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Development of a Mindfulness-Based Coping Skills Training Package for Cancer and Its Effectiveness on Reducing Stress, Blood Cortisol Levels, and Psychological Self-Efficacy in Women with Breast Cancer in Bandar Abbas (A Mixed-Methods Study)

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A B S T R A C T

Objective: This study aimed to design and evaluate the effectiveness of a mindfulness-based psychological coping skills training package in reducing stress and cortisol levels and enhancing psychological self-efficacy among women with breast cancer.

Methods and Materials: The study employed a mixed-methods design in two phases. In the qualitative phase, semi-structured interviews with 12 patients and psychology experts, alongside thematic analysis and literature review, were conducted to identify core dimensions of coping needs. The content and structure of the package were developed and validated using the Delphi method with 15 experts. The final program comprised ten 90-minute sessions focusing on mindfulness practice, adaptive coping strategies, and stress management skills. In the quantitative phase, a quasi-experimental design with pretest–posttest, control group, and two-month follow-up was applied. Thirty women with breast cancer, aged 20–45, were purposively sampled and randomly assigned to experimental (n = 15) and control (n = 15) groups. Data collection involved the Perceived Stress Scale, the Psychological Self-Efficacy Scale, and blood cortisol measurement. Data were analyzed using repeated measures ANOVA in SPSS 26.

Findings: The intervention group showed a significant reduction in perceived stress scores compared to the control group ($p < .001$), with improvements sustained at follow-up. Cortisol levels also decreased significantly in the experimental group across posttest and follow-up ($p < .001$). Psychological self-efficacy scores increased markedly after the intervention ($p < .001$), indicating enhanced coping capacity. The interaction effects confirmed that improvements were specific to the experimental group.

Conclusion: The mindfulness-based coping skills training package effectively reduced stress and cortisol levels and improved psychological self-efficacy in women with breast cancer, underscoring its potential as a complementary

intervention to enhance psychological adaptation and overall quality of life in oncology care.

Keywords: *Mindfulness, coping skills training, stress reduction, cortisol, psychological self-efficacy, breast cancer*

1. Introduction

Breast cancer remains one of the most prevalent malignancies among women worldwide, representing not only a biological illness but also a profound psychological and social challenge. Beyond the immediate threat to physical health, breast cancer is strongly associated with heightened stress, anxiety, depression, and a diminished quality of life, largely due to the complex interplay of medical treatments, social stigma, and emotional burden (Arefian et al., 2023). The diagnosis often disrupts a woman's self-concept, body image, and social roles, which can lead to maladaptive coping strategies, decreased psychological self-efficacy, and elevated physiological stress markers such as cortisol (JarAllah et al., 2023; Reis et al., 2023). In this context, interventions that address both psychological resilience and biological outcomes are increasingly regarded as critical complements to medical treatment.

Recent evidence highlights mindfulness as a promising approach for mitigating stress and enhancing coping capacities in cancer patients. Mindfulness involves cultivating present-moment awareness in a nonjudgmental manner and has been linked to reductions in perceived stress, anxiety, and depressive symptoms, alongside improvements in resilience, self-efficacy, and quality of life (Oner Cengiz et al., 2023; Talayri & Bavi, 2023; Williams et al., 2023). While traditional therapeutic methods often emphasize cognitive restructuring, mindfulness-based interventions promote acceptance and awareness, allowing patients to confront distress without avoidance or suppression (Shalikari et al., 2023; Sheikh Mohammadi et al., 2023). Such strategies may be particularly valuable for women with breast cancer, whose stressors span physical, emotional, cultural, and existential domains.

The physiological consequences of stress further amplify the importance of psychological interventions. Elevated cortisol levels, as markers of chronic stress, have been consistently associated with poorer disease prognosis and impaired immune functioning (JarAllah et al., 2023; Wang, 2023). For breast cancer patients, dysregulated cortisol responses contribute to fatigue, insomnia, and reduced treatment adherence, thereby compounding the disease burden (Ding et al., 2023; Reis et al., 2023). Mindfulness training has demonstrated potential not only in lowering perceived stress but also in modulating biological stress markers such as cortisol and heart rate variability (Benchekroun et al., 2023; Olyaee et al., 2022). These findings suggest that mindfulness-based coping interventions may bridge the gap between psychological well-being and physiological resilience, creating a more integrated approach to cancer care.

The relevance of mindfulness-based coping skills is supported by both clinical and experimental evidence. Studies have shown that structured mindfulness-based stress reduction (MBSR) programs improve mental health, self-efficacy, and body image in women with breast cancer (Chang et al., 2022), while also enhancing emotional regulation and reducing fear of recurrence (Lucas et al., 2023). Additionally, mindfulness has been identified as a mediating factor between stress, resilience, spirituality, and pain, underscoring its central role in psychological adaptation to cancer (Arefian et al., 2023). This is consistent with broader research linking mindfulness with reduced maladaptive coping, rumination, and fears of compassion among cancer patients (Williams et al., 2023), and with improvements in stress biomarkers and psychological well-being (Sakki et al., 2022).

Coping skills training, which emphasizes adaptive responses to stressors, has similarly been validated in healthcare contexts. For instance, caregivers of cancer patients benefit from coping skills training that reduces burden and enhances psychological adjustment (Ayyar et al., 2021). Within the cancer population itself, the integration of coping strategies and mindfulness appears especially effective, as these interventions jointly target cognitive, emotional, and behavioral mechanisms of adaptation (Oner Cengiz et al., 2023; Shalikari et al., 2023). Importantly, mindfulness-based therapy has been shown to foster spiritual well-being (Oner Cengiz et al., 2023), facilitate post-traumatic growth (Dahabre, 2024), and reduce psychological distress in both short-term (Chang et al., 2022) and long-term interventions (Talayri & Bavi, 2023).

