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Original research article

Effect of acceptance and commitment therapy on depression, anxiety, stress, and psychological flexibility in women with breast cancer

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Abstract

Background: The present study proposes to investigate the benefits of a Therapeutic Approach based on Acceptance and Commitment (ACT) in the face of depression, anxiety, stress and psychological flexibility experienced by women with breast cancer.
Methods: This research was conducted using a pre-test and post-test design with 40 breast cancer patients, allocated randomly to the intervention group ($n = 20$) and the control group ($n = 20$) through convenience sampling. Unlike the control group, the intervention group benefited from 6 sessions of acceptance and commitment therapy. Participants completed a sociodemographic questionnaire, the Depression, Anxiety and Stress Scale 21, and the Acceptance and Action Questionnaire II. Descriptive analyses (number, percentage, mean and standard deviation), Pearson correlations and analyses of covariance (ANCOVA and MANCOVA) were applied to measure the contribution of this psychotherapeutic approach.
Results: The intervention group recorded a significant decrease in levels of depression, anxiety and stress ($p < 0.05$), and also showed a significant overall increase in levels of acceptance and psychological flexibility after this therapy ($p < 0.05$), compared with the control group.
Conclusion: The Acceptance and Commitment Therapy approach provides real support for women with breast cancer, reducing manifestations of depression and anxiety, and promoting psychological acceptance and flexibility.

Keywords: Acceptance and commitment therapy; Anxiety and stress; Breast cancer; Depression; Psychological flexibility

Introduction

Worldwide, breast cancer remains the leading cancer among women, with one in eight likely to be affected during the course of their lives (Zainal et al., 2013a). It is also the second leading cause of mortality in women aged 35 to 45 (Moghad-amfar et al., 2013; Piraux et al., 2020). In Morocco, the results of a study conducted by Fouhi et al. (2020) identified a total of 668 cases of breast cancer in 2018, with an average age of 51.6 years.

Certain disorders, including physical manifestations, psychological reactions and difficulties in accepting the disease and engaging in the therapeutic project, may indeed disrupt patients' well-being (Chen et al., 2022; Groenvold, 2010).

In this respect, the declaration of breast cancer and its management cause real psychological trauma due to its impact on femininity, sexual relations, and self-image (Karakoyun-Celik et al., 2010; Zainal et al., 2013b). Consequently, in most of these patients, certain psychological manifestations

appear, including in particular non-acceptance of their illness, a permanent feeling of sadness and an intensive phobia towards their death, and many develop various mental disorders (Cheng et al., 2017). Indeed, states of anxiety, depression and stress are often found after a breast cancer diagnosis, months or even years later, and are associated with increasing fatigue and worsening living conditions (Bennett et al., 2016; Tsaras et al., 2018).

Depression can take many forms: major depressive episode, dysthymia, atypical depression, reactive depression, and traumatic depression. Additional psychiatric disorders frequently observed in this type of cancer comprise certain anxiety states, including post-traumatic stress syndrome, generalized anxiety and phobic disorders (Karakoyun-Celik et al., 2010; Ksiksou et al., 2023; Vahdaninia et al., 2010).

Epidemiologically, the incidence of depressive and anxiety disorders remains consistently elevated throughout the first consecutive year following breast cancer diagnosis. The findings of a study involving a large sample of women with breast cancer revealed that 68.6% suffered from depression and

73.3% showed signs of anxiety and stress when the illness reappeared (Alagizy et al., 2020).

According to data from a transversal survey carried out at Malaysia's Kebangsaan University Medical Center, they found that anxiety and depression were the most prevalent among breast cancer patients (31.7% and 22.0% respectively) (Hassan et al., 2015).

In Morocco, a study conducted at the Iben Roched University Hospital in Casablanca found that 26.7% of breast cancer patients had severe depression, 60% had moderate depression, and 13.3% had mild depression (Manoudi et al., 2010).

Some factors contribute to the development of depression and anxiety in women with breast cancer, notably a pre-existing psychiatric disorder of anxiety or depression, early diagnosis of breast cancer, poor social status, painful complaints, anxiety about death and disease recurrence, altered physical appearance, and sexual and feminine attractiveness (Li et al., 2021; Puigpinós-Riera et al., 2018). Furthermore, it has been confirmed that chemical treatment contributes to a high frequency of psychological disorders during the treatment period, particularly anxiety-depressive disorders (Puigpinós-Riera et al., 2018).

In this context, studies are exploring a new generation of psychological management protocols inspired by cognitive behavioral therapie (CBT). Among these is Acceptance and Commitment Therapy (ACT), which has shown positive effects on depressive and anxiety symptoms in breast cancer patients (Dehghani et al., 2015). This therapeutic strategy is designed to address the major factors that affect mental health, not just isolated symptoms (Kanter et al., 2006).

