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The Effectiveness of Distress Tolerance Skills Training on Emotional Dyslexia, Anxiety Sensitivity and Life Expectancy in Women with Various Types of Cancer

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ABSTRACT

Objective: The present study aimed to examine the effectiveness of distress tolerance skills training on emotional dyslexia, anxiety sensitivity, and life expectancy in women with various types of cancer.

Methods: This quasi-experimental study employed a pretest–posttest design with a follow-up phase and a control group. The sample consisted of 30 women with cancer who were referred to two private centers in Isfahan, Iran, in 2024 and were selected through purposive sampling. Participants were assigned to an experimental group, which received distress tolerance skills training, and a control group, which received no intervention. Data were collected using the Life Expectancy Questionnaire, the Toronto Alexithymia Scale, and an anxiety sensitivity questionnaire. The data were analyzed using analysis of variance and comparative statistical methods.

Results: The findings showed that distress tolerance skills training had a significant effect on life expectancy, emotional dyslexia, and anxiety sensitivity in women with cancer at the $p<.001$ level. In the posttest phase, there was a significant difference between the experimental and control groups ($p<.01$). In the follow-up phase, the effects of training on life expectancy and anxiety sensitivity remained significant ($p<.01$), indicating the stability of these improvements over time.

Conclusions: The results suggest that distress tolerance skills training can reduce psychological difficulties and improve life expectancy and anxiety-related outcomes in women with cancer. Therefore, counselors and psychologists working with patients suffering from chronic illnesses are encouraged to use distress tolerance-based interventions to help reduce the psychological burden of cancer and improve patients' mental well-being.

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Introduction

Cancers constitute a broad spectrum of diseases caused by the uncontrolled growth of cells; they are characterized by the rapid emergence of abnormal cells that invade surrounding tissues, spread to other organs, and develop beyond their natural boundaries (Martino, Tagliaferri, & Tassone, 2025). Approximately 20 million new cases of cancer and 10 million cancer-related deaths were reported in 2022 (Alum, 2025). Indeed, cancer is the second leading cause of death worldwide (Kureshi & Dougan, 2025) and the third leading cause of death in Iran, accounting for 13% of all deaths (Darabi, Ahmadi-Panah Mehrabadi, & Faraji-Goliane, 2025). Global cancer estimates indicate that the number of cancer cases will reach 35 million by 2050 (Li, Chen, Shi, Yi, Xiong, et al., 2025). Women with cancer face a critical period in their pursuit of autonomy and in making decisions about their health. The pressure of their roles and social standing within the family and society can lead to despair and aimlessness in decision-making, challenging their ability to determine their own position (Mahlaq, Lahlou, Rammouz, Abouqal, & Belayachi, 2023).

Life expectancy (hope) is one of the most important factors and a vital element for cancer patients, exerting a considerable influence on patients' adaptation to their condition, particularly during periods of pain and deprivation. Hope plays a significant role in enhancing patients' quality of life and affects various stages of the disease (Devasia, Howlader, Dewar, Stevens, Mittu, et al., 2024). In general, hope encompasses optimism and future orientation and is one of the resources for coping with problems and chronic illnesses such as cancer, which can be described as a dynamic, powerful, and multidimensional healing factor (Colonio, Lecman, Pinto, Vallejos, & Pinillos, 2021). As Sun, Pang, Yue, and Lee (2025) state, hope is a fundamental mechanism for coping with cancer at all stages. Hope endows patients with resilience, enabling them to continue finding meaning in their lives and relationships. Improving hope in women with cancer enhances not only their survival but also their quality of life and family cohesion; therefore, promoting hope is a vital necessity (Bhattacharjee & Ghosh, 2024).