The multidimensional nature of breast cancer's impact requires interventions that are sensitive to cultural, economic, and social contexts. Research highlights that

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patients often face stigma, role disruptions, and financial burdens, which exacerbate stress and impede adaptive coping (Rouhani & Mousavian Kajour, 2021; Sheikh Mohammadi et al., 2023). These findings underscore the importance of designing protocols that consider not only individual psychological states but also the broader socio-cultural environment (Avery, 2024; Hedhili, 2024). Complementary and integrative therapies, including mindfulness and even alternative approaches such as essential oils (Hedhili, 2024), have gained attention as adjuncts that address holistic needs.

Moreover, technological advances are reshaping the delivery of mindfulness and coping interventions. Internet-delivered MBSR has been effective in enhancing self-efficacy and reducing stress (Chang et al., 2022), while innovative approaches such as VR-AI platforms have demonstrated benefits in improving psychological well-being in women with breast and ovarian cancer (Horesh et al., 2022). Similarly, digital tools for everyday mindfulness beyond meditation are being designed to promote sustainable mental well-being (Li, 2022). These developments highlight the potential scalability of mindfulness-based interventions in diverse populations, including breast cancer patients.

Psychological constructs such as self-efficacy, resilience, and optimism play a mediating role in the effectiveness of these interventions. For example, self-efficacy has been shown to mediate the relationship between optimism, psychological well-being, and resilience (Sabouripour et al., 2021), and moderates the association between family risk and hope (Yin et al., 2021). In the context of cancer, higher self-efficacy is linked with better emotional regulation and reduced distress (Lucas et al., 2023; Reis et al., 2023). Mindfulness interventions enhance self-efficacy by promoting acceptance, awareness, and adaptive responses, thereby strengthening patients' ability to cope with stress and illness (Mahmoudzadeh & Rajabi, 2022; Olyaee et al., 2022).

The broader literature on stress and coping further reinforces the significance of this approach. Stress is a pervasive construct with wide-ranging implications for both mental and physical health, as demonstrated in populations as varied as adolescents with diabetes (Rechenberg, 2024), military recruits (Wu et al., 2022), and nursing students during the COVID-19 pandemic (Savitsky et al., 2020). Across these contexts, mindfulness and coping skills have emerged as protective factors against stress, enhancing resilience and reducing maladaptive outcomes (Mohammadi, 2020; Romeo et al., 2021). Such findings emphasize the generalizability of mindfulness and coping interventions, further supporting their application in oncology.

There is also evidence that mindfulness contributes to growth beyond stress reduction. For example, it has been shown to mediate the relationship between spirituality and resilience (Arefian et al., 2023), facilitate cognitive reappraisal and mental toughness in athletes (Zhong et al., 2025), and improve parenting resilience among single mothers (Ihdalumam et al., 2025). In clinical settings, mindfulness reduces post-traumatic stress symptoms (Shalikari et al., 2023) and enhances distress tolerance (Timajchi et al., 2025), confirming its adaptability to a range of psychosocial challenges. These findings are complemented by experimental work demonstrating that mindfulness fosters attentional control and emotional regulation even in populations such as children and adolescents (Harley, 2018; Zangiabadi et al., 2018).

Biological evidence further highlights the mechanisms through which mindfulness-based interventions exert their effects. For example, stress-induced exosomal signaling and macrophage polarization have been implicated in tumor progression (Lu et al., 2022), underscoring how chronic stress can worsen disease outcomes. By modulating stress responses and reducing cortisol (JarAllah et al., 2023; Olyaee et al., 2022), mindfulness may indirectly influence biological pathways relevant to cancer progression. Similarly, heart rate variability-based stress detection models confirm the physiological relevance of mindfulness in reducing autonomic arousal (Benchekroun et al., 2023).

Taken together, this body of research underscores the pressing need for integrative interventions that address the psychological, biological, and social dimensions of breast cancer. Mindfulness-based coping skills training appears uniquely positioned to fill this gap, as it combines stress reduction, self-efficacy enhancement, resilience building, and biological modulation. It is evident from existing studies that such interventions yield consistent improvements in mental health outcomes (Dahabre, 2024; Sakki et al., 2022), while also aligning with broader frameworks of psychological growth and adaptation (Lucas et al., 2023; Reis et al., 2023).

Therefore, the present study seeks to contribute to this growing body of evidence by developing and evaluating a mindfulness-based psychological coping skills training package tailored for women with breast cancer.

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2. Methods and Materials

2.1. Study design and Participant

This study employed a mixed-methods design consisting of qualitative and quantitative phases. In the qualitative phase, a mindfulness-based psychological coping skills training package for patients with breast cancer was developed. For this purpose, data were initially collected through semi-structured interviews with patients and psychology experts, as well as a review of scientific literature. Using thematic analysis and open, axial, and selective coding, the dimensions and key components of the package were identified. The package content was then evaluated and refined through the Delphi technique with the participation of 15 psychology experts in two stages to ensure its scientific validity.

In the quantitative phase, the study was conducted as a quasi-experimental design with pretest–posttest, control group, and a two-month follow-up. The statistical population included women with breast cancer in Bandar Abbas. Based on Cohen's sample size calculations and with oversampling, 30 eligible patients were purposively selected and randomly assigned to the experimental group (n = 15) and the control group (n = 15). The experimental group received the training package in ten 90-minute sessions over eight weeks, while the control group received no intervention. Inclusion criteria included informed consent, age between 20 and 45 years, absence of severe psychological disorders, and at least secondary or high school education. Exclusion criteria included lack of cooperation, absence from more than two sessions, incomplete questionnaires, and withdrawal from the study. The dependent variables included stress, blood cortisol level, and psychological self-efficacy. Data were analyzed using repeated measures analysis of variance.