ACT is so called because of its fundamental goal of accepting events beyond one's control and taking action to improve one's quality of life (Cayoun, 2011; Davoudi et al., 2017). It is a time-limited psychotherapy, like the CBT of which it is a part. One of the main differences between ACT and CBT is that it relies on the notion of context to make sense of the behaviour concerned and not on the simple learning mechanism (Lau and McMain, 2005).

This new therapeutic approach has its roots in relational framework theory and functional contextualism (Dehghani et al., 2015). ACT is a psychological intervention that uses the strategies of acceptance, cognitive diffusion, and mindfulness, to get an individual to engage in actions in support of what is important to them, including their values (Pull, 2009). This therapy aims to promote better functioning.

ACT utilizes the concept of psychological flexibility to consider the ability to remain fully engaged with the range of thoughts and emotions that arise, or to maintain behavior in response to the situation and goals (Hayes et al., 2006). In trying to suppress the unpleasant thoughts and emotions they experience, patients restrict their behavioral repertoire and devote all their efforts, under all circumstances, to trying to control or suppress their distressing psychological events. In other words, they lose their ability to adapt to the situations they experience and decrease their psychological flexibility. Psychological flexibility allows for adjustments other than simply reducing a painful psychological experience. It is not an emotional control but an acceptance of all psychological events, with the aim of freeing up resources for current action (Hayes et al., 2006).

The results of the Feros et al. (2013) research demonstrated that ACT had greater therapeutic potential, especially in the long term, for reducing anxiety and depression symptomatology, and also for promoting a better quality of life.

Through research conducted in patients with advanced ovarian cancer using a randomized controlled trial, Rost et al. (2012) found a significant improvement in psychological distress and overall quality of life compared to usual treatment in the ACT group.

Although this therapeutic approach has demonstrated positive contributions to reducing levels of depression and anxiety in several contexts and countries around the world (Davison et al., 2017; Dehghani et al., 2015; Saedy et al., 2015), no study has explored the impact of ACT on depression, anxiety, and stress among women with breast cancer in Morocco. Therefore, the objective of the present research is to explore the effects of ACT on reducing levels of depression, anxiety, and stress, as well as improving psychological flexibility in a sample of Moroccan women with breast cancer.

Materials and methods

The present study is based on a pre-test and post-test design to evaluate the effects of ACT therapy on depression, anxiety, and stress, as well as on psychological flexibility in women with breast cancer, during the period May–September 2022.

A voluntary sample of 40 women referred to the Lalla Salma Oncology Center, Morocco, was used for data collection. Initially, 52 participants enrolled in ACT therapy. 12 were withdrawn from the study due to their use of antidepressants and anxiolytics. The intervention and control groups were allocated randomly using Excel's RAND function. This method generated an equal distribution of 1:1. Consequently, 20 participants were assigned to a control group and 20 to an experimental group.

To participate in this research, women must have a confirmed report of diagnosed breast cancer, a level of depression and anxiety ≥10 measured by the Depression, Anxiety and Stress Scale (DASS-21), be free of other serious illnesses, have completed at least elementary school, be willing and motivated to participate in the program, have the ability to interact with others in group situations, be willing and able to accept voluntary participation in all program activities, and be willing to engage in group and home-based activities. Those women suffering from psychotic disorders, undergoing psychopharmacological and/or psychotherapeutic treatment and not motivated to participate in ACT training were not eligible for inclusion in the study.

Participants in the control group did not receive this ACT therapy, but were given an awareness session (one hour) explaining why they had been chosen for the study, and specifying that they would be invited to benefit from the similar therapy at the end of the research, on condition that it produced positive results for participants in the experimental group. To calculate the sample size, G* power analysis was performed, using the a priori sample size calculated for the MANOVA (Cohen, 1992). Based on a significance of $\alpha = 0.05$, a large effect size ($\eta^2 = 0.12$) and a statistical power of 0.93 are expected. The sample size is more than adequate for a representative statistical analysis.

Before starting ACT sessions, both groups underwent a pre-test. Then, six ACT sessions were offered by an expert clinical psychologist to the experimental group, for two hours a week, reinforced by half an hour of daily practice at home. This treatment protocol was based on the principles outlined by Hayes et al. (2006).

Intervention: ACT

Session one: Introduction of participants to the therapist, explanation of the group charter, preparation for the therapeutic approach and description of the therapeutic process in general. Practical exercices: To list the problems frequently encountered by patients during their lives.

Session two: Evaluation of the previous session, analysis and assessment of patient problems according to ACT principles, identification of avoidance behaviors, relating them to the variety of situations and preferences of each patient. Practical exercices: To list the advantages and disadvantages of methods for managing problematic situations.

Session three: Recap and evaluation of the previous session's exercises, showing the ineffectiveness of managing harmful emotions using metaphors, and developing and learning the skills needed to deal positively with negative emotions and experiences. Take-home exercise: Identify circumstances in which patients might discard ineffective control methods.

Session four: Recap and evaluation of the previous session's exercises, learning to differentiate between current judgments and past events, and acquiring the capacity to observe thoughts without judgment. Take-home exercise: notation of different situations empowering participants to perceive the emotions of others and themselves without evaluating them.

