

## Study the Effectiveness of Memory Specialization Training on Rumination and Emotional Processing in Cancer Patients

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### Abstract

Important factors, such as deficits in rumination and emotional processing associated with traumatic events (such as cancer), may influence the maintenance and development of PTSD symptoms. The current study was done to study the effect of memory-specificity training on rumination and emotional processing deficits in cancer patients. This research was a post-test-pre-test type with a control group. 30 cancer patients with symptoms of Post-Traumatic Stress Disorder were selected as samples and randomly replaced in two control and experimental groups. The experimental group underwent 6 sessions of 90 minutes, one day a week for memory specialization training. No intervention was utilized for the control group. After and before the intervention, both groups responded to the emotional processing scale and rumination response scale questionnaires. To analyze the data, the method of covariance multivariate analysis was used using SPSS23 software. Based on the obtained results, there was a remarkable difference between the average post-test scores of the control group and intervention group ( $P < 0.05$ ), so memory specialization training significantly causes the reduction of defects in rumination and emotional processing. A thought intervened in the group. Based on the results of the current study, memory specificity training is a cost-effective and short-term treatment to reduce emotional and cognitive symptoms in cancer patients with Post Traumatic Stress Disorder symptoms, which reduces emotional and cognitive symptoms by increasing memory specificity. Thus, it is recommended as a useful intervention to decrease the emotional and cognitive problems of cancer patients with Post Traumatic Stress Disorder symptoms.

**Keywords:** Training, Cancer patients, Memory specialization, Rumination, Emotional processing

### Introduction

Cancer may be considered as a traumatic event. Cancer is a life-threatening disease, and in total, the process of diagnosis, life threat level, severity, loneliness associated with hospitalization, illness duration, need for repeated medical procedures, treatment side effects, and negative medical prognosis (risk of recurrence and disease progression) leads to cancer-related trauma of a complex nature. Cancer differs from other traumatic events and has characteristics such as the chronicity of the disease, its unpredictability, the expected nature of the threat, and its intangibility. Therefore, experiencing a traumatic event (such as cancer) usually has several negative

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consequences, including PTSD (post-traumatic stress disorder) symptoms [1, 2]. In this regard, research evidence shows that people with cancer who perceive their illness as sudden, unexpected, and life-threatening meet the PTSD diagnostic criteria. These criteria include re-experiencing thoughts, dreams, or other aspects of diagnosis and treatment, avoiding stimuli that can remind you of cancer pain, anger, and inability to concentrate [3].

In the cognitive model of post-traumatic stress disorder presented by Ehlers and Clark, it is the result of negative evaluations of the experienced traumatic event that creates the feeling of current threat. Such evaluations, as well as difficulty in trauma memory, not only generate negative emotions, but also avoidance, maintain overgeneralized fear, and assist in persistent PTSD symptoms. Based on the PTSD cognitive model, people who perceive a traumatic event as a threat try to deal with it by using a usually maladaptive cognitive processing style in the rumination form. Considering the model assumptions, it is essential to examine the factors that hinder the adaptation process to trauma. These factors contain persistent ruminations about an experienced event and difficulties in regulating emotions [4, 5].

The concept of emotional processing refers to the process of regulating emotional processing, emotional functions, or emotional regulation successfully, and its purpose is to give meaning to a reformulate trauma-related emotions and traumatic events [6]. Based on Rachman [7], emotional processing is an event in which emotional disturbances are reduced and absorbed to such an extent that other experiences and behaviors can proceed without disturbance. Based on the emotional processing model, there are five groups of emotional processing deficits including avoidance, suppression, ineffective regulation, poor emotional experience, and unprocessed emotional symptoms [8]. According to the model of Ehlers and Clark [5], the cognitive and emotional activities of people in the trauma face are one of the main factors that affect the consequences of experiencing a traumatic event. Based on the available evidence, Efron suggests that problems in the emotional processing of cognitive activities in the form of uncontrollable rumination related to a traumatic event cause PTSD and maintain its symptoms [9].

