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Comparison of the Effectiveness of Mindfulness-Based Cognitive Therapy and Acceptance and Commitment Therapy on Intolerance of Uncertainty and Self-Efficacy in Patients with Breast Cancer

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A B S T R A C T

Objective: This study aimed to compare the effectiveness of Mindfulness-Based Cognitive Therapy (MBCT) and Acceptance and Commitment Therapy (ACT) on pain self-efficacy and intolerance of uncertainty in women diagnosed with breast cancer.

Methods and Materials: A quasi-experimental design with a pretest–posttest format and a nonequivalent control group was employed. The statistical population consisted of women with stage 3 and grade 2 breast cancer undergoing chemotherapy at a radiotherapy and oncology center in Tehran during the second half of 2024. A total of 45 participants were selected using convenience sampling and randomly assigned to two experimental groups (MBCT and ACT, 15 each) and one control group (15 participants). The MBCT protocol was implemented over eight weekly sessions based on the Segal et al. (2013) program, while the ACT protocol was based on the model developed by Dahl et al. (2014). Instruments included the Pain Self-Efficacy Questionnaire (Nicholas, 1998) and the Intolerance of Uncertainty Scale (Freeston et al., 1994). Data were analyzed using repeated measures ANOVA and Tukey post hoc tests.

Findings: The results of repeated measures ANOVA revealed statistically significant differences among the three groups in both pain self-efficacy ($F = 1476.764$, $p < .001$, $\eta^2 = .946$) and intolerance of uncertainty ($F = 2511.995$, $p < .001$, $\eta^2 = .968$). Post hoc analyses showed that both MBCT and ACT were significantly more effective than the control group in improving pain self-efficacy and reducing intolerance of uncertainty ($p < .01$). Furthermore, MBCT and ACT demonstrated differing levels of effectiveness in influencing these outcomes.

Conclusion: Both interventions significantly enhance pain self-efficacy and reduce intolerance of uncertainty in women with breast cancer, and may serve as complementary interventions alongside medical treatments.

Keywords: *Mindfulness-Based Cognitive Therapy, Acceptance and Commitment Therapy, Intolerance of Uncertainty, Self-Efficacy*

1. Introduction

In today's world, despite the fact that advances in medical science and technology have enabled humans to overcome many cancers, including breast cancer, cancer still remains a terrifying disease due to its prognosis, and from the time of diagnosis through treatment, it creates various physical and psychological challenges for the patient and their family (Cinek, 2025; Günay & Karahan, 2025). Breast cancer occurs during a stage in life when women are often at the height of their personal, familial, occupational, and social responsibilities. Moreover, treatments for this disease—often involving mastectomy—can result in changes to a woman's body and affect her sexual identity, femininity, and maternal roles. As a result, the disease poses extensive difficulties for patients and their families (Soto-Pérez-de-Celis, 2024; Torabiyan et al., 2024). Breast cancer is considered a condition that exposes individuals to psychological turmoil and stress related to the illness, leading many to experience adjustment difficulties directly tied to the onset and consequences of cancer (Carreiro et al., 2025; Wang et al., 2024).

One critical factor for cancer patients is pain perception (Ebrahimkhani et al., 2024; Ghodrati et al., 2024). Pain is one of the most frightening and distressing symptoms of cancer. It is typically categorized into two types: acute and chronic. Acute pain usually results from illness or injury and lasts for less than three months, while chronic pain persists for at least three months and may involve tissue damage or recurrent episodes (Fisher et al., 2023; Givi et al., 2023). Chronic pain affects multiple dimensions of a person's life, including emotional, interpersonal, occupational, and physical functioning, and places a significant financial burden on the healthcare system (Liu et al., 2024). There is a correlation between pain intensity and psychological well-being. Cancer patients who experience more severe pain also exhibit more emotional distress (Nicolescu et al., 2024; Park et al., 2024).