Session five: Recap and evaluation of the previous session's exercises, focusing awareness on the current situation and perception of context, and practical learning of mindfulness exercises. Take-home exercise: recording moments of concentration on feelings and thoughts using the techniques of mindfulness.

Session six: Recap and evaluation of the previous session's exercises, to determine the meaning of patients' lives and to assess their values in terms of importance. Practical exercices: To list the obstacles that prevent the effective realisation of these values.

At the final therapy session, participants in both the experimental and control groups are asked to complete post-test questionnaires. In addition, participants in the intervention group were followed up during the two months following the end of ACT, in order to confirm the maintenance of the results obtained over time.

Measures

Sociodemographic questionnaire

Sociodemographic information was collected from a form used to record patients' age, marital status, child number, level of education and occupation.

Depression, Anxiety and Stress Scale (DASS-21)

An Arabic version of the 21-item DASS questionnaire, validated by Al-Kalbani et al. (2022), was used in the present study. The instrument is based on a self-report model conceived to assess three main factors: depression, anxiety and stress.

For depression, items measure different aspects of the disorder, such as dissatisfaction, feelings of despair, low self-esteem and disinterest. As for anxiety, this factor consists of determining somatic manifestations, circumstantial anxiety, and the perceived experience of painful emotions. As for stress, this factor assesses constant tension and excitation, with signs of relaxation difficulties, nervousness, irritability and impatience. All questionnaire items are scored on a four-point Likert scale, from 0 to 3. The highest scores reflect the highest degrees in depression, anxiety, and stress. The reliability of the DASS-21 in all three domains was excellent: Depression ($\alpha = 0.84$), Anxiety ($\alpha = 0.81$), and Stress ($\alpha = 0.88$). Cronbach's alpha for this scale in the present study was $\alpha = 0.97$.

Acceptance and Action Questionnaire – II (AAQ-II)

This questionnaire, developed by Bond et al. (2011), is designed to assess psychological flexibility, in particular the ability to persevere or modify a behavior in response to an interest. It includes ten questions divided into three domains, namely acceptance, experiential avoidance, and psychological inflexibility. All questions are evaluated on a Likert scale with 7 points (from 1 "never true" to 7 "always true"). The higher points represent a higher degree of psychological flexibility. This instrument shows excellent reliability ($\alpha = 0.84$; test-retest reliability at 3 months = 0.81; discriminant validity $r = 0.97$). The questionnaire has also been validated in many languages and cultures (Monestès et al., 2009; Paladines-Costa et al., 2021; Soltani et al., 2016).

In the present study, the AAQ-II was translated from English into Arabic by a group of bilingual psychologists and psychiatrists who participated as a group to analyze and translate the AAQ-II items. Approximately 90% of these experts agreed that the questionnaire was effective in measuring the psychological flexibility of women with breast cancer. In a second step, a professional translator, who was not familiar with the research area, translated the questionnaire back into English. Finally, the differences between the two versions were corrected by an English speaker.

The psychometric characteristics of the Arabic version of the AAQ-II were measured by the correlation coefficients and Cronbach's alpha coefficients. Indeed, the correlation coefficients obtained between each item of the questionnaire and their domain are between 0.795 and 0.894. This represents satisfactory correlation coefficients suitable for this study.

For the reliability assessment, this questionnaire achieved a reliability coefficient of $\alpha = 0.92$, which demonstrates good internal consistency of the questionnaire. In addition, for each of the factors, the values of the reliability coefficients are as follows: Acceptance ($\alpha = 0.89$), Experiential avoidance ($\alpha = 0.86$), and Psychological inflexibility ($\alpha = 0.88$).

To assess test-retest reliability, we selected a sample of 10 women with breast cancer who were not part of the study panel. The questionnaire was administered twice over a 15-day period. The Pearson correlation coefficient obtained was 0.82 ($p < 0.01$), indicating good test-retest reliability.

To explore the factor structure of the Arabic version of the AAQ-II, a principal component analysis was performed. The factor analysis revealed a three-factor structure with satisfactory coefficients [Acceptance $\alpha = 0.84$, Experiential avoidance $\alpha = 0.87$ and Psychological inflexibility $\alpha = 0.85$].

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki. Approval was obtained from the ethics committee. All participants' consent were obtained prior to any intervention. Participant data are stored and protected in encrypted documents and databases, without any personal information.

Statistical analyses

IBM SPSS Statistics version 22.0 was used to process the data. Descriptive statistics, including number, percentage, mean and standard deviation, were used. Correlation between measurement tests was analyzed using Pearson's correlation coefficient. For testing the effects of therapy, an analysis of covariance (ANCOVA) was performed, considering the baseline

scores of both groups as initial covariates. The ANCOVA hypotheses were first tested for the scores of each question. When the interaction coefficient was $p > 0.05$ for the baseline scores of the intervention group, ANCOVA was applied, and when $p < 0.05$, ANCOVA was considered not appropriate. To determine the follow-up effects of therapy, analysis of variance with one factor was applied with measures replicated across three time points ("before intervention", "after intervention", and "two months later") across the two groups. A multiple test of Bonferroni was applied for comparing items with significant effects.