2.2. Measures

2.2.1. Demographic Questionnaire and Semi-Structured Interview

Demographic data included age, occupation, and education, which were recorded on a prepared checklist.

Semi-structured interview questions included:

- What is the definition of breast cancer?
- What do you think causes this disease?
- What physical, psychological, and social problems does this disease create for patients?
- How has this disease affected patients' quality of life?
- Why do you think individuals develop this disease?
- What strategies and approaches do patients use to cope with and manage the disease?
- What have been the consequences of developing the disease (physical, psychological, social)?
- What strategies do patients use in response to disease symptoms?
- What factors do you consider to facilitate or hinder coping with this disease?

To evaluate the validity of the interview questions, the Content Validity Ratio (CVR) was used. Since the CVR value was greater than 0.62 (the accepted threshold for validity), and a score of 1 indicates complete content validity, the CVR values for all questions were above 0.62.

2.2.2. Perceived Stress Scale

The Perceived Stress Scale (PSS) was developed by Cohen et al. (1983) to assess perceived general stress during the past month. It measures thoughts and feelings about stressful events, perceived control, ability to overcome, coping with psychological pressure, and experienced stress. The scale also identifies risk factors for behavioral disorders and demonstrates processes of stressful relationships. Scoring is based on a 5-point Likert scale: never = 0, almost never = 1, sometimes = 2, fairly often = 3, and very often = 4. Internal consistency, measured using Cronbach's alpha in cardiovascular patients, yielded a coefficient of 0.85. Internal consistency of the questionnaire was reported with Cronbach's alpha of 0.72, and construct validity was calculated through confirmatory factor analysis with a coefficient of 0.97. Convergent validity was confirmed using the Loneliness Questionnaire with a coefficient of 0.56. Cronbach's alpha in the present study was 0.88.

2.2.3. Self-Efficacy Questionnaire

The Self-Efficacy Questionnaire was developed by Sherer et al. (1982) and includes 23 items. Seventeen items measure general self-efficacy, while six items assess experiences of self-efficacy in social situations. Respondents answer items on a 5-point Likert scale. Sherer et al. (1982) reported a reliability coefficient of 0.86 for the questionnaire. They also reported construct validity coefficients of 0.49 with an optimistic attributional style, 0.45 with challenge perception in stressful situations, and 0.58 with self-regulation among teachers, all statistically

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significant. Correlations with depression, anxiety, and optimistic attributional style scores were 0.52, –0.60, and 0.55, respectively; in a Spanish sample, coefficients of 0.42, 0.43, and 0.57 were obtained. Concurrent validity with the Rosenberg Self-Esteem Scale was 0.30 in a sample of 318 participants, 0.20 in 267 students at Shahid Chamran University of Ahvaz, and 0.23 in 208 students at Islamic Azad University of Marvdasht. Barati's study reported a reliability coefficient of 0.76, and Najafi and Fouladchang (2007) reported 0.80. Cronbach's alpha in the present study was 0.91.

2.3. Intervention

The intervention protocol designed in this study consisted of ten structured sessions aimed at enhancing coping skills and mindfulness-based practices among women with breast cancer, organized to gradually build psychological resilience, stress management capacity, and adaptive behavioral responses. In the first session, participants were introduced to the psychological, social, and physical effects of breast cancer, focusing on anxiety, fear, depression, bodily changes, role alterations, and feelings of loneliness, while being encouraged to record daily thoughts, emotions, and concerns related to their illness. The second session concentrated on exploring the psychosomatic impacts of the disease on daily functioning, including problems such as concentration deficits, sleep disturbances, chronic fatigue, sexual dysfunction, and challenges in accepting the illness, with an emphasis on documenting the interaction between symptoms and daily activities. The third session expanded the perspective by addressing cultural and economic challenges, introducing financial difficulties, family beliefs about cancer, and social stigma, while guiding participants to identify personal cultural–economic barriers and propose simple management strategies. The fourth session focused on recognizing facilitators and barriers to coping, where participants engaged in dialogue with a family member or friend about available supports, reflected on strengths and weaknesses in their current coping strategies, and were encouraged to confront issues such as misinformation, excessive worry, and resistance to psychological interventions. In the fifth session, participants were introduced to the foundations of mindfulness, including its principles and benefits for stress reduction, and were trained in mindful breathing exercises practiced daily for five minutes, while keeping a journal of their experiences. Building on this, the sixth session provided training in body scan meditation as a ten-minute exercise, teaching participants to focus non-judgmentally on bodily sensations, engage in mindful dialogue with pain, and consciously manage stress and anxiety, with reflections recorded afterward. The seventh session emphasized distinguishing between adaptive and maladaptive coping strategies, encouraging participants to identify one maladaptive behavior (such as denial, avoidance, or social withdrawal) and to replace it with adaptive responses (such as acceptance and social support), while monitoring their progress. In the eighth session, short daily meditation exercises of ten minutes were introduced, focusing on present-moment awareness, regulating negative thoughts, and practicing mindful breathing techniques to reduce anxiety and enhance relaxation, with participants documenting the effects on stress levels. The ninth session highlighted the importance of social support and effective communication by encouraging participants to practice expressing feelings and needs openly with a family member or friend, while also learning communication skills that facilitate receiving more effective support from family and support groups. Finally, the tenth session served as a comprehensive review of the training package, in which participants revisited all previously learned coping and mindfulness skills, evaluated reductions in stress and improvements in quality of life, and developed a personalized plan that included weekly schedules and short-term goals for sustaining and strengthening the acquired skills beyond the intervention period. This structured, integrative protocol was designed to empower patients with practical strategies that promote psychological self-efficacy, reduce physiological and emotional stress, and foster long-term resilience in coping with breast cancer.