A cancer diagnosis gives rise to severe emotional and affective difficulties, and alexithymia is among the most important emotional challenges faced by cancer patients (Shalata, Gothelf, Bernstine, Michlin, Tourkey, et al., 2024). Alexithymia is a construct comprising difficulty in identifying feelings, difficulty in describing them, and an externally oriented thinking style (Neves, De Dios Perez, Panek, Jagani, Wilne, et al., 2023). Alexithymia is a risk factor in psychiatric

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disorders; patients under severe physical and emotional strain are unable to express their emotions, which hampers emotion regulation and adaptation and exacerbates clinical outcomes (Lin, Kuo, & Opal, 2024). Studies show that there is a significant difference in alexithymia between cancer patients and healthy individuals (Kapagan, Aksu, Yuzkan, Bulut, & Erdem, 2024), and that cancer severity is a significant predictor of alexithymia scores (Hughes, Paturzo, Fernandez, Garg, Rajan, et al., 2025). In cancer patients, numerous studies indicate a direct relationship between alexithymia and reduced emotional adjustment (Urbini, Siciliano, & Olivito, 2023), as well as increased depression and anxiety (Gong, Chen, Liu, Wan, Wang, et al., 2021).

Despite the emphasis on alleviating physical symptoms in cancer care, addressing the psychological and social dimensions of the patient's experience—including anxiety sensitivity—is essential (Lin, Yang, Sun, Li, Li, et al., 2025). Anxiety sensitivity refers to the fear of anxiety-related feelings or anxiety symptoms and stems from the belief that these symptoms carry potentially harmful physical, psychological, and social consequences (Yang, Zhao, Fang, & Elhai, 2023). Individuals with high anxiety sensitivity often react negatively to anxiety symptoms, whereas those with low anxiety sensitivity, although they may experience these symptoms as unpleasant, do not perceive them as threatening (Kazgan, Yıldız, Kurt, & Atmaca, 2022). Anxiety sensitivity is associated with a greater fear of illness and pain-related avoidance, including avoidance of movement to minimize pain and misuse of chemotherapy medications (Basharpour, Mohammadzadeh, & Ebadi, 2024). As a psychological construct, anxiety sensitivity encompasses individual differences in the fear of bodily physiological symptoms that give rise to increased breathing, dizziness, and palpitations, and, acting as a mediating variable, plays a prominent role in numerous mental disorders, including anxiety disorders. Consequently, the failure to treat anxiety sensitivity in cancer patients prolongs the duration of treatment and intensifies pain severity during relapse (Zvolensky, Robison, Ayers, Senger, Clausen, et al., 2024).

In this regard, educational and psychological interventions must be employed to enhance hope and reduce alexithymia and anxiety sensitivity. Among such educational and psychological interventions is distress tolerance skills training. Distress tolerance is often defined as an individual's perceived ability to withstand negative or unpleasant emotional states (e.g., physical discomfort) and the behavioral capacity to persist in the face of internal distress triggered by certain stressful situations (Leyro, Zvolensky, & Bernstein, 2016). Some definitions of distress tolerance

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further specify that persistence in the face of these negative events occurs in contexts in which there is a means of escaping the discomfort (Cheney, Alexander, Garey, Gallagher, Hébert, et al., 2025). From a theoretical standpoint, distress tolerance can affect, or be affected by, self-regulatory processes such as attention and cognitive appraisals of distressing emotional or physical states. Marsha Linehan refers to these as "crisis survival strategies," which enable one to enter difficult situations without exacerbating them. The fundamental principles are improvement or acceptance—being present in the current situation and accepting what is, rather than what should be. Mindfulness skills, soothing, distraction, and time extension are key components that may be suitable for women with chronic illnesses such as cancer, who are dealing with a crisis and find themselves in situations they do not want, cannot change, or in which altering the situation is extremely difficult or impossible; for such patients, this training is appropriate (Heiland & Veilleux, 2024).

Tofangchi, Raeisi, Ghamarani, and Rezaei (2021) demonstrated the effect of distress tolerance training on anxiety; Razavian, Imani, and Nourbakhsh (2021) on distress tolerance and the psychological vitality of parents of children with leukemia; and Taheri, Rezaei-Jamalouei, and Zamani (2019) on emotion regulation and emotional deficiency. With increased survival and improved quality of life among cancer patients resulting from therapeutic advances, attention to their chronic symptoms and the adverse effects of these symptoms has become more necessary. If left untreated, these symptoms can lead to reduced adjustment, social interaction, and quality of life. Hope, alexithymia, and anxiety sensitivity have gained significance in these patients, and psychological interventions such as distress tolerance-based training can promote mental health by increasing hope and reducing alexithymia and anxiety. Therefore, the aim of the present study was to determine the effectiveness of distress tolerance skills training on alexithymia, anxiety sensitivity, and hope in women with various types of cancer.

