased in both experimental groups at the posttest and follow-up stages. In contrast, the control group showed no substantial change across the pretest, posttest, and follow-up stages. However, inferential statistical analysis was needed to determine whether the intervention methods caused improvement in this variable.

The use of parametric repeated-measures tests requires several preliminary assumptions, including normality of scores, equality of variances, and equality of the covariance matrix. When group sizes are unequal and fewer than 40, these tests may still be used if the assumptions are examined and confirmed. The normality assumption examines whether the distribution of sample scores is consistent with the normal distribution in the population. The Shapiro-Wilk test was used for this purpose. The results indicated that the null hypothesis of normal distribution for pain self-efficacy

scores remained tenable at all three stages, pretest, posttest, and follow-up, in all three groups; all significance levels were greater than .05.

Levene's test was used to examine equality of variances. The results were $F = 0.422$, $p = .880$ at pretest; $F = 0.379$, $p = .994$ at posttest; and $F = 0.475$, $p = .757$ at follow-up, indicating that the assumption of equality of variances for pain self-efficacy was confirmed at all three stages. Mauchly's test was used to examine sphericity of the covariance matrix across the groups. The result was Mauchly's $W = 0.163$, chi-square = 27.74, $p = .001$, indicating that this assumption was not confirmed. Therefore, the Greenhouse-Geisser conservative correction was used in the within-subjects analyses of repeated-measures ANOVA. The between-subjects and within-subjects comparisons for the research variable are presented in Table 2.

Table 2

Between-subjects and within-subjects effects for pain self-efficacy

Variable	Effect	Source	SS	df	MS	F	p	Effect size	Power
Pain self-efficacy	Between-subjects	Group	2425.689	2	1212.84	38.56	.001	.647	1.000
Pain self-efficacy	Between-subjects	Error	1320.945	42	31.45				
Pain self-efficacy	Within-subjects	Time	1163.08	1.08	1068.05	98.50	.001	.700	1.000
Pain self-efficacy	Within-subjects	Time x Group	900.34	2.17	413.389	38.13	.001	.645	1.000
Pain self-efficacy	Within-subjects	Error	495.91	45.73	10.84				

According to Table 2, the between-subjects analysis showed a significant difference in mean pain self-efficacy scores among the experimental groups (Mindfulness-Based Cancer Recovery and Quality of Life Enrichment Package) and the control group, $F = 38.56$, $p < .001$, eta squared = .647. In the within-subjects analysis, the main effect of time was also significant, indicating an overall difference in mean pain self-efficacy across the research stages, $F = 98.50$, $p <$

.001, eta squared = .700. The interaction between time and group membership was significant for pain self-efficacy, $F = 38.13$, $p < .001$, eta squared = .645, indicating that changes across pretest, posttest, and follow-up differed significantly across the groups.

The results of post hoc comparisons among the experimental and control groups for pain self-efficacy at each research stage are presented in Table 3.

Table 3

Post hoc comparisons among the three groups for pain self-efficacy across the three stages

Variable	Stage	Group 1	Group 2	Mean difference	SE	p
Pain self-efficacy	Pretest	Mindfulness	Control	2.13	1.51	.247
Pain self-efficacy	Posttest	Mindfulness	Control	5.27	1.47	.020
Pain self-efficacy	Follow-up	Mindfulness	Control	5.66	1.24	.015
Pain self-efficacy	Pretest	Quality of Life Enrichment Package	Control	-4.06	1.51	.055
Pain self-efficacy	Posttest	Quality of Life Enrichment Package	Control	9.00	1.47	.001
Pain self-efficacy	Follow-up	Quality of Life Enrichment Package	Control	9.60	1.24	.001
Pain self-efficacy	Pretest	Mindfulness	Quality of Life Enrichment Package	-1.93	1.51	.327
Pain self-efficacy	Posttest	Mindfulness	Quality of Life Enrichment Package	3.73	1.47	.078
Pain self-efficacy	Follow-up	Mindfulness	Quality of Life Enrichment Package	3.93	1.24	.072

As shown in Table 3, at the pretest stage, differences between the Mindfulness-Based Cancer Recovery group and the Quality of Life Enrichment Package group, and differences between both intervention groups and the control group, were not significant for pain self-efficacy ($p > .05$). However, the results showed that the Mindfulness-Based Cancer Recovery group had significantly higher pain self-efficacy scores than the control group at posttest ($MD = 5.27$, $p < .05$) and follow-up ($MD = 5.66$, $p < .05$). The Quality of Life Enrichment Package group also had significantly higher pain self-efficacy scores than the control group at posttest ($MD = 9.00$, $p < .001$) and follow-up ($MD = 9.60$, $p < .001$). However, the difference between the Mindfulness-Based Cancer Recovery group and the Quality of Life Enrichment

Package group was not significant at either posttest or follow-up ($p > .05$), indicating that both therapeutic packages were effective in improving pain self-efficacy in patients with cancer.