To ensure that changes in mean values were statistically significant between groups, a MANCOVA analysis was performed.

Results

Participant characteristics
The results indicate that the average age of participants was 46.34 ± 4.16; 95% of participants were married, 67% had secondary education and 90% were housewives (Table 1).

Table 1. Demographic characteristics of the study participants (*n* = 40)				
Variables	Control group = 20		Intervention group = 20	
	N	%	*N*	%
Age (Mean ± SD) = 46.34 ± 4.16				
Marital status				
Married	18	90%	20	100%
Single	02	10%	00	00%
Education level				
Primary	05	25%	07	35%
Secondary	14	70%	13	65%
University	01	5%	00	00%
Profession				
Housewife	17	85%	19	95%
Has a profession	03	15%	01	5%

Depression, anxiety, stress, acceptance and psychological flexibility
The results demonstrate that levels of depression, anxiety, and stress were significantly reduced at post-test and the two-month follow-up compared to pre-test in the intervention group ($p = 0.001$). As for the level of psychological flexibility, it increased significantly at post-test and at the two-month follow-up compared to pre-test ($p = 0.001$), while the same changes were not observed in the control group (Table 2).

Table 2. ANCOVA results for depression, anxiety, stress, and acceptance and psychological flexibility scores at pre-test, post-test, and follow-up (*n* = 40)				
Variables	Evaluation	Control group = 20 Mean ± SD	Intervention group = 20 Mean ± SD	*P*-value
Depression	Pre-test	11.59 ± 3.46	10.22 ± 3.44	
	Post-test	12.11 ± 3.25	7.28 ± 3.21	0.001
	2-month follow-up	11.91 ± 3.88	6.28 ± 2.65	
Anxiety	Pre-test	11.55 ± 4.34	11,19 ± 4.36	
	Post-test	11.77 ± 4.73	8.82 ± 3.19	0.001
	2-month follow-up	11.43 ± 4.92	6.65 ± 2.59	
Stress	Pre-test	12.82 ± 4.74	12.28 ± 4.32	
	Post-test	12.55 ± 4.45	9.59 ± 3.38	0.001
	2-month follow-up	13.19 ± 4.96	7.71 ± 2.38	
AAQ-II	Pre-test	26.69 ± 5.32	27.43 ± 6.14	
	Post-test	26.19 ± 5.24	30.53 ± 7.32	0.001
	2-month follow-up	27.01 ± 5.87	35.37 ± 9.11	

Note: p < 0.001. AAQ-II: Acceptance and Action Questionnaire II.

According to the correlation matrix, depression, anxiety, and stress factors were statistically significantly correlated with AAQ-II scores, as well as with the overall scores of both scales ($r = 0.634^*$; $p < 0.05$). Indeed, as DASS-21 scores decreased, AAQ-II scores increased (Table 3).

Prior to analysis of variance, data were standardized using the Kolmogorov–Smirnov test. All results of this test were greater than 0.05, indicating that the distribution was normal for the scores of the dependent variables ($p ≥ 0.05$). To check the validity of the test, we also used Box's test of the equality of covariance matrices, designed to establish the equality of covariance matrices, and Mauchly's test of sphericity, which checks the conditionality of the results.

Table 3. Correlation matrix between DASS-21 factors and Acceptance and Action Questionnaire scores (*n* = 40)

Variables	AAQ-II	1	2	3
DASS-depression	0.543*	1		
DASS-anxiety	0.522*	0.538*	1	
DASS-stress	0.620*	0.591*	0.520*	1
DASS-21	0.634*	0.580*	0.598*	0.578*

Note: * *p* < 0.05. DASS-21: Depression, Anxiety and Stress Scale-21 Items; AAQ-II: Acceptance and Action Questionnaire II.

Table 4 shows that the significant *F*-value is greater than 0.05 for all four variables, confirming that all dependent variables are equally distributed between the two groups. Table 5 reveals that the results of Mauchly's sphericity test testify to the validity of the hypothesis ($p \geq 0.05$).

Table 4. Box's test of equality of covariance matrix (*n* = 40)

Variables	Box's M	F	Df_1	Df_2	*P*-value
AAQ-II	11.41	1.31	6.00	51265.12	0.26
Depression	10.30	1.13	6.00		0.23
Anxiety	9.25	0.58	6.00		0.37
Stress	11.07	1.14	6.00	51265.12	0.21

Note: $p \geq 0.05$. AAQ-II : Acceptance and Action Questionnaire II.

Table 5. Mauchly's test of sphericity (*n* = 40)

Variables	Mauchly's W	Approx. chi-square	*Df*	*P*-value
AAQ-II	0.84	4.84	2	0.21
Depression	0.98	2.57	2	0.16
Anxiety	0.93	2.51	2	0.12
Stress	0.82	4.69	2	0.24

Note: $p \geq 0.05$.