Rumination is specified by the inability to get rid of repetitive verbal thoughts and worry, which often includes self-blame and catastrophic events or painful experiences. A ruminating patient never focuses on the present, but either focuses on the past (symptoms of depression) or worries about the future (symptoms of anxiety). This always causes stagnation and low mood. In contrast to acute traumas, in which intrusive and disturbing cognitions (such as rumination) are related to an event that happened in the past. In the case of cancer, many unwanted and intrusive cognitions are related to fears about health and future events. Cancer survivors, unlike survivors of other traumas, have to live with the fears and threats of recurrence of their disease [10, 11].

Cancer's traumatic illness has a cold, and similar feelings of intense fear, panic, or helplessness. Usually, disturbing images and memories related to cancer treatment or diagnosis can be re-triggered at different stages of the cancer course. An early assessment of cancer may be perceived as a mortal threat. In addition, at the diagnosis time, patients also experience disbelief, confusion, impatience, and catastrophic thoughts [12].

Cognitive theories of PTSD emphasize the interaction of emotions and cognition in the development of PTSD symptoms. These theories claim that psychological damage occurs when emotional stress leads to changes in parts of cognitive networks that are responsible for processing information related to perception, meaning, and response to stressful events. Considering the two-way relationship between cognition and emotion, cognitive deficits can play a fundamental and central role in suffering from a disorder of post-traumatic stress, its continuation with the severity of the symptoms, as well as negative effects on the outcome of treatment [13, 14]. The cognitive structure that has recently attracted the attention of researchers is autobiographical memory, especially over general autobiographical memory. Problems related to memory, especially the overgeneralization of autobiographical memory, play a vital role in creating continuity and treating post-traumatic stress disorder [15].

Reducing the specificity of memory is an important factor in vulnerability to emotional disorders; because this cognitive defect causes an increase in intrusive thoughts, functional avoidance, rumination, increased use of the thought suppression mechanism, and dissociative states. Finally, it leads to an overgeneral crying recovery style in memory, which is the basis of implicit depression, symptom exacerbation, and chronicity of PTSD disorder [16].

Specificity Training Memory is a new treatment method that aims to help patients with major depressive disorder and PTSD create more specific history memories. Memory specialization training is based on the principle that the provided exercises make the person continue to search the memory of an event until he can remember the details and express the memory in a specific way. This training is a method of organizing personal memory and at the same time a satisfying training to confront and deal with the main cognitive processes involved in depression and PTSD disorder. The main goal of this training is to change the recall pattern in history memory from general to specific and specific, which is seen in many psychological disorders, including PTSD [17, 18].

Important factors, such as deficits in rumination and emotional processing associated with traumatic events (such as cancer), may influence the maintenance and development of PTSD symptoms. The current study was done to study the impact of memory-specificity training on rumination and emotional processing deficits in cancer patients.

## Materials and Methods

In purpose terms, the current research is part of an applied study, and in terms of the data collection method, it is an experimental type (post-test-pre-test with a control group). The statistical population of the current study included people with definite diagnoses of cancer and PTSD symptoms referring to medical centers and hospitals. In this research, after implementing the post-traumatic stress disorder checklist and conducting a semi-structured clinical interview, among the eligible people (score above 38 and diagnosis of the disorder of post-traumatic stress) [19], 30 people were randomly chosen. They were replaced in two control (15 people) and experimental (15 people) groups. The criteria for entering the research included cancer (stage 1 or 2), diagnosis of the disorder of post-traumatic stress, minimum education level to complete the questionnaires, non-participation in other psychological interventions until the end of the research, and continued participation in the intervention sessions. Also, the exit criteria of the research were not attending a session of the intervention, not wanting to continue participating in the sessions, and not having access to the people of the control and experimental groups to answer the questionnaires in the post-test stages. Then, memory specialization training was done in 6 group sessions of 90 minutes per week. The overall structure of the sessions was implemented by the memory specialization training published by Raes *et al.* [17]. The overall goal of this training is to recall specific autobiographical memories through positive, neutral, and negative words so that at the end of the sessions specific details of time, place, and sensory context of individual events are retrieved from memory. Both groups (control and experimental) answered questionnaires of the revised version of the emotional processing scale and rumination response scale before and after the intervention. In this research, ethical considerations, including the secrecy principle, each person's consent to participate in the research, and the withdrawing cooperation possibility in case of unwillingness, were considered. The description of memory allocation training sessions is provided in **Table 1**.