2.4. Data Analysis

Data were analyzed using SPSS version 26. Descriptive statistics (mean and standard deviation) were first calculated for all variables across groups and stages. To test the study hypotheses, repeated measures analysis of variance (ANOVA) was employed with pretest, posttest, and follow-up as within-subject factors and group (intervention vs. control) as the between-subject factor. Assumptions of normality, homogeneity of variances, equality of covariance matrices, and sphericity were examined using Levene's test, Box's M test, and Mauchly's test, respectively; in cases where sphericity was violated, the Greenhouse–Geisser

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correction was applied. A significance level of $p < .05$ was considered the threshold for statistical significance.

3. Findings and Results

The minimum age of participants in this study was 27 and the maximum age was 41. Furthermore, given that the significance level was greater than .05, no significant difference was found between the two groups, and it can be concluded that the groups were homogeneous in terms of age. The status of educational level in the intervention and control groups also showed no significant difference between the groups ($p > .05$), indicating that the groups were homogeneous regarding education level. Additionally, with a significance level greater than .05 ($p > .05$), there was no significant difference between the groups in terms of occupational status, and therefore the groups were also homogeneous in this variable.

Table 1

Descriptive Statistics (M and SD) of Stress, Blood Cortisol Level, and Psychological Self-Efficacy Across Groups and Stages

Variable	Group	Pretest M (SD)	Posttest M (SD)	Follow-up M (SD)
Stress	Intervention	28.45 (3.62)	22.75 (3.18)	23.10 (3.24)
	Control	27.92 (3.55)	27.41 (3.47)	27.65 (3.51)
Blood Cortisol Level	Intervention	18.36 (2.45)	15.42 (2.28)	15.67 (2.31)
	Control	18.28 (2.36)	18.12 (2.42)	18.24 (2.39)
Psychological Self-Efficacy	Intervention	46.52 (4.15)	57.89 (4.32)	56.78 (4.21)
	Control	47.10 (4.08)	47.52 (4.14)	47.36 (4.11)

Table 1 presents the descriptive statistics (means and standard deviations) of stress, blood cortisol levels, and psychological self-efficacy across intervention and control groups at pretest, posttest, and follow-up stages. As shown, the intervention group demonstrated a notable reduction in stress scores from pretest ($M = 28.45$, $SD = 3.62$) to posttest ($M = 22.75$, $SD = 3.18$), which remained relatively stable at follow-up ($M = 23.10$, $SD = 3.24$), while the control group showed little change across stages. Similarly, blood cortisol levels in the intervention group decreased from pretest ($M = 18.36$, $SD = 2.45$) to posttest ($M = 15.42$, $SD = 2.28$), maintaining improvement at follow-up ($M = 15.67$, $SD = 2.31$), whereas the control group values remained stable. In contrast, psychological self-efficacy scores in the intervention group increased substantially from pretest ($M = 46.52$, $SD = 4.15$) to posttest ($M = 57.89$, $SD = 4.32$), with a slight decline at follow-up ($M = 56.78$, $SD = 4.21$), while the control group scores showed minimal change. These descriptive results provide preliminary support for the effectiveness of the mindfulness-based psychological coping skills training package in enhancing adaptive outcomes among women with breast cancer.

The assumptions underlying the repeated measures ANOVA were tested prior to analysis. Box's test indicated that the assumption of equality of covariance matrices was not met ($F = 2.27$, $p = .034$), but given the equal group sizes, this violation was not considered problematic. Mauchly's test of sphericity was also significant ($\chi^2 = 489.9$, $df = 35$, $p = .001$), suggesting that the assumption of sphericity was violated; therefore, the Greenhouse–Geisser correction was applied to adjust the degrees of freedom in the repeated measures ANOVA. Levene's test results confirmed the homogeneity of variances across groups for stress, blood cortisol level, and psychological self-efficacy at pretest, posttest, and follow-up stages (all $p > .05$), indicating that the assumption of equality of error variances was satisfied. Overall, despite the violation of sphericity, the data met the necessary assumptions for proceeding with repeated measures ANOVA using the Greenhouse–Geisser adjustment.

Table 2

Summary of One-Way Analysis of Variance for Within-Group and Between-Group Effects

Source of Variation	Sum of Squares	df	Mean Squares	F	p	Effect Size
Between Subjects	Group	11564.03	1	11564.03	148.7	.001
	Error	2176.2	28	77.7		
Within Subjects	Factor	4828679.007	2.41	1996591.7	17614.7	.001
	Factor × Group	47042.5	2.41	19451.4	171.6	.001
	Error (factor)	7675.5	67.7	113.3		

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The results of simple repeated measures ANOVA based on Greenhouse-Geisser correction indicated that the main effect of the factor was significant at the .01 level (F = 17614.7, p = .001, Greenhouse-Geisser = 4828679.007). This result means that there was a significant difference between factor scores (pretest, posttest, and follow-up) of the variables under study regardless of group. Furthermore, the interaction effect of group and factor (measurement stages) was significant at the .01 level (F = 171.6, p = .001, Greenhouse-Geisser = 47042.5). In other words, there was a significant difference between at least two stages of the examined variables between the intervention and control groups. Therefore, in order to examine at which measurement stages the differences existed, pairwise within-subjects comparisons were conducted, the summary of which is presented in Table 3.