To ensure that changes in mean values were statistically significant, a MANCOVA analysis was performed. Prior to this analysis, a Levene's test was used to analyze the validity of the hypotheses on variance stability. This analysis produced no significant results for any of the variables (AAQ-II: $F = 2.14$, $p > 0.05$; Depression: $F = 2.07$, $p > 0.05$; Anxiety: $F = 1.30$, $p > 0.05$; Stress: $F = 1.42$, $p > 0.05$). A MANCOVA can be used.

The results of MANCOVA show that mean post-test scores are statistically significant between the two groups when pre-test scores are excluded (AAQ-II: $F = 10.23$, $p < 0.05$; Depression: $F = 7.50$, $p < 0.05$; Anxiety: $F = 7.73$, $p < 0.05$; Stress: $F = 9.89$, $p < 0.05$). These results confirm that ACT is effective in increasing psychological flexibility and acceptance of the disease, as well as reducing levels of depression, anxiety, and stress (Table 6).

The MANCOVA analysis of variance at two months' follow-up of the therapeutic program verifies the maintenance and persistence of differences in the variables concerned between the two groups. The results show that mean scores are statistically significant between the two groups (AAQ-II: $F = 10.44$, $p < 0.05$; Depression: $F = 8.43$, $p < 0.05$; Anxiety: $F = 8.58$, $p < 0.05$; Stress: $F = 9.66$, $p < 0.05$). This psychological intervention is therefore particularly beneficial for the management of psychological disorders associated with breast cancer, and for a better quality of life for the women concerned (Table 7).

Table 6. MANCOVA results for the acceptance and action questionnaire, as well as for depression, anxiety, and stress in the control and experimental groups at post-test (*n* = 40)

Dependent variable	Sum of squares	*Df*	Mean square	F	*P*-value
AAQ-II	48.13	1	48.13	10.23	0.001
Depression	38.31	2	19.15	7.50	0.001
Anxiety	39.63	2	19.81	7.73	0.001
Stress	45.14	2	22.57	9.89	0.001

Note: $p < 0.05$. AAQ-II : Acceptance and Action Questionnaire II.

Table 7. MANCOVA results for the acceptance and action questionnaire, as well as for depression, anxiety, and stress in the control and experimental groups at two-month follow-up (*n* = 40)

Dependent variable	Sum of squares	*Df*	Mean square	*F*	*P*-value
AAQ-II	59.63	1	59.63	10.44	0.001
Depression	35.54	2	17.77	8.43	0.001
Anxiety	39.92	2	19.96	8.58	0.001
Stress	41.36	2	20.68	9.66	0.001

Note: p < 0.05. AAQ-II : Acceptance and Action Questionnaire II.

Discussion

This pilot study was designed to explore ACT's effect on depression, anxiety, stress, and psychological flexibility in Moroccan women with breast cancer.

The findings concluded significant reductions in overall levels of depression, anxiety, and stress, while psychological flexibility, including acceptance, cognitive diffusion and engagement, was improved.

These findings are consistent with similar research on the effects of ACT. Indeed, Zarvijani et al. (2021) concluded that ACT is an effective means, particularly in the long term, of reducing symptoms of depression, anxiety and stress as well as developing greater acceptance of pleasant and unpleasant emotions. Similarly, the study by Fashler et al. (2018) showed that the ACT therapy program applied to women with breast cancer contributed significantly to the reduction of their symptoms of depression. Furthermore, in their study, Feros et al. (2013) determined that this therapy increased acceptance of the disease, cognitive diffusion, ability to experience things without judgment, and willingness to take action and engage in therapy, resulting in improved quality of life.

In this study, the effects of ACT can be explained by the use of different practices offered in the therapy sessions that come from research conducted in the field of positive psychology, mindfulness, and acceptance and commitment therapy. These practices have been shown to be effective in reducing ruminative thoughts and dysfunctional reactions, especially in the face of difficult life events (Rost et al., 2012). The training sessions also enabled patients to reconnect with what was important to them and to develop a positive attitude towards themselves (self-compassion).

The occurrence of breast cancer requires regular visits to the hospital for hematological examinations and treatment follow-up. These repeated visits, together with a high level of fatigue and demotivation in these patients, lead them to reduce their participation in pleasurable activities (González-Fernández et al., 2018). However, developing skills to eliminate ineffective control attitudes through ACT has been shown to generate positive thoughts that promote pleasant emotions and lead to improved quality of life and continued satisfaction (González-Fernández et al., 2018).

Surgical and chemotherapeutic treatment and their side effects are extremely anxiety-provoking and stressful for most patients (pain, nausea, fatigue, physical changes, loss of social and/or professional status, fear of death). However, studies show that despite these factors, some people are able to continue to thrive when faced with cancer (Carlson et al., 2013). Indeed, they are better able to identify the positive aspects of their experience, to free themselves from the pressure of the disease, and to engage in a process of improving the quality of life of their loved ones (clarity of values, choice of priorities, refocusing on positive relationships...). In addition, they are able to detach themselves from negative ruminations and adopt behaviors more in line with their values and priorities (reconnecting with loved ones, savoring shared moments, etc.).