Another important variable affected in cancer patients is self-efficacy (Cousin et al., 2024; Ebrahimkhani et al., 2024; Torabiyan et al., 2024). Over the years, various psychological theories have attempted to explain human behavior. Among them, social cognitive theories emphasize the role of self-efficacy, which significantly influences human performance and how individuals cope with challenges (Corry & Stella, 2018). Rather than being treated as a personality trait, self-efficacy is conceptualized as an individual's belief in their ability to organize and execute actions required to achieve specific goals under given circumstances—essentially, it is a self-evaluation of one's competence (Chiesi et al., 2022; Ghayour Kazemi et al., 2022). According to Bandura (1986), the environment, personal behavior, and individual factors interact reciprocally and cannot be viewed in isolation when assessing human behavior. Bandura (1997) also asserted that individuals with high self-efficacy, who believe they can manage life's potential stressors, are less likely to entertain distressing thoughts, thus avoiding anxiety. Conversely, those who doubt their ability to control threats tend to experience psychological stress and anxiety (Safikhani, 2022).

In cancer patients, interventions that enhance self-efficacy have been shown to improve treatment outcomes and reduce symptoms (McCarroll et al., 2014). One study found that higher physical self-efficacy was associated with longer survival and reduced recurrence in cancer patients (Penson et al., 2003). Enhancing self-efficacy improves quality of life, reduces symptoms of cancer, and lowers psychological stress. Moreover, higher self-efficacy contributes to a more positive body image and strengthens communication with healthcare providers (Chang et al., 2022; Safar Mohammadlou et al., 2021).

Another variable that has been studied in traumatic events, including cancer and other health conditions, is intolerance of uncertainty, which in cancer patients often manifests as a sense of ambiguity that impairs mental health and can trigger maladaptive behaviors (Panchyshyn et al., 2023). Uncertainty refers to the inability to tolerate distress caused by perceived lack of crucial, prominent, or sufficient information, which is reinforced by the experience of ambiguity (Bottesi et al., 2019). Intolerance of uncertainty is defined as a tendency to respond negatively—emotionally, cognitively, and behaviorally—to uncertain situations (Bauer et al., 2020). Those with clinical levels of intolerance perceive uncertain future events as threatening, regardless of the actual probability, and when they attempt to manage or avoid uncertainty, they often experience negative thoughts about their coping abilities and exhibit clinical levels of stress. Consequently, they resort to maladaptive behaviors such as reassurance-seeking, avoidance, or impulsive decision-making (Bredemeier et al., 2023).

Given the importance of self-efficacy and intolerance of uncertainty in the rehabilitation and recovery processes of cancer patients—particularly women with breast cancer—effective interventions are essential. One such therapeutic method is Acceptance and Commitment Therapy (ACT),

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which has roots in behavioral theory but incorporates cognitive processes (Pentzien, 2019). Rather than altering thoughts, ACT seeks to increase the individual's psychological flexibility and engagement with internal experiences to create a more meaningful and satisfying life (Walser & O'Connell, 2023). Initially, ACT aims to increase psychological acceptance of internal experiences (thoughts, emotions, etc.) and teaches that efforts to suppress or avoid such experiences are ineffective and may worsen them. Acceptance involves allowing these experiences to occur without internal or external attempts to eliminate them (Lawrence et al., 2022). The therapy enhances present-moment awareness and teaches cognitive defusion—helping individuals detach from their thoughts and narratives—and clarifies core personal values to guide committed actions aligned with these values (Walser & O'Connell, 2023).

Cancer diagnosis often brings existential concerns and a wide range of cognitive, behavioral, emotional, and physical consequences. Therefore, given the multidimensional challenges faced by cancer patients, it is not sufficient to rely on a single therapeutic approach. Research has demonstrated the efficacy of integrative treatments in cancer care. Among these is Mindfulness-Based Cognitive Therapy (MBCT), developed based on mindfulness theory and adapted for advanced cancer treatment (Kissane et al., 2019). Mindfulness is defined as nonjudgmental present-moment awareness—being attentive to one's environment, thoughts, and feelings without labeling them as good or bad. It helps regulate cognitive evaluations and enables objective observation of experiences (Segal et al., 2018). Furthermore, mindfulness enhances coping and management of aversive stimuli. Individuals with high mindfulness report better emotional and behavioral self-regulation and show greater self-compassion (Wilson et al., 2020). Mindfulness fosters a kind and accepting attitude toward painful emotions rather than suppressing them, thereby replacing negative emotions with more positive ones and enabling constructive coping strategies (Chen et al., 2022; Kelley & Nichols, 2023). Through focused attention and cognitive-emotional challenge, individuals can overcome problems effectively (Wimmer et al., 2020).