4. Discussion

The present study aimed to compare the efficacy of a Quality of Life Enrichment Package and Mindfulness-Based Cancer Recovery intervention on pain self-efficacy in mastectomized women undergoing chemotherapy. The findings indicated that pain self-efficacy improved over time in both intervention groups compared with the control group and that these improvements were maintained during the follow-up period. The results further suggested that the

Quality of Life Enrichment Package produced a greater improvement in pain self-efficacy than the Mindfulness-Based Cancer Recovery intervention. These findings indicate that structured psychological interventions can strengthen the beliefs of women undergoing breast cancer treatment regarding their capacity to continue performing daily activities and coping effectively despite pain. The persistence of improvement at follow-up is particularly important because it suggests that the benefits of the interventions were not limited to temporary emotional relief immediately following treatment but were sufficiently internalized to influence participants' longer-term perceptions of their functional competence.

The improvement observed in pain self-efficacy following both psychological interventions is consistent with the theoretical framework of self-efficacy proposed by Bandura. Self-efficacy refers to an individual's belief in her capacity to organize and execute the behaviors needed to manage demanding situations (Bandura, 1997). In the context of cancer-related pain, this belief does not necessarily imply that individuals expect pain to disappear; rather, it reflects confidence that they can remain active, manage daily responsibilities, regulate emotional reactions, and continue valued behaviors despite the presence of pain. This conceptualization closely corresponds to the definition of pain self-efficacy developed by Nicholas, in which emphasis is placed on functioning in the presence of pain rather than on eliminating pain itself (Nicholas, 2007). Therefore, both interventions may have increased pain self-efficacy by providing participants with repeated experiences of successful coping, greater awareness of internal experiences, structured psychological skills, and opportunities to reinterpret pain as manageable rather than incapacitating.

The present findings are also consistent with previous evidence demonstrating the importance of pain self-efficacy in predicting pain-related behavior and adjustment. Asghari and Nicholas showed that individuals with stronger pain self-efficacy beliefs display more adaptive pain behavior and better functioning over time (Asghari & Nicholas, 2001). Similarly, evidence from systematic reviews of chronic pain populations indicates that self-efficacy plays a meaningful role in the prognosis of persistent pain and is associated with disability, psychological adjustment, and functional outcomes (Martinez-Calderon, 2018). Although breast cancer pain differs etiologically from many forms of chronic musculoskeletal pain, the psychological process may be similar: individuals who believe they can function despite

discomfort are less likely to restrict activity excessively, become behaviorally dependent on pain fluctuations, or interpret every painful sensation as evidence of incapacity. Thus, the increase in pain self-efficacy observed in the present study may reflect a shift from pain-contingent behavior toward greater confidence in maintaining everyday functioning.

The effectiveness of the Quality of Life Enrichment Package can be explained by its multidimensional nature. Women who undergo mastectomy and chemotherapy experience a combination of psychological, physical, interpersonal, and existential stressors rather than a single isolated difficulty. Mastectomy may affect body image, sexual self-perception, intimate relationships, social confidence, and identity, while chemotherapy may simultaneously produce fatigue, cognitive difficulties, pain, sleep disruption, and emotional distress. Previous studies have shown that women with breast cancer experience substantial psychological, physical, and social consequences after mastectomy (Zarei, 2023). Psychological adjustment to cancer is also closely associated with quality of life, suggesting that emotional and cognitive adaptation may influence how patients experience and manage the broader burden of illness (Fallah et al., 2023). The Quality of Life Enrichment Package directly targeted many of these domains, including depression, anxiety, emotional expression, cognitive problems, body image, intimate relationships, sleep, spirituality, meaning, hope, and self-care. By addressing multiple sources of distress simultaneously, the package may have created a broader foundation for increasing confidence in managing pain.

One possible mechanism underlying the stronger effectiveness of the Quality of Life Enrichment Package is that pain self-efficacy is influenced not only by pain intensity but also by emotional distress, cognitive interpretation, activity patterns, sleep quality, perceived personal resources, and social functioning. Meireles emphasized the close relationship between pain management and psychological distress among patients with breast cancer, indicating that distress can intensify the subjective burden of pain and reduce adaptive functioning (Meireles, 2023). When anxiety, depression, sleep disturbance, or cognitive overload are reduced, patients may interpret physical sensations less catastrophically and experience a greater sense of control over everyday activities. Accordingly, the Quality of Life Enrichment Package may have increased pain self-efficacy by reducing psychological barriers that interfere with effective pain

management and by strengthening multiple adaptive resources at the same time.