In ACT, the clarification of each patient's values is also an essential part of the process. This is a personality-building mechanism, since, even in the presence of certain constraints, values allow these patients to decide for themselves how to behave and what to do. Because cancer patients are living with a life-threatening disease, they may not be aware of their own values. Therefore, encouraging them to identify their values and areas of importance in life provides the incentive and motivation to accept the cancer diagnosis and treatment in a thoughtful and responsible manner. This motivation and willingness contributes to a better medical and psychological prognosis.

In addition, ACT facilitates and encourages patients to accept and behave in ways that are consistent with their values, rather than fighting their thoughts and feelings. In this way, despite the restrictions imposed by the disease, patients gradually develop attitudes consistent with their values, resulting in improved relationships with family members and friends, as well as with religious and spiritual life. Indeed, this dynamic and active participation in all essential areas of life leads to better therapeutic outcomes. Greater psychological flexibility has also been shown to help alleviate patients' psychological suffering (Mahdavi et al., 2017; Rost et al., 2012). Specifically, the acceptance and mindfulness approach, as well as behavioral change, contribute significantly to a positive mood in breast cancer patients.

The present study is the first in Morocco to examine the effect of acceptance and commitment therapy on the improvement of depression, anxiety and stress, and psychological flexibility in women with breast cancer. Based on the results of this research, this therapy represents an effective method of psychotherapy for reducing symptoms of depression, anxiety, and stress in breast cancer patients.

Strength and limitations

The strength of this study lies in the fact that it provides alternative solutions to the psychological problems of women with breast cancer, who are usually victims of a mastectomy and very painful chemotherapy that can contribute to a relapse or even a dramatic evolution. The solution lies in the beneficial effects of acceptance and commitment therapy on the depression, anxiety, stress, and psychological flexibility of the women concerned. However, certain limitations should be noted: firstly, the study found no long-term effect of acceptance and commitment therapy, only a short-term effect. Secondly, this study is based on a self-report questionnaire, and responses

to this type of question may be biased by a social desirability effect. In this context, it is recommended to use as many instruments as possible, including those that produce results other than self-report data, such as personal interviews or observation checklists. Finally, our study was carried out in a single cancer center, which restricts coverage of all breast cancer patients in Morocco. Thus, a transversal study can potentially produce much more diverse clinical findings, by including a very large population representing the country's different hospital centers.

Conclusion

The findings of the eight-session ACT training program for breast cancer patients showed that symptoms of depression, anxiety and stress in general, and psychological flexibility in particular, were significantly improved, with a lasting impact over a period of two months. However, further studies involving advanced electroencephalogram (EEG) testing based on neuroscientific evidence are needed to provide a more accurate and objective assessment of the possible benefits and effects of the ACT program.

Author contributions
JK: conceptualization, design, methodology, investigation, project administration, data management, formal analysis, interpretation, supervision, writing original draft, writing review and editing. *LM:* interpretation, supervision, writing original draft. *SA:* interpretation, supervision, writing original draft.

Ethical aspects and conflict of interest
The authors have no conflict of interest to declare.