Mindfulness combined with ACT helps clients build a vibrant, purposeful life. In essence, ACT encourages individuals to live more meaningfully—even in the presence of undesirable thoughts and feelings—and recent studies offer strong support for the effectiveness of these approaches in treating psychological and physical disorders (Brown et al., 2007). Yousefi et al. (2012) found that both cognitive-behavioral hypnosis and mindfulness therapy were similarly effective in reducing pain perception and increasing pain-related self-efficacy (Yousefi et al., 2012). In another study, Sanai et al. (2017) reported that Mindfulness-Based Stress Reduction significantly improved life orientation and reduced perceived stress in the intervention group at both post-test and follow-up, although it had no significant effect on self-efficacy (Senai et al., 2017). Similarly, Khanaghani et l. (2017) observed that both cognitive-behavioral group therapy and ACT-based group therapy led to self-efficacy improvements in breast cancer patients (Khanaghani et al., 2017). Jerusalem and Mittag (1995) demonstrated that general self-efficacy was positively correlated with optimism, self-esteem, internal locus of control, and achievement motivation, and negatively correlated with anxiety, depression, and neuroticism (Jerusalem & Mittag, 1995). Numerous other studies have highlighted the role of third-wave therapies, particularly ACT, in enhancing psychological and physical well-being and self-efficacy in both clinical and non-clinical populations (McCracken & Vowles, 2014).

In sum, self-efficacy and intolerance of uncertainty are crucial variables in breast cancer patients, contributing to symptom improvement and better adjustment to illness and life circumstances. The research literature suggests that MBCT and ACT are effective interventions for improving both psychological and physical symptoms in cancer patients. However, few studies have explored the impact of these interventions on self-efficacy and intolerance of uncertainty in breast cancer patients. Therefore, the present study seeks to answer the question: Are Mindfulness-Based Cognitive Therapy and Acceptance and Commitment Therapy effective in improving self-efficacy and reducing intolerance of uncertainty in patients with breast cancer?

2. Methods and Materials

2.1. Study design and Participant

This study was a quasi-experimental investigation using a nonequivalent groups design (experimental and control groups) with pretest–posttest assessments. The statistical population included all women diagnosed with breast cancer who visited the Radiotherapy and Oncology Center in Tehran during the second half of 2024. A total of 45 individuals were estimated for inclusion: 15 in the first experimental group, 15 in the second experimental group, and 15 in the control group. To determine the sample size, 30 women were initially selected through convenience

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sampling based on inclusion criteria. Following the selection of the initial sample, the participants were randomly divided into three groups of 15. Two groups were randomly assigned as intervention groups, while the third group was designated as the control.

Inclusion criteria for the study were as follows: diagnosis of breast cancer at stage 3 and grade 2, currently undergoing chemotherapy, minimum educational level of middle school completion, age range between 25 and 55 years, and provision of informed consent to participate in the study. Exclusion criteria included psychiatric disorders requiring urgent intervention (e.g., psychotic symptoms or severe depression), identified through a preliminary clinical interview, and metastasis within the last six months, confirmed through the patient's medical records.

Following the acquisition of necessary ethical and institutional approvals and the completion of the sampling procedure (as previously described), 45 women with breast cancer were randomly assigned to two experimental groups and one control group. All participants completed the research questionnaires. Additionally, participants were informed of the benefits, expected outcomes, and limitations of the treatment interventions. Data for the current study were collected in two phases: the first involved a literature review, including the gathering of information from books, journals, electronic databases, and dissertations. The second phase, which was interventional, was implemented based on the designed protocol.

2.2. *Measures*

2.2.1. *Pain Self-Efficacy*

Pain Self-Efficacy Questionnaire (PSEQ): Based on Bandura's self-efficacy theory, the PSEQ was developed by Nicholas (1998) to assess the patient's belief in their ability to perform various activities despite experiencing pain. This questionnaire contains 10 items scored on a 7-point Likert scale from 0 to 6. The cutoff score is 30. A higher score reflects a stronger sense of self-efficacy and a greater belief in the ability to perform daily activities despite pain. Nicholas (1998) reported a Cronbach's alpha of .92, indicating high internal consistency. The instrument showed strong construct validity through high correlations with pain-related disability. Test–retest reliability over a 9-day interval was also reported (Vakilzadeh & Nakhaee, 2006). Reliability coefficients using Cronbach's alpha, split-half, and test–retest methods were .81, .78, and .77, respectively, confirming acceptable reliability.