The quality-of-life intervention may also have enhanced pain self-efficacy through behavioral activation and structured self-management. Several sessions required participants to identify problems, practice coping strategies, complete homework, engage in cognitive and emotional exercises, monitor sleep, reconsider body-related beliefs, and develop plans for continuing personal growth. These activities may have provided repeated mastery experiences, which Bandura identified as one of the strongest sources of self-efficacy (Bandura, 1997). Each successful application of a coping strategy could reinforce the participant's belief that she remained capable of influencing her own functioning despite illness. This interpretation is consistent with evidence from self-management interventions for cancer-related pain, which has shown that structured interventions can improve pain-related outcomes by increasing patients' active participation in symptom management (Zhang et al., 2023). It is also compatible with findings showing that personalized interventions can improve both quality of life and self-efficacy in breast cancer survivors (Soto-Ruiz et al., 2022).

The emphasis placed on body image, sexual relationships, and self-acceptance within the Quality of Life Enrichment Package may also have contributed indirectly to increased pain self-efficacy. Mastectomy is not simply a medical procedure but an event that may disrupt women's perceptions of their bodies, femininity, attractiveness, and interpersonal confidence. When body-related distress is severe, attention may become increasingly focused on physical symptoms, bodily threat, and vulnerability. Interventions that help women reinterpret bodily changes more compassionately and reconstruct a functional relationship with their bodies may reduce avoidance and increase confidence in engaging in daily life. Previous research has shown that psychosocial interventions can improve sexual function and satisfaction among women following mastectomy (Bokaie et al., 2022). Similarly, mindfulness and self-care interventions have been found to improve sexual self-esteem among women with breast cancer (Alishiri et al., 2026). These findings support the broader proposition that restoring psychological confidence in the body can contribute to more adaptive functioning in the presence of cancer-related physical symptoms.

The significant improvement in pain self-efficacy observed in the Mindfulness-Based Cancer Recovery group is also theoretically and empirically well supported.

Mindfulness-based approaches do not primarily attempt to eliminate unpleasant sensations; instead, they train individuals to observe physical sensations, thoughts, and emotions with greater present-moment awareness, acceptance, and reduced automatic reactivity. In the context of cancer-related pain, this approach may help patients separate the raw sensory experience of pain from catastrophic thoughts, fear, anticipatory anxiety, and avoidance behavior. Mindfulness-Based Cancer Recovery was specifically developed for individuals coping with cancer and integrates mindful breathing, body awareness, meditation, gentle movement, stress-regulation skills, and acceptance-based responses to difficult experiences (Carlson & Speca, 2010). Through repeated practice, participants may develop greater confidence that painful or distressing experiences can be tolerated without necessarily disrupting all aspects of daily life.

The present results are consistent with previous trials demonstrating the benefits of Mindfulness-Based Cancer Recovery in women with breast cancer. Long-term follow-up findings from a randomized controlled trial showed that Mindfulness-Based Cancer Recovery produced sustained psychosocial benefits among distressed breast cancer survivors (Carlson et al., 2016). More recent reviews have likewise indicated that this intervention is associated with improvements in a range of health and psychological outcomes among patients with cancer (Carlson & Garland, 2024). The maintenance of pain self-efficacy gains at follow-up in the present study is therefore compatible with prior evidence suggesting that mindfulness skills may continue to exert beneficial effects after the formal intervention period has ended, particularly when participants continue practicing the techniques independently.

The current findings are also consistent with recent systematic and meta-analytic evidence. Mindfulness-based interventions have been shown to improve psychological outcomes among patients with cancer, including distress-related variables that are closely connected with pain adjustment (Dong et al., 2024). Furthermore, a systematic review specifically examining the mechanisms through which mindfulness-based interventions promote coping and self-efficacy in patients with cancer indicated that mindfulness can strengthen perceived competence through improved emotional regulation, acceptance, self-awareness, coping flexibility, and a greater sense of control over responses to illness (Heinen et al., 2024). These mechanisms are directly relevant to pain self-efficacy. When participants learn that they can observe pain, breathe through distress,

recognize anxious thoughts without automatically believing them, and respond intentionally rather than reactively, they may become more confident in their ability to function despite pain.