Material and Methods

The present study was a quasi-experimental investigation with a pretest–posttest control group design and a two-month follow-up period. The statistical population consisted of women with various types of cancer who referred to treatment centers in Isfahan, Iran, in 2023. From this

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population, 30 participants were selected through purposive sampling and then randomly assigned to two groups (15 participants in each group).

The inclusion criteria were: diagnosis of cancer by a subspecialist in oncology, at least one year having elapsed since the last conventional treatment (such as chemotherapy, radiotherapy, or surgery), age between 18 and 50 years, physical ability to participate in the sessions, and informed consent. The exclusion criteria included absence from more than two sessions, failure to complete the treatment protocol assignments, presence of physical problems or psychological disorders, and simultaneous participation in other counseling or psychotherapy programs.

The experimental group participated in eight sessions of distress tolerance skills training over a two-month period, with one 60-minute session per week, whereas the control group received no intervention. Both groups completed the questionnaires at three stages: pretest, posttest, and two-month follow-up.

Ethical principles, including confidentiality, anonymity of participants, informed consent, voluntary participation, and the right to withdraw from the study at any stage, were fully observed. In addition, the study was approved by the Ethics Committee of Islamic Azad University, Khorasgan Branch, under code IR.IAU.KHUISF.REC.1402.137. Finally, the data were analyzed using repeated-measures analysis of variance (ANOVA) with SPSS version 29.

Measurement Instruments

Life Expectancy Questionnaire (LEQ): The Life Expectancy Questionnaire was developed by Snyder, Harris, Anderson, Holleran, Irving, et al. (1991). It contains 12 items and is designed to assess the level of life expectancy/hope in individuals. The questionnaire is scored on a 4-point Likert scale ranging from 1 = strongly disagree to 4 = strongly agree. Items 3, 7, and 11 are reverse-scored. Total scores range from 12 to 48, with higher scores indicating greater hope. Snyder et al. (1991) confirmed the validity and reliability of the scale and reported acceptable internal consistency, with Cronbach's alpha coefficients ranging from 0.74 to 0.84 across different samples. In Iran, the validity and reliability of this questionnaire were examined by Kermani, Khodapanahi, and Heidari (2011), who reported a Cronbach's alpha of 0.86 and internal consistency of 0.70. In the present study, the reliability coefficient obtained using Cronbach's alpha was 0.82.

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Emotional Dyslexia / Alexithymia Questionnaire (EDQ): The Toronto Alexithymia Scale was developed in 2003 and consists of 20 items designed to assess difficulty identifying feelings and externally oriented thinking. It is scored on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Items 4, 10, 18, and 19 are reverse-scored. The total score is obtained by summing all items, with scores ranging from 20 to 100. Higher scores indicate greater alexithymia. Bagby, Parker, and Taylor (1994) reported a Cronbach's alpha of 0.89 for the whole questionnaire. Besharat and Mohammadmehr (2009) also reported a Cronbach's alpha of 0.89. In addition, using a test–retest method in a sample of 67 students over a four-week interval, reliability coefficients between 0.80 and 0.87 were obtained. In a study by Masouri and Bayat (2023), the Cronbach's alpha coefficient was reported as 0.85. In the present study, the reliability coefficient of the questionnaire using Cronbach's alpha was 0.91.

Anxiety Sensitivity Questionnaire (SQA): The revised Anxiety Sensitivity Index is a self-report questionnaire developed by Reiss and Peterson (1986). It contains 16 items and is scored on a 5-point Likert scale from 0 = very little to 4 = very much. Higher scores indicate greater fear of anxiety-related symptoms. Total scores range from 0 to 64 (Reiss, Peterson, Gursky, & McNally, 1986). Psychometric evaluation of the scale showed internal consistency with alpha coefficients ranging from 0.80 to 0.90. Test–retest reliability over two weeks was 0.75 and over three years was 0.71, indicating that anxiety sensitivity is a stable personality construct. In the Iranian sample, reliability was calculated using internal consistency, test–retest, and split-half methods, yielding coefficients of 0.93, 0.95, and 0.97 for the total scale, respectively. Concurrent validity was assessed using the SCL-90, with a correlation coefficient of 0.56. Item–total correlations were satisfactory and ranged from 0.74 to 0.88 (Narimani & Sharbati, 2015). In the present study, the Cronbach's alpha coefficient was 0.79.