**Table 1.** Schedule of memory specialization training sessions.

Session	Description of the session
1	Write a specific memory for a neutral and positive word
2	Recalling two memories for four cue words, two positive cue words, and two neutral cue words
3	Practice memory recall with positive cue words only
4	Recalling two memories for four cue words, two negative cue words, and two neutral cue words
5	Helping the person explain their feelings about the recalled memories
6	Providing participants with examples of general thinking, receiving training course evaluation feedback from participants

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Both groups (experimental and control) responded to the questionnaires of the revised version of the emotional processing scale of Baker *et al.* (2010) and the rumination response scale of Nolen and Hoeksma (1991) before and after the intervention.

Structured clinical interviews based on 5-DSM are a comprehensive and standardized tool for evaluating psychiatric disorders based on 5-DSM diagnostic criteria and are used for clinical and research purposes. This interview is the most widely used diagnostic interview among other standard diagnostic tools. This version of the SCID interview, like the previous versions, has high reliability and validity in diagnosing PTSD (kappa coefficient 0.69) [20].

Post-Traumatic Stress Disorder Checklist for DSM-5 (PCL-5) is the most common self-report tool for PTSD symptoms, which is used as a clinical screening test to check PTSD symptoms. The accident is used. This scale has 20 items, 5 of which are associated with the symptoms and signs of re-experiencing the traumatic event, 2 of which are associated with avoiding stimuli associated with the traumatic event, and 7 of which are associated with negative changes in cognition and mood associated with the event, and its 6 items are related to arousal and reactivity associated with the traumatic event. Participants respond to this scale on a 5-point Likert scale from never (0) to very much (5), in the last month, and the range of scores is between 0 and 80 [21]. Internal consistency of convergent validity and discriminant validity and factor structure of PCL-5 showed high internal consistency and acceptable validity of PCLA inventory [22].

Emotional Processing Scale-Revised was developed by Baker *et al.* in 2010 to measure emotional processing styles [23]. The revised version of this scale, derived from the emotional processing scale [8], includes a five-factor structure with 25 items, which is used to measure emotional processing styles. It also measures the five components of emotional suppression, dysregulated emotions, poor emotional experience, unprocessed emotions, and emotional avoidance. The emotional processing scale is answered in the five-point Likert scale form (from completely disagree to completely agree).

The ruminative Response Scale is a 22-question self-report instrument designed by Nolen-Hoeksema and Morrow [24]. The grading method is based on a four-point Likert scale from never (1) to always (4). Scores less than 33 show low rumination and higher scores show high rumination. The intraclass correlation for the measure of

authority with five measurement times is reported. 75 The reliability of this scale using Cronbach's alpha coefficient is in the range of 0.88 to 0.92, which indicates the high reliability of the scale. Also, the retest correlation for more than 12 months has been reported as 0.67 [24].

For data analysis, the method of covariance multivariate analysis was used by SPSS23 software.

## Results and Discussion

A comparison of demographic statistics showed that the mean  $\pm$  SD (standard deviation) of the post-traumatic stress of the experimental group was  $49.20 \pm 6.155$ , and the mean  $\pm$  SD of the post-traumatic stress of the control group was  $48.80 \pm 6.316$ . According to the t-test statistic obtained from the comparison of 2 groups in the post-traumatic stress disorder variable,  $t = 0.176$ , which is not statistically significant ( $P = 0.862$ ), which indicates homogeneity. There are two groups in terms of post-traumatic stress symptoms. The mean  $\pm$  SD of the age of the experimental group was  $53.80 \pm 7.504$ , and the mean  $\pm$  SD of the age of the control group was  $52.93 \pm 10.859$ . Based on the t-test statistic obtained from the comparison of the two groups in the age variable,  $t = 0.254$ , which is not statistically significant ( $P = 0.801$ ), which indicates the homogeneity of the two groups in age terms. The Chi-Square statistic obtained from the comparison of the frequencies of the two groups in the education variable is Chi-Square = 1.467, which is not statistically significant ( $P = 0.917$ ), which indicates the homogeneity of the two groups in terms of education. **Table 2** demonstrates the descriptive findings including the mean  $\pm$  SD deviation of the research variables.