2.2.2. *Intolerance of Uncertainty*

Intolerance of Uncertainty Scale (IUS): Developed by Freeston et al. (1994), the IUS is a 27-item instrument designed to assess an individual's ability to tolerate uncertain or ambiguous situations. Items are rated on a 5-point Likert scale ranging from 1 (never) to 5 (always). Total scores range from 27 to 135, with a mean of 81. In the original French version, Freeston et al. (1994) reported internal consistency of $\alpha = .91$ and a 4-week test–retest reliability of .78. Buhr and Dugas (2002) validated the English version of the scale, reporting a Cronbach's alpha of .94 and a 5-week test–retest reliability of .74. Convergent validity was supported by correlations of .60 with the Penn State Worry Questionnaire, and .59 and .55 with the Beck Depression and Anxiety Inventories, respectively, all significant at $p < .001$. In a study by Bakhtiari Zadeh et al. (2022), the Cronbach's alpha for this instrument was reported as .85 (Bakhtiari Zadeh et al., 2022; Buhr & Dugas, 2002; Freeston et al., 1994).

2.3. *Intervention*

2.3.1. *Mindfulness-Based Cognitive Therapy*

The MBCT intervention was based on the treatment manual by Segal, Williams, and Teasdale (2013), adapted for individuals with cancer. Modifications were made to align the program with the psychological and educational needs of cancer patients, incorporating movement-based mindfulness practices. The intervention consisted of eight weekly sessions lasting one hour each, along with homework assignments of 45 minutes per day, six days a week. During the sessions, the instructor guided various mindfulness exercises, introduced new practices, and reviewed the assigned homework (Segal et al., 2018).

The MBCT intervention consisted of eight structured weekly sessions, each incorporating psychoeducation, mindfulness practices, and behavioral assignments. The first session introduced mindful body movements, a three-minute breathing space, and open awareness meditation, combined with psychoeducation on communication and goal-setting. In the second session, participants practiced mindful breathing and verbal/non-verbal communication through observational exercises such as mindful walking and memory recall. The third session emphasized body scanning and energy balance for relapse prevention, with daily breath awareness. Session four focused on present-moment awareness and future reflection, integrating three-minute

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breathing practices and stress-related memory processing. In the fifth session, sitting meditation and stress response psychoeducation were introduced, along with mindful interaction. Session six deepened awareness of anxiety, anger, and depressive thoughts through mindful walking, movement exercises, and body scanning. The seventh session emphasized self-care through intentional practice and mental rehearsal for relapse prevention. Finally, session eight consolidated internal strength and resilience through reflective breathing and self-empowerment exercises. Daily homework included 45-minute mindfulness practices, six days per week, reinforcing session content and enhancing emotional regulation and attentional control.

2.3.2. Acceptance and Commitment Therapy

ACT sessions were based on the treatment program developed by Dahl, Stewart, Martell, and Kaplan (2014). After minor revisions and validation by several clinical experts, the program was implemented in eight weekly sessions, each lasting 60–75 minutes (Dahl et al., 2014).

The ACT intervention was delivered over eight weekly sessions, structured to foster psychological flexibility through six core processes: acceptance, cognitive defusion, present-moment awareness, self-as-context, values clarification, and committed action. The first session involved introductions, discussion of treatment expectations, and psychoeducation on the ACT framework. The second session addressed the necessity of psychological intervention, fostering hope, and encouraging the differentiation of thoughts, feelings, and memories as transient experiences. In session three, group members were taught to accept emotional experiences without judgment, with an emphasis on emotional literacy. The fourth session introduced mindfulness and breath-focused exercises to enhance present-moment awareness and reduce cognitive entanglement. In session five, participants learned to observe their emotions nonjudgmentally, cultivating detachment through witnessing. The sixth session integrated feedback and introduced selective attention as a strategy to manage intrusive thoughts, alongside body scanning and mindfulness practice. Session seven reviewed previous content, resolved remaining challenges, and encouraged commitment to value-based actions and adaptive behavioral alternatives. The final session reviewed therapeutic progress, secured post-intervention commitments, facilitated group feedback, and administered post-testing, ensuring the consolidation of therapeutic gains and continuity of practice beyond the intervention period.

2.4. Data Analysis

Statistical analyses were conducted using both descriptive and inferential methods. Descriptive statistics included frequency tables, percentages, and measures of central tendency and dispersion for the sample groups. To evaluate the hypotheses, multivariate analysis of variance (MANOVA) was employed. Data analysis was carried out using SPSS software, version 24.