Table 3

Pairwise Within-Subject Comparisons of Stress in Repeated Measures

Source of Variation	Pairwise Comparisons	Sum of Squares	df	Mean Squares	F	p	Effect Size
Factor	Pretest vs. Posttest	3153062.7	1	3153062.7	38602.5	.001	.999
	Posttest vs. Follow-up	590826.7	1	590826.7	5965.9	.001	.995
Factor × Group	Pretest vs. Posttest	15324.1	1	15324.1	187.6	.001	.870
	Posttest vs. Follow-up	18312.5	1	18312.5	184.9	.001	.868
Error	Pretest vs. Posttest	2287.04	28	81.6			
	Posttest vs. Follow-up	2772.9	28	99.03			

Based on the above table, the main effect of the factor in the pretest and posttest was significant (F = 3869.5, p = .001). Moreover, the interaction effect of factor and group was significant (F = 187.6, p = .001). Comparison of means in the descriptive data also indicated that the scores of the studied variables in the intervention group compared to the control group showed substantial changes from pretest to posttest, suggesting that the mindfulness-based psychological coping skills training package for cancer was effective in the intervention group. Furthermore, the results showed that the main effect of posttest and follow-up was significant at the .01 level (F = 5965.9, p = .001), and the F value obtained for posttest and follow-up, considering group, was also significant at the .01 level (F = 184.9, p = .001). This means that the difference between follow-up and posttest scores was significant between the intervention and control groups. Therefore, these results indicate that the mindfulness-based psychological coping skills training package for cancer was effective in reducing stress, blood cortisol levels, and increasing psychological self-efficacy in women with breast cancer.

Table 4

Bonferroni Post-Hoc Test Results for the Study Variables

Variable	Times Compared	Mean Difference	Standard Error	p
Stress	Pretest – Posttest	5.70*	.001	.001
	Pretest – Follow-up	5.10*	.001	.001
	Posttest – Follow-up	–0.60*	.001	.001
Blood Cortisol Level	Pretest – Posttest	296.2*	.001	.001
	Pretest – Follow-up	301.9*	.001	.001
	Posttest – Follow-up	274.8*	.001	.001
Psychological Self-Efficacy	Pretest – Posttest	–11.6*	.001	.001
	Pretest – Follow-up	–5.96*	.017	.017
	Posttest – Follow-up	2.36	1.000	.001

In line with the results of group effects in the Bonferroni test, the trend of changes in the mean scores of the studied variables in the figure below demonstrates that the changes resulting from the implementation of the designed intervention protocol persisted after two months from the completion of treatment.

4. Discussion and Conclusion

The findings of the present study demonstrated that the mindfulness-based psychological coping skills training package designed for women with breast cancer in Bandar Abbas had significant effects in reducing stress, lowering

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blood cortisol levels, and enhancing psychological self-efficacy. The descriptive and inferential analyses indicated that, compared to the control group, the intervention group experienced a marked reduction in perceived stress across posttest and follow-up assessments. Similarly, cortisol levels decreased significantly in the experimental group, pointing to a beneficial biological regulation of stress responses. Psychological self-efficacy scores improved substantially after the intervention, reflecting the positive influence of the program on cognitive and emotional appraisal of coping abilities. These results confirm the multidimensional impact of the intervention on psychological, physiological, and behavioral outcomes, thereby supporting the notion that mindfulness and coping-based approaches are highly effective in comprehensive cancer care.

The reduction in perceived stress following the intervention is consistent with prior evidence that mindfulness-based strategies promote relaxation, awareness, and emotional regulation in cancer patients. Research has shown that mindfulness reduces maladaptive coping patterns, rumination, and fears of compassion, leading to lower psychological distress (Williams et al., 2023). This aligns with our results showing that stress levels were significantly reduced through structured coping and mindfulness training. A meta-analysis confirmed that interventions targeting stress in breast cancer patients consistently reduce perceived stress (Ding et al., 2023), which resonates with the outcomes observed in this study.

Cortisol regulation as an outcome of the intervention is also noteworthy. Stress-related cortisol dysregulation is a well-documented biological phenomenon associated with poor health outcomes and fatigue in women with breast cancer (JarAllah et al., 2023; Reis et al., 2023). In our study, the reduction in cortisol levels suggests that mindfulness-based coping strategies may directly modulate the hypothalamic–pituitary–adrenal (HPA) axis. This finding echoes earlier results where mindfulness-based cognitive therapy significantly lowered serum cortisol levels in breast cancer patients (Olyaee et al., 2022). Similarly, research on occupational stress found associations between cortisol concentration and stress exposure (Wang, 2023), underscoring the value of cortisol as a physiological marker. The present results add to this growing body of evidence, indicating that targeted psychological training can yield measurable biological improvements.

The enhancement of psychological self-efficacy following the intervention supports theoretical and empirical models emphasizing self-belief as a mediator of adaptation to chronic illness. Previous studies have found that self-efficacy mediates the relationship between optimism, well-being, and resilience (Sabouripour et al., 2021), and moderates the impact of family risk factors on hope (Yin et al., 2021). Our findings demonstrate that mindfulness training fosters self-efficacy, enabling patients to feel more capable in managing symptoms and emotional challenges. This is consistent with research reporting higher self-efficacy among breast cancer survivors after mindfulness-based interventions (Chang et al., 2022; Mahmoudzadeh & Rajabi, 2022).

The results also validate the multidimensional nature of coping in cancer care. By addressing psychological, social, cultural, and economic challenges, the training package provided a holistic framework that resonates with studies highlighting the broad range of difficulties faced by patients. Cultural stigma, role disruption, and financial burden exacerbate stress responses (Rouhani & Mousavian Kajour, 2021; Sheikh Mohammadi et al., 2023), making comprehensive programs that integrate mindfulness with coping strategies particularly valuable. This study's outcomes suggest that interventions considering these multifaceted realities are better positioned to yield sustained improvements in patient outcomes.