**Table 2.** Mean and SD (standard deviation) of defects in rumination and emotional processing.

Dependent variables		Experimental group		Control group	
		Pre-test	Post-test	Pre-test	Post-test
Emotional suppression	Mean	15.47	14.33	15.53	15.40
	SD	0.834	0.724	1.187	1.183
Unregulated emotions	Mean	15.93	14.60	15.73	15.67
	SD	1.100	0.986	0.884	0.816
Lack of emotional experience	Mean	16.07	14.93	16.13	16.00
	SD	1.033	1.534	1.407	1.604
Unprocessed emotions	Mean	15.80	15.07	15.67	15.60
	SD	1.014	1.335	0.816	0.828
Emotional avoidance	Mean	15.60	14.73	16.20	16.13
	SD	0.910	1.335	1.320	1.407
Rumination - to reflect	Mean	13.00	12.20	12.80	12.73
	SD	0.756	1.082	0.775	0.884
Rumination - thinking	Mean	14.73	13.40	14.67	14.60
	SD	0.594	1.242	0.488	0.632
Rumination - depression	Mean	29.40	27.87	29.73	29.67
	SD	1.639	1.959	1.163	1.234

**Table 2** shows the mean  $\pm$  SD of defects in emotional processing and rumination in the control and experimental groups in the post-test and pre-test stages. Next, to use the inferential statistic of multivariate covariance analysis, the presuppositions of this analysis were examined. Shapiro-Wilk test was utilized to check the assumption of normality, based on the data, for emotional suppression ( $Z=0.752$ ,  $P = 0.602$ ), unregulated emotions ( $Z=0.803$ ,  $P = 0.075$ ), poor emotional experience ( $Z=0.815$ ,  $P = 0.085$ ), unprocessed emotions ( $Z=0.774$ ,  $P = 0.109$ ), emotional avoidance ( $Z=0.699$ ,  $P = 0.165$ ), expression ( $Z=0.732$ ,  $P = 0.158$ ), thinking ( $Z=0.782$ ,  $P = 0.153$ ), and depression ( $Z=0.718$ ,  $P = 0.152$ ).

The assumption of variances homogeneity was checked with the Levene test, this assumption was confirmed in the post-test stage ( $P>0.05$ ). To check the other assumption of this test, i.e. the equality of the covariance matrix, the Mbox test was used, which was not statistically significant, and this means establishing the assumption of the equality of the variance and covariance matrices ( $F = 47.431$ ,  $P = 0.632$ ). Since the presuppositions were in place, it is possible to utilize the parametric test of multivariate covariance analysis and its results are reliable (**Tables 3 and 4**).

**Table 3.** The findings of multivariate post-tests for deficits in emotional processing and rumination.

Test type	Amount	F test	P-value	Effect coefficient	Statistical power
Pillais Trace	0.669	10.747	0.001	0.669	0.999
Wilks Lambda	0.131	10.747	0.001	0.669	0.999
Hotelling's Trace	6.613	10.747	0.001	0.669	0.999
Roy's Largest Root	6.613	10.747	0.001	0.669	0.999

The results of **Table 3** show that Wilks's lambda is significant. The results confirm that there is a significant difference between the two groups (control and experimental) in terms of post-test deficits in emotional processing and rumination with the pre-test control (exclusion or covariate). Based on this, it can be said that there is a significant difference in at least one of the dependent variables, and the impact coefficient shows that 66.9% of the difference between the two groups is associated with memory specialization training. After this, it should be investigated whether each of the dependent variables is affected separately from the independent variable (memory allocation training) or not. For this purpose, the MANCOVA (multivariate covariance analysis) test was utilized, the results of which are presented in **Table 4**.

**Table 4.** The results of inter-subject effects of multivariate covariance analysis of deficits in emotional processing and rumination.