3. Findings and Results

Based on the obtained results, the average age of patients with breast cancer was 55 years, and 15 patients (41.7%) were in the 50–55 age range. In terms of education, 17 patients (47.2%) had completed high school. Regarding housing status, 16 patients (44.4%) were homeowners.

Table 1

Mean and Standard Deviation of Pain Self-Efficacy and Intolerance of Uncertainty by Measurement Phase and Group

Group	Variable	Indicator	Pretest	Posttest	Follow-up
MBCT	Intolerance of Uncertainty	Mean	61.60	47.06	46.55
		Std. Deviation	15.15	14.38	11.34
ACT	Intolerance of Uncertainty	Mean	33.40	21.13	19.22
		Std. Deviation	13.36	7.48	8.97
Control	Intolerance of Uncertainty	Mean	58.33	59.13	59.10
		Std. Deviation	13.47	15.27	9.42
MBCT	Pain Self-Efficacy	Mean	55.53	41.98	39.23
		Std. Deviation	15.07	13.03	10.23
ACT	Pain Self-Efficacy	Mean	31.09	25.76	22.45
		Std. Deviation	5.72	4.67	5.68
Control	Pain Self-Efficacy	Mean	34.46	35.65	36.74
		Std. Deviation	4.92	6.50	6.52

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The mean scores for pain self-efficacy across the three experimental groups showed a decrease from pretest to posttest. Similarly, the mean scores for intolerance of uncertainty also declined from pretest to posttest in all three experimental groups (Table 1).

Table 2

Results of Repeated Measures ANOVA

Statistical Index	Source of Variation	SS	df	MS	F	Sig.	η^2
Intolerance of Uncertainty	Group	396,010.000	1	396,010.000	2511.995	.000	.968
	Time × Group	25,625.600	5	5,125.120	32.510	.000	.659
Pain Self-Efficacy	Group	65,826.178	1	65,826.178	1476.764	.000	.946
	Time × Group	5,293.556	5	1,058.711	23.751	.000	.586

As shown in Table 2, after controlling for pretest effects, the main hypothesis—that there would be significant differences in pain self-efficacy and intolerance of uncertainty among the three groups—was confirmed. The obtained significance levels for pain self-efficacy and intolerance of uncertainty were both smaller than the Bonferroni-corrected significance threshold of .001 (i.e., .05 divided by 3 dependent variables). Accordingly, it can be concluded with 95% confidence that both outcome variables changed significantly in the two experimental groups compared to the control group. To identify pairwise group differences, a Tukey post hoc test was conducted, and the results are presented in Table 3.

Table 3

Tukey Post Hoc Test Results for Pairwise Comparison of Three Groups on Pain Self-Efficacy and Intolerance of Uncertainty

Group 1	Group 2	Mean Difference	Std. Error	Sig.
MBCT	ACT	-3.8667	2.34587	.231
	Control	-10.9667*	2.34587	.000
ACT	MBCT	3.8667	2.34587	.231
	Control	-7.1000*	2.34587	.009
Control	MBCT	10.9667*	2.34587	.000
	ACT	7.1000*	2.34587	.009
MBCT	ACT	-13.8333*	5.07080	.021
	Control	-17.9667*	5.07080	.002
ACT	MBCT	-4.1333	5.07080	.695
	Control	13.8333*	5.07080	.021
Control	MBCT	4.1333	5.07080	.695
	ACT	17.9667*	5.07080	.002

As presented in Table 3, there were significant differences among the three groups on the variable of pain self-efficacy ($p < .05$). The results demonstrate that both experimental groups (MBCT and ACT) differed significantly from the control group ($p < .05$). Accordingly, based on the findings, it can be concluded that MBCT and ACT led to improvements in pain self-efficacy in breast cancer patients compared to the control group. The post hoc test also revealed that MBCT and ACT had differing levels of effectiveness in reducing pain self-efficacy ($p < .05$).

Furthermore, Table 3 also shows significant differences among the three groups regarding intolerance of uncertainty ($p < .05$). The results indicate that the experimental groups (MBCT and ACT) significantly differed from the control group ($p < .05$). Based on these findings, it can be concluded that both MBCT and ACT were effective in reducing intolerance of uncertainty in breast cancer patients compared to the control group. The post hoc test also demonstrated differing levels of effectiveness between MBCT and ACT in reducing intolerance of uncertainty in breast cancer patients ($p < .05$).