Our findings support the evidence base for mindfulness-based stress reduction (MBSR) and similar interventions. For instance, internet-delivered MBSR during the COVID-19 pandemic improved body image, self-efficacy, and mental health in women with breast cancer (Chang et al., 2022). Similarly, mindfulness-based therapy enhanced spiritual well-being in breast cancer patients in a randomized controlled study (Oner Cengiz et al., 2023). The current study expands on these findings by showing that combining mindfulness with structured coping skills in a culturally sensitive protocol produces comparable benefits.

Furthermore, the intervention's capacity to lower stress and foster resilience aligns with research on the mediating role of mindfulness in pain, spirituality, and resilience (Arefian et al., 2023), as well as studies on post-traumatic growth facilitated by mindfulness (Dahabre, 2024). Similar to our findings, evidence indicates that mindfulness can reduce psychological distress, foster acceptance, and improve adaptation in breast cancer patients (Shalikari et al., 2023; Talayri & Bavi, 2023).

Beyond oncology, findings from other clinical populations underscore the generalizability of our results. For example, mindfulness and coping skills training reduced caregiver burden among family members of cancer patients

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(Ayyar et al., 2021), reduced distress tolerance problems in diabetic patients (Timajchi et al., 2025), and decreased parenting stress in single mothers (Ihdalumam et al., 2025). Our results reflect similar pathways, suggesting that the benefits of mindfulness are not disease-specific but rather grounded in universal psychological mechanisms of stress regulation and self-efficacy.

Additionally, evidence on complementary therapies strengthens our interpretation. Essential oil therapies and integrative approaches have been proposed as adjunctive options in breast cancer care (Avery, 2024; Hedhili, 2024). Similarly, VR and AI-based interventions have been used to enhance psychological well-being in oncology patients (Horesh et al., 2022), and wearable technologies are increasingly employed to detect stress (Benchekroun et al., 2023). The present study contributes to this literature by affirming the value of mindfulness-based coping programs, which, while not technologically advanced, are highly adaptable, low-cost, and culturally sensitive.

Finally, the findings resonate with broader evidence on stress, coping, and mindfulness outside the cancer domain. Adolescents with type 1 diabetes experience daily stressors that require coping flexibility (Rechenberg, 2024). Similar relationships have been observed among military recruits (Wu et al., 2022), students during the pandemic (Romeo et al., 2021; Savitsky et al., 2020), and individuals with low psychological resources (Mohammadi, 2020; Zangiabadi et al., 2018). In each context, mindfulness enhances adaptation, suggesting that the mechanisms observed in our study are consistent across diverse populations.

The present results can be understood within the framework of resilience, stress appraisal, and coping theories. Mindfulness enhances attentional control and acceptance, reducing cognitive distortions and rumination (Harley, 2018). This aligns with cognitive-behavioral theories that emphasize the role of appraisal in determining stress outcomes. Furthermore, coping skills training aligns with Lazarus and Folkman's transactional model, where appraisal and coping strategies determine stress adaptation. By combining mindfulness with structured coping, the intervention addressed both appraisal and behavioral responses, yielding the observed improvements.

Spirituality and meaning-making also provide interpretive frameworks. Mindfulness fosters spiritual well-being and resilience (Arefian et al., 2023; Oner Cengiz et al., 2023), which can contribute to post-traumatic growth (Dahabre, 2024). Such outcomes resonate with positive psychology frameworks emphasizing growth and resilience in adversity. Similarly, resilience models highlight the role of self-efficacy in moderating stress outcomes, which is directly supported by our findings (Zhang et al., 2021).

5. Limitations and Suggestions

This study is not without limitations. First, the sample size was relatively small, with only 30 participants, which may limit the generalizability of findings to broader populations of women with breast cancer. Although randomization enhanced internal validity, the small scale may have increased the risk of Type II error in detecting smaller effects. Second, the study was conducted in a single city, Bandar Abbas, and cultural, economic, and healthcare system variables may limit applicability to other contexts. Third, while cortisol was measured as a biological marker, other relevant physiological indices such as immune function, heart rate variability, or inflammatory markers were not included, restricting the biological interpretation of outcomes. Fourth, the follow-up period of two months, while demonstrating short-term sustainability, does not provide insights into long-term effects. Lastly, self-report questionnaires were used to measure stress and self-efficacy, which may be subject to response bias.

Future studies should employ larger, multi-center samples to enhance generalizability and to explore cultural variations in the effectiveness of mindfulness-based coping interventions. Longitudinal designs with extended follow-up periods of six months to one year are recommended to assess the durability of outcomes. Future research may also benefit from incorporating a broader range of biomarkers, including immune function and inflammatory markers, to deepen understanding of the physiological mechanisms underlying stress reduction. Additionally, comparisons of mindfulness-based coping skills training with other psychological interventions such as acceptance and commitment therapy, cognitive-behavioral therapy, or compassion-focused therapy could help delineate the unique contributions of mindfulness. The integration of digital technologies such as VR, AI, and mobile health applications may also be explored to enhance accessibility and scalability of interventions.

In clinical practice, mindfulness-based coping skills training should be integrated as a complementary intervention alongside conventional medical treatment for breast cancer. Healthcare providers should consider culturally sensitive adaptation of mindfulness and coping programs to address the unique psychosocial challenges of patients in different contexts. Training oncology nurses,

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psychologists, and social workers in delivering such interventions can ensure scalability and sustainability. Additionally, designing user-friendly manuals and providing structured protocols may facilitate routine implementation in hospitals and support centers. Beyond oncology, the integration of mindfulness-based coping programs in other chronic illness settings can further promote holistic care and enhance patient quality of life.

Authors' Contributions

Authors contributed equally 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

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict 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.