Distress Tolerance Skills Training Protocol

The distress tolerance skills training protocol was based on Linehan's theory (1993) and was implemented as an educational intervention in eight sessions, held once per week for 60 minutes each. The content of the sessions is presented in Table 1.

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Table 1. Content of Distress Tolerance Skills Training Sessions

Session	Topic
1	Introduction and overview
2	Introduction to dimensions of mental health and characteristics of psychologically well-functioning individuals
3	Introduction to psychosomatic problems, their causes, and symptoms
4	Muscle relaxation training and emotional dimension of distress tolerance (practical exercise based on imagining unpleasant life situations and how to respond to them) – homework assignment
5	Review of previous session, mindfulness training, and physiological dimension of distress tolerance (exercise, movement, and massage)
6	Review of previous session, practical exercise on identifying ambiguity and logical decision-making in adverse conditions related to distress tolerance
7	Review of previous session, weekly practice of recording real distress-inducing situations and reviewing responses in the next session
8	Summary and presentation of strategies for maintaining and applying the methods in daily life

Results

In the experimental group, 2 participants (13.3%) were in the 26–35 age range, 4 (26.7%) in the 36–45 range, 6 (40%) in the 46–55 range, and 3 (20%) in the 56–68 range. Regarding educational level, 5 participants (33.3%) held a primary school diploma, 7 (46.7%) held a high school diploma or associate degree, and 3 (20%) held a bachelor's degree. In the control group, 5 participants (33.3%) were in the 26–35 age range, 4 (26.7%) in the 36–45 range, 4 (26.7%) in the 46–55 range, and 2 (13.3%) in the 56–68 range. Regarding educational level, 5 participants (33.3%) held a primary school diploma, 7 (46.7%) held a high school diploma or associate degree, and 3 (20%) held a bachelor's degree. Based on the chi-square test, there was no significant difference between the two groups in terms of age range or educational level ($p>0.05$).

Table 2. Descriptive Statistics of Dependent Variable Scores by Group

Variable	Group	Pretest		Posttest		Follow-up	
		Mean	SD	Mean	SD	Mean	SD
Life expectancy	Experimental	21.40	3.112	26.27	2.915	25.33	2.870
	Control	22.67	2.637	22.27	2.658	21.27	1.534
Alexithymia	Experimental	57.00	9.118	48.93	8.730	47.00	8.904
	Control	63.00	10.261	63.27	10.026	64.60	10.855
Anxiety sensitivity	Experimental	51.20	8.882	44.53	8.568	45.67	8.583
	Control	53.53	7.180	54.20	7.350	52.27	7.896

As shown in Table 2, which presents the mean scores for life expectancy, alexithymia, and anxiety sensitivity in the intervention and control groups, the mean scores of these variables showed little difference between the two groups at pretest. However, following the intervention, the intervention group demonstrated marked differences compared with the control group relative to the pretest stage; this difference was also evident at the follow-up stage.

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The use of parametric repeated-measures tests requires the fulfillment of several preliminary assumptions. The results of the normality assumption test indicated that the assumption of normal score distribution was maintained for all research variables at all three stages (pretest, posttest, and follow-up) in both groups ($p>0.05$). Levene's test was used to examine the homogeneity of variances assumption. The results obtained for life expectancy ($F=0.120$, $p=0.462$), alexithymia ($F=0.068$, $p=0.796$), and anxiety sensitivity ($F=0.189$, $p=0.667$) collectively confirmed the homogeneity of variances for all variables at all three stages. The results of Mauchly's test, used to examine the sphericity assumption, were as follows: life expectancy (Mauchly's $W = 0.308$, $\chi^2 = 2.20938$, $p=0.13$, alexithymia (Mauchly's $W = 0.491$, $\chi^2 = 4.46781$, $p=0.09$), and anxiety sensitivity (Mauchly's $W = 0.397$, $\chi^2 = 10.35213$, $p=0.18$), indicating confirmation of the sphericity assumption. The results of between-subjects and within-subjects comparisons for the research variables are presented in Table 3.