4. Discussion and Conclusion

The present study aimed to investigate the effectiveness of Mindfulness-Based Cognitive Therapy (MBCT) and Acceptance and Commitment Therapy (ACT) on intolerance of uncertainty and self-efficacy in patients with breast cancer. The results indicated a significant difference among the three groups in the variable of pain self-efficacy.

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Specifically, there was a statistically significant difference between the experimental groups (MBCT and ACT) and the control group. Based on these findings, it can be concluded that MBCT and ACT, compared to the control condition, effectively reduced pain-related self-efficacy in women with breast cancer. Furthermore, post hoc test results indicated that MBCT and ACT had differential effectiveness in enhancing pain self-efficacy among patients.

Additionally, a significant difference was observed between the three groups in terms of intolerance of uncertainty. The results showed that both MBCT and ACT groups significantly differed from the control group. Therefore, it can be inferred that MBCT and ACT led to reductions in intolerance of uncertainty in patients with breast cancer compared to the control condition. Post hoc analysis also suggested that MBCT and ACT varied in their effectiveness in reducing intolerance of uncertainty.

These findings align with the results of previous research (Khanaghani et al., 2017; Kissane et al., 2019; Senai et al., 2017), as well as those by Jerusalem and Mittag (1995). Numerous other studies have also emphasized the positive role of third-wave therapies, particularly ACT-based group therapy, in promoting physical and mental health and enhancing self-efficacy in patients and individuals with disabilities (McCracken & Vowles, 2014).

These findings can be interpreted through the theoretical lens that views mindfulness as a complex and multidimensional psychological phenomenon through which individuals uniquely experience pain. Within this framework, clinical health professionals should not only evaluate a patient's perception of pain but also understand how daily activities influence that perception. Receiving a cancer diagnosis and experiencing its threat introduces profound psychological challenges. The emotional, cognitive, and social impacts of cancer may interact with physical symptoms and negatively influence psychological adjustment.

Moreover, as the results indicated, mindfulness led to a significant reduction in intolerance of uncertainty and an increase in self-efficacy in the experimental groups compared to the control group. Mindfulness not only reduces the harmful consequences of stressful conditions by facilitating positive cognitive processing but also mitigates stress-related issues through the habituation of adaptive strategies supported by high self-efficacy. These findings suggest that stress in women with breast cancer is primarily cognitive and mental in nature. Through mindfulness-based techniques that emphasize present-moment awareness, individuals learn to temporarily release themselves from beliefs rooted in the past or shaped by future fears and anxieties.

This perspective encourages individuals to adopt a nonjudgmental acceptance of all experiences—whether pleasant or unpleasant. Such an approach is particularly beneficial for individuals with cancer, who often experience painful emotions such as hopelessness, helplessness, and sadness. Therefore, the final conclusion is that Mindfulness-Based Cognitive Therapy can reduce perceived stress and maladaptive cognitive patterns in breast cancer patients. This therapeutic approach can be used independently or alongside other treatment modalities, such as pharmacotherapy, to improve psychological and behavioral problems associated with perceived stress.

Additionally, research suggests that Acceptance and Commitment Therapy encourages families to connect with and internalize core life values, which can enhance individual self-efficacy and improve interpersonal relationships. ACT has also been shown to reduce intolerance of uncertainty and increase self-efficacy in women with breast cancer (Pull, 2009). Thus, both MBCT and ACT had a positive impact on self-efficacy and intolerance of uncertainty in patients with breast cancer, and both treatments were equally effective in improving these outcomes.

Given that both MBCT and ACT are empirically supported psychological interventions with demonstrated efficacy across a wide range of psychological disorders and both utilize well-established therapeutic techniques, it is predictable that neither would be superior to the other in this context. Furthermore, as breast cancer is fundamentally a physical illness, pharmacological treatment remains the primary approach, and psychological therapies such as MBCT and ACT are considered complementary.

5. Limitations and Suggestions

However, because this study was conducted within a specific population and geographical region and employed convenience sampling, caution should be exercised in generalizing the findings.

It is recommended that future studies replicate this research with more diverse samples and random sampling methods. Based on the present findings, the use of mindfulness and Acceptance and Commitment Therapy in therapeutic interventions for breast cancer is strongly encouraged.

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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.

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