

# Comparison of the Effectiveness of Acceptance and Commitment Therapy and Cognitive Behavioral Therapy on Psychosocial Adjustment to Illness and Expanded Disability in Patients with MS

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## Abstract

**Objective:** Multiple sclerosis (MS) is a chronic and progressive nervous system disease. The present study aimed to compare the effectiveness of acceptance and commitment therapy (ACT) and cognitive behavioral therapy (CBT) on the psychosocial adjustment to illness and expanded disability of multiple sclerosis patients.

**Method:** This research was a pretest-posttest controlled quasi-experimental study with a three-month and six-month follow-up. The research population was comprised of all MS patients in Tehran in 2021. Using the purposeful sampling method, 60 people were selected and randomly assigned to ACT and CBT experimental groups and the control group. Drogits' (1986) Psychosocial Adjustment to Illness Scale (PAIS) and expanded disability status scale (EDSS) were used to collect data. The ACT group received eight 120-minute sessions, the CBT group received eight one-hour sessions, and no intervention was provided for the control group. Covariance analysis and post hoc tests were used to analyze the data.

**Results:** The results demonstrated that ACT had a higher effect than CBT in enhancing psychosocial adjustment to illness ( $P=0.024$ ) and reducing expanded disability ( $P=0.024$ ), which has been constant in the follow-up stages.

**Conclusion:** In general, both ACT and CBT interventions significantly improved the psychosocial adjustment to illness and reduced the expanded disability of MS patients. However, it is suggested that professionals use ACT intervention for more effectiveness.

**Keywords:** MS, Acceptance and commitment, Psychosocial adjustment to illness, Cognitive behavior, Expanded disability.

## Introduction

Multiple sclerosis (MS) occurs due to the destruction of the myelin sheath of nerve cells in the central nervous system. The prevalence of MS in Iran is 40 per 100,000 people, and women are affected by this disease two to three times more than men

(Shakernegad, Moazen, Hamidi, et al., 2017). The clinical course of this disease completely fluctuates from a stable and chronic state to a rapidly evolving illness (Yosefi, Zargham Hajebi & Saravani, 2021; Reynders, D'haeseleer, De Keyser, et al., 2017).

This disease often occurs when a person expects good health, and when the disease develops, the person's confidence in her body and health is distorted. Because MS can affect any part of the central nervous system, the symptoms of this disease are very diverse. For this reason, this disease is sometimes

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called a thousand faces disease (Suleimani & Taj al-Dini, 2016). Most people diagnosed with MS are usually in early adulthood (between the ages of 20 and 50) and when they first receive this diagnosis, overwhelming negative emotions overcome them (Garabedian, Perrone, Pileggi, et al., 2020). These people are psychologically vulnerable, and high levels of depression and anxiety are reported in them (Kiroopoulos, Kilpatrick, Holmes, et al., 2016). Considering that these patients are psychologically disturbed and need psychological care and attention, there is a significant research gap in this field, and in almost all research conducted on MS patients, this vulnerable group is not considered (Kiroopoulos, Kilpatrick, Kalincek, et al., 2020).

Although the cause of MS is currently not fully known, there is no doubt that environmental factors such as stress and psychological factors play a significant role in the exacerbation of the disease and the occurrence of new attacks (Davoodi, Shamely & Hadian Fard, 2019). When people experience a deficiency in their physical health status, poor adjustment to the illness that threatens their physical health can affect the rate of recovery from the disease and slow down the healing process (Aliakbari Dehkordi & Dehkodaie, 2020). To adjust to the illness, MS patients must change their way of life in some areas. People diagnosed with MS may involuntarily lose some of their roles, their relationships may change, and they may face financial problems (Hyarat, Subih, Rayan, et al., 2019). Considering the consequences MS brings to patients, the patients need to increase their psychosocial adjustment to the illness to better cope with the disease and its complications (Okanli, Tanriverdi, Ipek Coban, et al., 2017). Psychosocial adjustment to illness is described as an active adjustment process using cognitive and behavioral resources in response to stress and events in an emotional, physical, interpersonal, and practical field (Mazanec, Daly, Douglas, et al., 2011). Among the

results of increasing psychosocial adjustment to the illness, we can mention having a sense of physical and emotional well-being, a sense of control, and having appropriate resources to communicate needs, concerns, and social interactions (Derman & Deatrck, 2016).

MS is a multifocal inflammatory disease that involves the central nervous system associated with paralysis of the hands and feet, vision, and constrictor muscles. Currently, there is no effective treatment method to cure MS, and current medical treatments are focused on improving symptoms and chronic inflammation (Bejargafshe, Hedayati, Zahabiasli, et al., 2019). Cognitive pathology is common in MS patients, and up to 0.70 of these patients suffer from some kind of cognitive pathology including attention, memory, and apparent processing speed, and information processing speed decreases (Costa, Genova, DeLuca, et al., 2017). MS disease destroys the person's performance in various dimensions and causes an increase in their expanded disability (Namdarnaghani, Danesh, Asadi Khansari, et al., 2020).