Table 3. Results of Between-Subjects and Within-Subjects Effects Analysis for the Research Variables

Variable	Effect	Source	SS	df	MS	F	Sig.	Effect Size	Power
Life expectancy	Between-subjects	Group	115.600	1	115.600	7.753	0.01	0.217	0.767
	Within-subjects	Time	75.267	2	37.633	11.605	0.001	0.293	0.992
		Time × Group	140.467	2	70.233	21.658	0.001	0.436	1
Alexithymia	Between-subjects	Group	2092.844	1	2092.844	8.551	0.007	0.234	0.802
	Within-subjects	Time	329.400	2	164.700	9.055	0.001	0.244	0.968
		Time × Group	272.689	2	136.344	7.496	0.001	0.211	0.932
Anxiety sensitivity	Between-subjects	Group	864.900	1	864.900	5.119	0.032	0.155	0.789
	Within-subjects	Time	207.200	2	103.600	7.400	0.001	0.209	0.928
		Time × Group	203.467	2	101.733	7.267	0.001	0.206	0.856

Based on the findings in Table 3, in the between-subjects analysis, the mean scores of life expectancy ($F=7.753$, $p<0.05$), alexithymia ($F=8.551$, $p<0.01$), and anxiety sensitivity ($F=5.119$, $p<0.05$) differed significantly between the distress tolerance skills training group and the control group. In the within-subjects analyses, the main effect of time was significant for life expectancy, alexithymia, and anxiety sensitivity ($p<0.01p$), indicating that the mean scores of these variables differed significantly across the research stages overall. The time × group interaction effect was also significant for life expectancy ($F=21.658$, $p<0.01$), alexithymia ($F=7.496$, $p<0.01$), and

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anxiety sensitivity (F=7.267, p<0.01), indicating that changes across the pretest, posttest, and follow-up stages were significant within each group. The proportion of variance in the differences between stages across groups was 21.7% for life expectancy, 23.4% for alexithymia, and 15.5% for anxiety sensitivity. To determine at which test stage the variables differed significantly, post-hoc tests were used; the results are presented in Table 4.

Table 4. Results of Bonferroni Post-hoc Test Comparing Means Across Test Stages and by Group

Variable	Group	Pretest–Posttest		Pretest–Follow-up		Posttest–Follow-up	
		Mean Diff.	Sig.	Mean Diff.	Sig.	Mean Diff.	Sig.
Life expectancy	Experimental	−4.87	0.01	−3.95	0.01	−0.94	0.2
	Control	0.04	1	1.4	1	1	0.68
Alexithymia	Experimental	8.07	0.01	10.00	0.01	1.93	1
	Control	−0.27	1	−1.60	1	−1.33	1
Anxiety sensitivity	Experimental	6.67	0.01	5.53	0.014	−1.14	1
	Control	−0.67	1	1.26	1	1.93	1

The results of Table 4 indicate that life expectancy in the experimental group increased significantly from pretest to posttest and to follow-up (p<0.01). Moreover, in the distress tolerance skills training group, mean scores did not differ significantly from posttest to follow-up. Alexithymia and anxiety sensitivity in the experimental group decreased significantly from pretest to posttest and to follow-up (p<0.01), and their mean scores did not differ significantly from posttest to follow-up. Therefore, distress tolerance skills training exerted a lasting effect on increasing life expectancy and reducing alexithymia and anxiety sensitivity.

Discussion

The aim of the present study was to determine the effectiveness of distress tolerance training on alexithymia, anxiety sensitivity, and life expectancy in women with cancer. The findings showed that distress tolerance skills training had a sustained effect in improving life expectancy and reducing alexithymia and anxiety sensitivity in women with various types of cancer. These findings are consistent with the results of Tofangchi et al. (2021), who reported the effect of distress tolerance skills training on anxiety, as well as with Taheri et al. (2019), who found that distress tolerance training affected alexithymia.