References

1. Alagizy HA, Soltan MR, Soliman SS, Hegazy NN, Gohar SF (2020). Anxiety, depression and perceived stress in breast cancer patients: a single institute experience. Middle East Curr Psychiatry 27: 29. DOI: 10.1186/s43045-020-00036-x.
2. Al-Kalbani M, Al-Adawi S, Alshekaili W (2022). Psychometric properties of the depression, anxiety, stress scales-21 (DASS-21) in a sample of health care workers in Oman. J Affect Disord Rep 10: 100451. DOI: 10.1016/j.jadr.2022.100451.
3. Bennett S, Pigott A, Beller EM, Haines T, Meredith P, Delaney C (2016). Educational interventions for the management of cancer-related fatigue in adults. Cochrane Database Syst Rev 11(11): CD008144. DOI: 10.1002/14651858.CD008144.pub2.
4. Bond FW, Hayes SC, Baer RA, Carpenter KM, Guenole N, Orcutt HK, et al. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire-II: a revised measure of psychological inflexibility and experiential avoidance. Behavior Therapy 42(4): 676–688. DOI: 10.1016/j.beth.2011.03.007.
5. Carlson LE, Doll R, Stephen J, Faris P, Tamagawa R, Drysdale E, Speca M (2013). Randomized controlled trial of Mindfulness-based cancer recovery versus supportive expressive group therapy for distressed survivors of breast cancer. J Clin Oncol 31(25): 3119–3126. DOI: 10.1200/JCO.2012.47.5210.
6. Cayoun BA (2011). Mindfulness-Integrated CBT: Principles and Practice. John Wiley & Sons, 320 p.
7. Chen Y, Maitiniyazi G, Li Z, LiT, Liu Y, Zhang, R, et al. (2022). TNF-α Mediates the Association between Dietary Inflammatory Index and Depressive Symptoms in Breast Cancer. Nutrients 15(1): 84. DOI: 10.3390/nu15010084.
8. Cheng KKF, Lim YTE, Koh ZM, Tam WWS (2017). Home-based multidimensional survivorship programmes for breast cancer survivors. Cochrane Database Syst Rev 8(8): CD011152. DOI: 10.1002/14651858.CD011152.pub2.
9. Cohen J (1992). Statistical power analysis. Curr Dir Psychol Sci 1(3): 98–101. DOI: 10.1111/1467-8721.ep10768783.
10. Davison TE, Eppingstall B, Runci S, O'Connor DW (2017). A pilot trial of acceptance and commitment therapy for symptoms of depression and anxiety in older adults residing in long-term care facilities. Aging Ment Health 21(7): 766–773. DOI: 10.1080/13607863.2016.1156051.
11. Davoudi M, Omidi A, Sehat M, Sepehrmanesh Z (2017). The Effects of Acceptance and Commitment Therapy on Man Smokers' Comorbid Depression and Anxiety Symptoms and Smoking Cessation: A Randomized Controlled Trial. Addict Health 9(3): 129–138.
12. Dehghani NB, Neshatdoost HT, Abedi MR, Mokarian F (2015). The Effect of Acceptance and Commitment Therapy on Depression and Psychological Flexibility in Women with Breast Cancer. Zahedan J Res Med Sci 17(4): e965. DOI: 10.17795/zjrms965.
13. Fashler SR, Weinrib AZ., Azam MA, Katz J (2018). The Use of Acceptance and Commitment Therapy in Oncology Settings: A Narrative Review. Psychol Rep 121(2): 229–252. DOI: 10.1177/0033294117726061.
14. Feros DL, Lane L, Ciarrochi J, Blackledge JT (2013). Acceptance and Commitment Therapy (ACT) for improving the lives of cancer patients: a preliminary study. Psychooncology 22(2): 459–464. DOI: 10.1002/pon.2083.
15. Fouhi ME, Benider A, Gaëtan KZA, Mesfioui A (2020). Profil épidémiologique et anatomopathologique du cancer de sein au CHU Ibn Rochd, Casablanca [Epidemiological and anatomopathological profile of breast cancer at the Ibn Rochd University Hospital, Casablanca]. Pan Afr Med J 37: 41. DOI: 10.11604/pamj.2020.37.41.21336.
16. González-Fernández S, Fernández-Rodríguez C, Paz-Caballero MD, Pérez-Álvarez M (2018). Treating anxiety and depression of cancer survivors: Behavioral activation versus acceptance and commitment therapy. Psicothema 30(1): 14–20. DOI: 10.7334/psicothema2017.396.
17. Groenvold M (2010). Health-related quality of life in early breast cancer. Dan Med Bull 57(9): B4184.
18. Hassan MR, Shah SA, Ghazi HF, Mohd Mujar NM, Samsuri MF, Baharom N (2015). Anxiety and Depression among Breast Cancer Patients in an Urban Setting in Malaysia. Asian Pac J Cancer Prev 16(9): 4031–4035. DOI: 10.7314/apjcp.2015.16.9.4031.
19. Hayes SC, Luoma JB, Bond FW, Masuda A, Lillis J (2006). Acceptance and commitment therapy: model, processes and outcomes. Behav Res Ther 44(1): 1–25. DOI: 10.1016/j.brat.2005.06.006.
20. Kanter JW, Baruch DE, Gaynor ST (2006). Acceptance and commitment therapy and behavioral activation for the treatment of depression: description and comparison. Behav Anal 29(2): 161–185. DOI: 10.1007/BF03392129.
21. Karakoyun-Celik O, Gorken I, Sahin S, Orcin E, Alanyali H, Kinay M (2010). Depression and anxiety levels in woman under follow-up for breast cancer: relationship to coping with cancer and quality of life. Med Oncol 27(1): 108–113. DOI: 10.1007/s12032-009-9181-4.
22. Ksiksou J, Maskour L, Alaoui S (2023). Effects of Cognitive-Behavioral Group Therapy on the Management of Internet Addiction, Depression, Anxiety, and Stress Among Nursing Students in Morocco. Iran J Psychiatry Behav Sci 17(3): e136425. DOI: 10.5812/ijpbs-136425.
23. Lau MA, McMain SF (2005). Integrating mindfulness meditation with cognitive and behavioural therapies: the challenge of combining acceptance- and change-based strategies. Can J Psychiatry 50(13): 863–869. DOI: 10.1177/070674370505001310.

24. Li J, Zhang F, Wang W, Pang R, Liu J, Man Q, Zhang A (2021). Prevalence and risk factors of anxiety and depression among patients with breast cancer: a protocol for systematic review and meta-analysis. BMJ Open 11(2): e041588. DOI: 10.1136/bmjopen-2020-041588.