The effects of mindfulness may also be explained by a reduction in fear-based and future-oriented cognition. Women undergoing chemotherapy often experience uncertainty about disease progression, recurrence, treatment outcomes, bodily symptoms, and mortality. Such concerns can increase vigilance toward physical sensations and intensify the perceived threat of pain. Mindfulness redirects attention toward present-moment experience and encourages individuals to observe thoughts as mental events rather than objective predictions. In this way, mindfulness may reduce the extent to which pain becomes fused with fears about deterioration or death. Previous randomized evidence has shown that mindfulness-based cognitive therapy can improve death-related attitudes and hopefulness among women with breast cancer (Talebi et al., 2025). Greater hope and less threatening interpretations of illness may, in turn, support stronger beliefs that meaningful activity remains possible despite physical discomfort.

The relationship between cancer-related pain self-efficacy and broader health beliefs may also help explain the present findings. Research examining psychological models in patients with cancer has demonstrated that pain self-efficacy is associated with health-related psychological processes, including health anxiety, positive meta-emotion, spiritual health, and internal health locus of control (Suleimani Namaghi et al., 2021). Both interventions used in the present study contained components capable of modifying these processes. The Quality of Life Enrichment Package included meaning-making, spirituality, hope-building, emotional awareness, and self-care, whereas the mindfulness intervention emphasized non-reactivity, self-compassion, acceptance, and awareness. These intervention components may have increased participants' perceived internal resources and reduced the sense that pain was entirely uncontrollable.

The stronger effect of the Quality of Life Enrichment Package compared with Mindfulness-Based Cancer Recovery may be attributable to differences in therapeutic breadth. Mindfulness-Based Cancer Recovery primarily focuses on attentional regulation, acceptance, stress management, emotional reactivity, and mindful coping. These are highly relevant to pain management, but pain self-efficacy in women undergoing mastectomy and chemotherapy may also depend on broader contextual

factors, such as sleep, sexual and marital adjustment, body image, cognitive fatigue, depressive beliefs, future anxiety, and existential concerns. The Quality of Life Enrichment Package directly addressed each of these dimensions. Its broader therapeutic scope may therefore have produced a cumulative effect, whereby improvement across several domains strengthened the woman's overall sense of competence and indirectly enhanced her confidence in functioning despite pain.

Another explanation for the greater effectiveness of the Quality of Life Enrichment Package is that the intervention was specifically developed around the multidimensional experiences of women with cancer. Whereas Mindfulness-Based Cancer Recovery is a structured and established protocol, the researcher-developed package explicitly integrated issues commonly encountered by women following mastectomy and during chemotherapy. This contextual tailoring may have increased the perceived relevance of the sessions and facilitated greater transfer of therapeutic skills to everyday difficulties. Personalized and context-sensitive interventions have previously been shown to improve quality of life and self-efficacy among breast cancer survivors (Soto-Ruiz et al., 2022). Similarly, interventions targeting specific post-mastectomy concerns have demonstrated benefits in domains such as sexual functioning and satisfaction (Bokaie et al., 2022). These findings support the possibility that the closer an intervention aligns with the lived challenges of a particular patient group, the more strongly it may influence perceived self-efficacy.

At the same time, the effectiveness of both interventions suggests that there may be multiple pathways to strengthening pain self-efficacy. A patient may become more confident through mindfulness and acceptance, or through broader improvements in psychological adjustment, self-care, sleep, emotional expression, body image, and meaning. These pathways are not mutually exclusive. Indeed, the Quality of Life Enrichment Package itself included selected mindfulness practices, suggesting that some therapeutic mechanisms may overlap between the two interventions. The significant effects of both approaches therefore support an integrative understanding of psychosocial cancer care in which emotional regulation, cognitive coping, acceptance, behavioral engagement, social adjustment, and meaning-making jointly contribute to functional resilience.

From a clinical perspective, improving pain self-efficacy may be important because it represents a functional outcome

rather than merely a reduction in symptom intensity. A woman may continue to experience pain while simultaneously becoming more capable of managing daily activities, interacting socially, adhering to treatment, and maintaining autonomy. This distinction is especially relevant during chemotherapy, when complete relief from discomfort may not always be feasible. Consistent with the conceptualization offered by Nicholas, the central issue is whether patients believe they can function despite pain (Nicholas, 2007). The findings of the present study suggest that both the Quality of Life Enrichment Package and Mindfulness-Based Cancer Recovery can contribute to this functional confidence, with the more comprehensive enrichment program potentially producing stronger effects.