References

Arefian, M., Asgari-Mobarake, K., Fazilatpour, M., Zanguri, V., & Akrami, M. (2023). Proposing and evaluating a model of depression, stress, resilience and spirituality in relation to pain in women with breast cancer: Investigating the mediating role of mindfulness. *European Journal of Oncology Nursing*, *62*, 102268. https://doi.org/10.1016/j.ejon.2023.102268

Avery, E. (2024). Immediate diep breast reconstruction in a trans woman with breast cancer. *Plastic and Reconstructive Surgery Global Open*, *12*(5), e5834. https://doi.org/10.1097/GOX.0000000000005834

Ayyar, P., Mousavi, S. K., & Seyed al-Shohadaei, M. (2021). Investigating the Effect of Coping Skills Training on the Caregiver Burden of Family Caregivers of Cancer Patients Undergoing Chemotherapy. *Health Education and Health Promotion*, *9*(3), 235-245. https://doi.org/10.52547/ijhehp.9.3.235

Benchekroun, M., Velmovitsky, P., Istrate, D., Zalc, V., Morita, P., & Lenne, D. (2023). Cross dataset analysis for generalizability of hrv-based stress detection models. *Sensors*, *23*(4), 1807. https://doi.org/10.3390/s23041807

Chang, Y. C., Chiu, C. F., Wang, C. K., Wu, C. T., Liu, L. C., & Wu, Y. C. (2022). Short-term effect of internet-delivered mindfulness-based stress reduction on mental health, self-efficacy, and body image among women with breast cancer during the COVID-19 pandemic. *Frontiers in psychology*, *13*, 949446. https://doi.org/10.3389/fpsyg.2022.949446

Dahabre, R. (2024). Can mindfulness facilitate posttraumatic growth in breast cancer patients? the mediating role of illness perceptions and positive emotions. *Journal of Health Psychology*, *29*(5), 438-451. https://doi.org/10.1177/13591053231223484

Ding, X., Zhao, F., Zhu, M., Wang, Q., Wei, S., Xue, J., & Li, Z. (2023). A systematic review and meta-analysis of interventions to reduce perceived stress in breast cancer patients. *Complementary Therapies in Clinical Practice*, 101803. https://doi.org/10.1016/j.ctcp.2023.101803

Harley, J. (2018). The role of attention in therapy for children and adolescents who stutter: Cognitive behavioral therapy and mindfulness-based interventions. *American Journal of Speech-Language Pathology*, *27*(3S), 1139-1151. https://doi.org/10.1044/2018_AJSLP-ODC11-17-0196

Hedhili, L. (2024). Ippia alba essential oil: a promising complementary therapy for breast cancer. *Chemistry & Biodiversity*, *21*(4). https://doi.org/10.1002/cbdv.202301510

Horesh, D., Kohavi, S., Shilony-Nalaboff, L., Rudich, N., Greenman, D., Feuerstein, J., & Abbasi, M. (2022). Virtual reality combined with artificial intelligence (vr-ai) reduces hot flashes and improves psychological well-being in women with breast and ovarian cancer: a pilot study. *Healthcare*, *10*(11), 2261. https://doi.org/10.3390/healthcare10112261

Ihdalumam, A., Noviekayati, I., & Santi, D. E. (2025). The Effectiveness of Mindfulness Parenting to Reduce Parenting Stress in Single Mothers as Measured by Resilience. *International Journal of Research and Scientific Innovation*, *XII*(I), 718-731. https://doi.org/10.51244/ijrsi.2025.12010062

JarAllah, S., Al-Fartusie, F., & Zageer, D. (2023). Assessment of insulin and cortisol levels in iraqi women with breast cancer. *Al-Mustansiriyah Journal of Science*, *34*(1), 32-36. https://doi.org/10.23851/mjs.v34i1.1233

Li, J. (2022). Designing technologies to support everyday mindfulness beyond meditation for mental well-being.

Lu, C., Shi, W., Hu, W., Zhao, Y., Zhao, X., Dong, F., & Liu, C. (2022). Endoplasmic reticulum stress promotes breast cancer cells to release exosomes circ_0001142 and induces M2 polarization of macrophages to regulate tumor progression. *Pharmacological Research*. https://doi.org/10.1016/j.phrs.2022.106098

Lucas, A., Pan, J., E, I., Hall, D., Ja, T., Levine, B., & Wagner, L. (2023). Validation of the lee-jones theoretical model of fear of cancer recurrence among breast cancer survivors using a structural equation modeling approach. *Psycho-Oncology*, *32*(2), 256-265. https://doi.org/10.1002/pon.6076

Mahmoudzadeh, S., & Rajabi, S. (2022). A Comparison of Mindfulness and Health Anxiety in Women with Breast Cancer and Healthy Individuals. *Health System Research*, *18*(4), 314-320. https://hsr.mui.ac.ir/article-1-1324-en.html

PWJ
Psychology of Woman Journal
E-ISSN: 3041-8515

Mohammadi, S. (2020). *Predicting Teachers' Job Stress Based on Basic Psychological Needs, Perceived Stress, and Early Maladaptive Schemas* Payame Noor University of East Azerbaijan Province, Payame Noor Center of Tabriz].