25. Mahdavi A, Aghaei M, Aminnasab V, Tavakoli Z, Besharat M, Abedin M (2017). The effectiveness of acceptance-commitment therapy (ACT) on perceived stress, depressive symptoms, and marital satisfaction in women with breast cancer. Arch Breast Cancer 4(1): 16–23. DOI: 10.19187/abc.20174116-23.

26. Manoudi F, Chagh R, Asri F, Tarwate M, Tazi I, Tahiri A, Bouras N (2010). Depression in cancer patients. A moroccan study. Psycho-Oncol 4: S13–S20. DOI: 10.1007/s11839-010-0253-7.

27. Moghadamfar N, Amraei R, Asadi F, Amani O (2018). The efficacy of Acceptance and Commitment Therapy (ACT) on hope and psychological well-being in women with breast cancer under chemotherapy. Iranian J Psychiatry Nurs 6(5): 1–8.

28. Monestès JL, Villatte M, Mouras H, Loas G, Bond FW (2009). Traduction et validation française du questionnaire d'acceptation et d'action (AAQ-II). Eur Rev Appl Psychol 59(4): 301–308. DOI: 10.1016/j.erap.2009.09.001.

29. Paladines-Costa B, López-Guerra V, Ruisoto P, Vaca-Gallegos S, Cacho R (2021). Psychometric Properties and Factor Structure of the Spanish Version of the Acceptance and Action Questionnaire-II (AAQ-II) in Ecuador. Int J Environ Res Public Health 18(6): 2944. DOI: 10.3390/ijerph18062944.

30. Piraux E, Caty G, Aboubakar Nana F, Reychler G (2020). Effects of exercise therapy in cancer patients undergoing radiotherapy treatment: a narrative review. SAGE Open Med 8: 2050312120922657. DOI: 10.1177/2050312120922657.

31. Puigpinós-Riera R, Graells-Sans A, Serral G, Continente X, Bargalló X, Domènech M, et al. (2018). Anxiety and depression in women with breast cancer: Social and clinical determinants and influence of the social network and social support (DAMA cohort). Cancer Epidemiol 55: 123–129. DOI: 10.1016/j.canep.2018.06.002.

32. Pull CB (2009). Current empirical status of acceptance and commitment therapy. Curr Opin Psychiatry 22(1): 55–60. DOI: 10.1097/YCO.0b013e32831a6e9d.

33. Rost AD, Wilson KG, Buchanan E, Hildebrandt MJ, Mutch D (2012). Improving psychological adjustment among late-stage ovarian cancer patients: Examining the role of avoidance in treatment. Cogn Behav Pract 19(4): 508–517. DOI: 10.1016/j.cbpra.2012.01.003.

34. Saedy M, Kooshki S, Jamali Firouzabadi M, Emamipour S, Rezaei Ardani A (2015). Effectiveness of Acceptance-Commitment Therapy on Anxiety and Depression among Patients on Methadone Treatment: A Pilot Study. Iran J Psychiatry Behav Sci 9(1): e222. DOI: 10.17795/ijpbs222.

35. Soltani E, Bahrainian SA, Masjedi Arani A, Farhoudian A, Gachkar L (2016). Psychometric Properties of the Persian Version of the Social Anxiety – Acceptance and Action Questionnaire. Iran J Psychiatry Behav Sci 10(2): e3753. DOI: 10.17795/ijpbs.3753.

36. Tsaras K, Papathanasiou IV, Mitsi D, Veneti A, Kelesi M, Zyga S, Fradelos EC (2018). Assessment of Depression and Anxiety in Breast Cancer Patients: Prevalence and Associated Factors. Asian Pac J Cancer Prev 19(6): 1661–1669. DOI: 10.22034/APJCP.2018.19.6.1661.

37. Vahdaninia M, Omidvari S, Montazeri A (2010). What do predict anxiety and depression in breast cancer patients? A follow-up study. Soc Psychiatry Psychiatr Epidemiol 45(3): 355–361. DOI: 10.1007/s00127-009-0068-7.

38. Zainal NZ, Booth S, Huppert FA (2013a). The efficacy of mindfulness-based stress reduction on mental health of breast cancer patients: a meta-analysis. Psychooncology 22(7): 1457–1465. DOI: 10.1002/pon.3171.

39. Zainal NZ, Nik-Jaafar NR, Baharudin A, Sabki, ZA, Ng CG (2013b). Prevalence of depression in breast cancer survivors: a systematic review of observational studies. Asian Pac J Cancer Prev 14(4): 2649–2656. DOI: 10.7314/apjcp.2013.14.4.2649.

40. Zarvijani SA, Moghaddam LF, Parchebafieh S (2021). Acceptance and commitment therapy on perceived stress and psychological flexibility of psychiatric nurses: a randomized control trial. BMC Nurs 20(1): 239. DOI: 10.1186/s12912-021-00763-4.