Dependent variables	Sum of squares	Degree of freedom	F statistic	P-value	Effect coefficient	Statistical power
Emotional suppression	7.278	1	16.785	0.001	0.456	0.999
Unregulated emotions	7.430	1	17.123	0.001	0.461	0.999
Lack of emotional experience	8.413	1	6.198	0.022	0.237	0.999
Unprocessed emotions	3.731	1	6.198	0.136	0.257	0.999
Emotional avoidance	4.370	1	5.173	0.034	0.205	0.999
Rumination - to reflect	2.805	1	6.858	0.016	0.255	0.999
Rumination - thinking	11.567	1	13.704	0.001	0.407	0.999
Rumination - depression	13.357	1	39.239	0.001	0.662	0.999

As can be seen in **Table 4**, the use of memory specialization training affects the defects in rumination and emotional processing in the post-test stage.

The current study was done to study the effect of memory-specificity training on rumination and emotional processing deficits in cancer patients. The findings of the current study revealed that memory specificity training has a significant effect on reducing emotional processing deficits in cancer patients with PTSD symptoms. The results of this study are directly and indirectly aligned with the study of Lavaei *et al.* [25], and Williams *et al.* [26]. In explaining this finding, it can be said that the emotions that occur during a traumatic event affect the way that event is encoded in the memory, the way it is stored, and the way it is remembered and processed [27]. From this point of view, autobiographical memories are closely related to emotions [28]. Not recalling special negative events that occurred in our past, is thought to decrease exposure to negative emotional experiences and therefore the individual's ability to learn how to cope and regulate these emotions when they occur [29]. Thus, by ameliorating memory attribution problems through intervention, we would expect a proportional improvement in mood disorder symptoms in currently symptomatic individuals or a reduced likelihood of diagnosis in currently asymptomatic individuals [30].

By performing memory specialization exercises, it can be expected that the number of defects in the emotional processing of cancer patients will decrease. Also, the findings of the current study revealed that memory-specificity training has a significant effect on reducing rumination in cancer patients with PTSD symptoms. This finding is in line with the research of Colombo *et al.* [31], and Quenstedt *et al.* [32]. In explaining these findings, it can be said that since the inability to recall specific memories is related to emotional problems, people who are less able to remember unpleasant and negative events with high emotional load in detail, rumination is more intense and possible [31]. Also, the research results of Quenstedt *et al.* [32] show that people who suffer from pain and chronic diseases or who have higher levels of depression symptoms are less able to reproduce specific memories. They also produce far less specific future-oriented events. On the other hand, cancer patients often experience trauma in the early stages of the disease, i.e., during the diagnosis and then during the disease process [33].

The post-traumatic stress symptoms and the experience of other intense negative emotions can only be on the road to recovery when the person stops narrating the highly emotional, contradictory, and fragmented traumatic event and narrates the truth of what happened instead of telling the story of the traumatic event. The cause should not be presented in the form of a disease symptom but in the form of an oral and real narrative [34]. The training of memory assignment is based on the principle that the presented exercises make the person continue searching in the memory of an event until he can remember the details and express the memory in a specific and detailed way. Therefore, carrying out specific memory training exercises reduces general memories and subsequently reduces rumination.

## Conclusion

Considering the comprehensive and destructive effects of cancer, this disease as a traumatic event can have significant effects on mental health and life quality. This deadly disease is a serious threat to people's lives, so in total, the diagnosis process, the severity of the disease, the life threat level, the feeling of loneliness associated with long-term hospitalization, the disease duration, the need to repeat treatment methods such as chemotherapy Treatment and radiation therapy, side effects of treatment and drugs and negative prognosis (risk of recurrence and disease progression) will lead to cancer trauma with a complex nature. In this regard, experiencing a traumatic event (such as cancer) usually causes several negative consequences, including PTSD (post-traumatic stress syndrome). The cognitive and emotional activities of people in the trauma face are the main factors that affect the consequences of experiencing a traumatic event. In addition, the available evidence shows that problems in emotional processing and cognitive activities in the form of uncontrollable rumination related to the traumatic event can lead to PTSD and maintain its symptoms. History memory specificity training to decrease emotional and cognitive symptoms in cancer patients with symptoms of post-traumatic stress disorder is a cost-effective and short-term treatment that, as more time passes and the process of increasing memory specificity continues, symptoms decrease, emotional and cognitive characteristics of cancer patients with symptoms of the disorder of post-traumatic stress.

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