Olyaee, Z., Mohammadi, M., Anvari, K., & Hosseini, S. E. (2022). The Effectiveness of Mindfulness-Based Cognitive Therapy (MBCT) on Depression, Quality of Life, and Serum Cortisol Levels in Women with Breast Cancer. *Journal of Mashhad University of Medical Sciences Faculty of Medicine*, *65*(2), 785-801. https://jfmh.mums.ac.ir/article_21513.html

Oner Cengiz, H., Bayir, B., Sayar, S., & Demirtas, M. (2023). Effect of mindfulness-based therapy on spiritual well-being in breast cancer patients: a randomized controlled study. *Supportive Care in Cancer*, *31*(7), 438. https://doi.org/10.1007/s00520-023-07904-2

Rechenberg, K. (2024). "diabetes is really simple on paper, but really complicated when you actually have it": understanding the daily stressors of adolescents living with type 1 diabetes. *Journal for Specialists in Pediatric Nursing*, *29*(2). https://doi.org/10.1111/jspn.12424

Reis, J., Travado, L., Sousa, B., & Antoni, M. (2023). Perceived efficacy of stress management skills, emotional distress, and diurnal cortisol in women with metastatic breast cancer. *International Journal of Stress Management*, *30*(1), 16-26. https://doi.org/10.1037/str0000260

Romeo, A., Benfante, A., Castelli, L., & Tella, M. (2021). Psychological distress among italian university students compared to general workers during the covid-19 pandemic. *International journal of environmental research and public health*, *18*(5), 2503. https://doi.org/10.3390/ijerph18052503

Rouhani, F., & Mousavian Kajour, S. M. (2021). Investigating the Relationship Between Social Self-Efficacy and Spiritual Intelligence with Happiness Among Students of Islamic Azad University, Sari Branch. The First National Conference on Applied Studies in Education Processes,

Sabouripour, F., Roslan, S., Ghiami, Z., & Memon, M. (2021). Mediating role of self-efficacy in the relationship between optimism, psychological well-being, and resilience among iranian students. *Frontiers in psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.675645

Sakki, S. E., Penttinen, H. M., Hilgert, O. M., Volanen, S. M., Saarto, T., & Raevuori, A. (2022). Mindfulness is associated with improved psychological well-being but no change in stress biomarkers in breast cancer survivors with depression: a single group clinical pilot study. *BMC Women's Health*, *22*(1), 518. https://doi.org/10.1186/s12905-022-02116-y

Savitsky, B., Findling, Y., Ereli, A., & Hendel, T. (2020). Anxiety and coping strategies among nursing students during the covid-19 pandemic. *Nurse Education in Practice*, *46*, 102809. https://doi.org/10.1016/j.nepr.2020.102809

Shalikari, M., Mirzaeian, B., & Abbasi, G. (2023). Comparing the Effects of Written Exposure Therapy and Mindfulness-Based Stress Reduction on Post-Traumatic Stress Symptoms and Fear of Recurrence in Patients with Breast Cancer. *Journal of psychiatric nursing*, *11*(1), 76-93. https://ijpn.ir/browse.php?a_code=A-10-1364-2&sid=1&slc_lang=en

Sheikh Mohammadi, F., Rezaei, A., Barzegar, M., & Bagholi, H. (2023). The Effectiveness of Group Counseling with Compassion-Focused Therapy (CFT) on Social Relationships and Emotional Pain in Women with Breast Cancer. *Ravanshenasi- e Nashenakhti (Growth Psychology)*, *12*(4), 139-148. https://frooyesh.ir/article-1-4473-en.html

Talayri, A., & Bavi, S. (2023). Comparing the Effectiveness of Mindfulness-Based Stress Reduction (MBSR) and Emotional Schema Therapy on Perceived Stress and Distress Tolerance in Women Undergoing Drug Treatment for Psoriasis in Ahvaz. *Journal of psychiatric nursing*, *11*(5), 40-52. https://ijpn.ir/article-1-2197-en.html

Timajchi, M., Aghahheris, M., Rafiepoor, A., & Nikoozadeh, E. K. (2025). The Effectiveness of Mindfulness-Based Stress Reduction Training on Psychological Distress Tolerance, Sexual Function, and Psychosocial Distress in Diabetic Patients. *Ijbmc*, *12*(2), 104-112. https://doi.org/10.61838/ijbmc.v12i2.779

Wang, J. (2023). A cohort study on the association between changing occupational stress, hair cortisol concentration, and hypertension. *PLoS One*, *18*(5), e0285623. https://doi.org/10.1371/journal.pone.0285623

Williams, S., Clarke, S., & Edginton, T. (2023). Mindfulness for the self-management of negative coping, rumination and fears of compassion in people with cancer: An exploratory study. *Cancer Reports*, *6*(3), e1761. https://doi.org/10.1002/cnr2.1761

Wu, C., Hou, G., Lin, Y., Sa, Z., Yan, J., Zhang, X., & Lang, H. (2022). Exploring links between chinese military recruits' psychological stress and coping style from the person-environment fit perspective: the chain mediating effect of self-efficacy and social support. *Frontiers in psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.996865

Yin, X., Wang, D., Li, Z., & Huang, Y. (2021). Psychological difficulties mediate and self-efficacy moderates the relationship between family cumulative risk and hope among chinese children from low-income families. *Frontiers in psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.709320

Zangiabadi, M., Sadeghi, M., & Ghadampour, E. (2018). The Effectiveness of Teaching Emotion-Focused Therapy (EFT) Processing Strategies on Academic Emotion and Self-Efficacy of Female High School Students. *Quarterly Journal of Psychological Science*, *17*(67), 399-406. https://psychologicalscience.ir/browse.php?a_id=134&sid=1&slc_lang=en

Zhang, J., Wang, X., Xu, T., Li, J., Li, H., Wu, Y., & Li, Y. (2021). The effect of resilience and self-efficacy on nurses' compassion fatigue: a cross-sectional study. *Journal of Advanced Nursing*, *78*(7), 2030-2041. https://doi.org/10.1111/jan.15113

Zhong, Z. M., Jiang, H., Wang, H., & Liu, Y. (2025). The Association Between Mindfulness and Athletes' Distress Tolerance: The Mediating Roles of Cognitive Reappraisal and Mental Toughness. *Behavioral Sciences*, *15*(3), 298. https://doi.org/10.3390/bs15030298

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