To explain the effect of distress tolerance skills training on life expectancy in women with cancer, it can be stated that the hope of women with cancer in achieving any goal or meaning depends on

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differences in their appraisal of life problems and challenges. Women may exhibit high or low levels of hope, and consequently display different behaviors. The beneficial role of hope is evident both before a problem arises (primary role) and after it emerges (secondary role). Women with higher distress tolerance are more hopeful, pursue their desired meanings more successfully, and consequently experience more positive emotions. In facing difficulties, they are able to pursue their intended goals without major problems and therefore experience fewer negative emotions. This educational method teaches them that hope is an effective factor in achieving social success, and that lack of hope or low hope can lead to feelings of low efficacy and self-efficacy, reduced self-esteem, and a belief that trying to move forward in life is futile, ultimately resulting in fewer achievements. In this way, the training enables them to see beyond their current condition, disorder, pain, and suffering, and to achieve the positive outcomes associated with increased hope, such as a more meaningful life, energy for work, maintenance of joy and vitality, self-confidence, calmness, adjustment to conditions, and superiority in life (Murphy, 2023).

In explaining the effect of distress tolerance skills training on alexithymia in women with cancer, it can be argued that through distress tolerance training, women with cancer were taught problem-solving abilities in various situations, which increased self-confidence and control over alexithymia. This training involved the evaluation and recognition of thoughts and emotions that lead to impulsive behaviors and reduced difficulties in understanding the emotional states of others, thereby increasing empathy in interpersonal relationships. Through this educational approach, as emotional awareness increased, the differentiation of the individual's emotions from those of others also improved. In the absence of such differentiation, emotions remain general and undifferentiated, which limits women's ability to use emotions to produce adaptive behavior. As a result, distress tolerance training helps women identify their emotions; when barriers exist, they cannot recognize their positive and negative emotions, and emotional dysregulation, emotion regulation, and distress tolerance are improved. This training also promotes moment-by-moment awareness of bodily sensations, thoughts, feelings, and emotions (Taheri et al., 2019). Distress tolerance training helps women with cancer accurately identify their emotions and adopt appropriate coping responses, thereby promoting their psychological well-being. In other words, women can adopt appropriate strategies in the face of negative emotions only when they first accurately identify the relevant behaviors and emotions before taking action, so that they can select

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suitable strategies and prioritize their therapeutic plans and goals. Therefore, it is clear that distress tolerance training helps women with cancer identify negative emotions and, by adopting appropriate coping strategies, reduces their stress and alexithymia. This gradual reduction in negative emotions and helplessness acts as a reinforcer of self-confidence and efficacy, leading to increased positive emotions and decreased negative emotions (Goerlich & Votinov, 2023).

To explain the effectiveness of distress tolerance skills training on anxiety sensitivity in women with cancer, it can be stated that at times the negative emotions experienced by women with cancer become so intense that they may feel that their lives are disrupted and develop anxiety sensitivity. Distress tolerance training can help them take control of their thoughts and emotions in the moment. They need this training so that they can calm their minds during difficult moments. Simple bodily movements may help women with cancer reduce anxiety sensitivity and manage their anxiety in the moment. During distress tolerance training, the most important sign of anxiety sensitivity—fear arising from the belief that cancer will have harmful consequences and thus increase anxiety sensitivity—was addressed by teaching exercises that help women shift their attention away from distressing thoughts and feelings and focus on the present moment. This is one of the most practical forms of distress tolerance training, as it can reduce stress and lower anxiety sensitivity. Distress tolerance training facilitates magnified response thinking and fear conditioning to the aversive stimulus, namely cancer (Tofangchi et al., 2021).

Conclusion

The results showed that the use of distress tolerance skills training can be effective in improving life expectancy, alexithymia, and anxiety sensitivity in women with various types of cancer.

Like other studies, this research had certain limitations. Despite efforts to homogenize the groups and control the effects of confounding variables, possible response bias in the research instruments and the amount and type of medication used by the patients should be considered when generalizing the findings.

The results of this study may provide a basis for interventions aimed at supporting women with cancer. It is recommended that physicians and psychotherapists use distress tolerance training to improve the psychological distress of women with cancer, thereby contributing to improvements in both their psychological and physical health.

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Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Islamic Azad University.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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