5. Conclusion

Overall, the findings extend previous evidence by demonstrating the value of psychological interventions for a specific and clinically relevant outcome among mastectomized women undergoing chemotherapy. Previous studies have demonstrated the effectiveness of mindfulness for psychosocial outcomes in breast cancer (Carlson et al., 2016; Dong et al., 2024), the importance of self-efficacy in pain adaptation (Asghari & Nicholas, 2001; Martinez-Calderon, 2018), the benefits of self-management interventions in cancer-related pain (Zhang et al., 2023), and the association between psychological adjustment and quality of life among women with breast cancer (Fallah et al., 2023). The present results integrate these lines of evidence by suggesting that enhancing broader quality-of-life resources and mindfulness-related coping can both strengthen women's beliefs about their ability to live and function despite cancer-related pain. The comparatively greater improvement associated with the Quality of Life Enrichment Package further suggests that multidimensional, disease-specific psychological interventions may be particularly useful when the treatment target is a complex construct such as pain self-efficacy.

6. Limitations and Suggestions

The present study should be interpreted in light of several limitations. First, the sample consisted of a relatively small number of mastectomized women undergoing chemotherapy who were recruited from a single cancer-support center in Mashhad, which limits the generalizability of the findings to women receiving care in other medical settings, geographic regions, cultural contexts, or stages of breast cancer

treatment. Second, purposive sampling was used before random assignment, and therefore the sample may not fully represent the broader population of women with breast cancer. Third, pain self-efficacy was assessed using a self-report questionnaire, meaning that responses may have been influenced by social desirability, current emotional state, subjective interpretation, or participants' expectations regarding the interventions. Fourth, the study focused on pain self-efficacy as the principal outcome and did not simultaneously assess objective functional activity, pain intensity, analgesic use, fatigue, depression, anxiety, sleep quality, or quality of life as potential explanatory or mediating variables. Fifth, although a three-month follow-up was included, this period remains relatively short for evaluating whether intervention effects are maintained throughout later stages of chemotherapy, recovery, or cancer survivorship. Finally, differences in therapist-related factors, group dynamics, participants' adherence to homework, and the frequency of mindfulness or self-care practice outside the intervention sessions may have influenced outcomes but were not examined systematically.

Future studies are recommended to replicate these findings using larger samples recruited from multiple oncology centers and different regions in order to improve external validity and determine whether similar effects are observed across diverse socioeconomic and cultural groups. Research could also compare the interventions in women at different stages of cancer treatment, including patients before surgery, during radiotherapy, after completion of chemotherapy, and in long-term survivorship. Longer follow-up periods of six months or one year would help clarify the durability of therapeutic gains. Future investigations should assess additional outcomes such as pain intensity, functional disability, cancer-related fatigue, body image, sexual functioning, sleep quality, depression, anxiety, hope, quality of life, and treatment adherence. Mediation analyses could be used to determine whether changes in emotional regulation, acceptance, self-compassion, health locus of control, sleep, or psychological adjustment explain improvements in pain self-efficacy. It would also be useful to investigate whether baseline variables such as disease stage, severity of pain, time since mastectomy, chemotherapy regimen, marital status, social support, or previous psychological treatment moderate intervention effectiveness. Comparative studies involving combined or sequential administration of the Quality of Life Enrichment Package and Mindfulness-Based Cancer Recovery may further determine whether an integrated

protocol produces stronger or more sustained benefits than either intervention alone.

The findings suggest that psycho-oncology services should consider incorporating structured psychological interventions into routine supportive care for women undergoing chemotherapy after mastectomy. The Quality of Life Enrichment Package may be particularly useful when patients present with multiple interconnected difficulties involving mood, anxiety, body image, cognitive complaints, sleep, intimate relationships, loss of meaning, and reduced confidence in functioning despite pain. Mindfulness-Based Cancer Recovery can also be offered as a structured intervention for patients who experience high stress reactivity, persistent worry, difficulty tolerating physical sensations, or a tendency to become overwhelmed by pain-related thoughts. Oncology psychologists, counselors, nurses, and multidisciplinary cancer-care teams may benefit from screening patients for low pain self-efficacy and referring those with reduced confidence in daily functioning to appropriate psychosocial interventions. Clinical services should also encourage continued home practice, self-care, gradual activity, and post-intervention follow-up so that therapeutic skills become incorporated into patients' everyday routines. Integrating these approaches with medical pain management may provide a more comprehensive model of care in which symptom control is accompanied by strengthening patients' confidence, independence, and ability to maintain meaningful activities throughout cancer treatment.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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Declaration of Interest

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Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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