In addition to the physical problems and symptoms that MS patients experience, they also face psychological disturbances (Braley, Kratz, Kaplish, et al., 2016). These patients may experience lethargy, fatigue, anxiety, depression, low self-confidence, and sleep disturbances (Marrie, Reingold, Cohen, et al., 2015). Various complications of MS can disrupt the patients' regular activity and cause them to face problems in education, family life, job opportunities, and daily life activities (Berrigan, Fisk, Patten, et al., 2016; Dehghani & Kazemi Moghaddam, 2022). Accordingly, we can conclude that MS disease affects the psychological life of people. To moderate and reduce these adverse effects, using effective psychological interventions for the target population is essential (Hayarat et al., 2019).

In this regard, Cognitive Behavioral Therapy (CBT)

is one of the effective psychological interventions. CBT is a short-term, goal-oriented, and action-oriented psychological treatment method focusing on problem-solving (Martin, 2019). The CBT's goal is to change people's emotions and change thinking or behavior patterns that cause problems (Martin, 2019). CBT includes training by which people learn cognitive and behavioral skills to adapt and adjust better to stressful and problematic situations. The cognitive skills a person acquires in CBT can modify and reduce dysfunctional thoughts (Kwon, Ahn, Kim, et al., 2017). CBT is one of the few treatment approaches with strong theoretical support aiming to teach cognitive and behavioral skills to adjust to hard and difficult situations (Cheng, Au, Losada, et al., 2019). The effectiveness of CBT treatment for improving the psychological condition of patients with MS has been confirmed in various types of research, such as the effectiveness of CBT in reducing stress, anxiety, and depression (Ghielen, Rutten, Boeschoten, et al., 2019), reducing anxiety thoughts, increasing resilience and life expectancy (Maghsud Lu, Sanagoo & Shirazi, 2022) and reducing fatigue and improving insomnia (Siengsukon, Alshehri, Williams, et al., 2020).

The goal of the CBT approach is to directly change the content of thoughts, feelings, or physical symptoms. Recently, alternative approaches have emerged. These approaches, which are called the third wave of behavioral therapy, target the function of cognitions and emotions instead of changing their form, frequency, or situational sensitivity (Hayes, 2016). Acceptance and commitment therapy is one of the approaches of the third wave of behavioral therapy, called ACT for short. ACT has six central processes that lead to psychological flexibility. These six processes are acceptance, detachment, self as context, connection with the present, values, and committed action (Hayes, Luoma, Bond, et al., 2006). The central focus of ACT is the prevention

of experiential avoidance. This principle seeks to teach patients how to avoid the idea of suppressing anxiety, how to detach themselves from intrusive thoughts, and allow people to experience unpleasant emotions rather than avoid them (Swain, Hancock, Hainsworth, et al., 2013). The effectiveness of ACT intervention for MS patients has been demonstrated in various studies. For example, ACT has increased resilience (Pakenham, Mawdsley, Brown, et al., 2018), improved general mental health and decreased depression, anxiety and stress (Larsson, Hartley & McHugh, 2022) and improved anxiety and increased quality of life (Kahani, Rasouli Azad, Naser Moghdasi, et al., 2019) in patients with MS. CBT and ACT interventions have differences in some theoretical assumptions. For example, in CBT, the primary assumption of treatment is focused on the fact that spontaneous thoughts and cognitive distortions are the cause of maladaptive behavior, and therefore, people should challenge these distorted thoughts and replace maladaptive thoughts with compatible thoughts (Crumb & Haskins, 2017). While ACT intervention, instead of directly attempting to reduce disturbing emotions and thoughts, emphasis is on increasing behavioral efficiency despite the presence of unpleasant thoughts and feelings (Hayes, Strosahl & Wilson, 2011). On the other hand, according to Hayes et al. (2011), ACT is partially based on Eastern culture and religions. Considering that the effectiveness of both CBT and ACT approaches has been confirmed in various research, it can be said that these two approaches have differences in their main assumptions. This problem has made us investigate this research gap and compare the effectiveness of these two approaches. According to the related literature, CBT and ACT approaches have been investigated separately. Still, in comparing the effectiveness of these two ap-

proaches on psychosocial adjustment to illness and expanded disability, we are facing limitations. Accordingly, the current research seeks to answer whether there is a difference between the effectiveness of CBT and ACT treatment on psychosocial adjustment to illness and expanded disability of patients with MS.

## Method

### Participants and Procedure

This research was a pretest-posttest controlled quasi-experimental study with a three-month and six-month follow-up. The research population was all MS patients in the MS Association of Tehran in 2021. Using the purposeful sampling method, 60 people were selected and randomly assigned to ACT and CBT experimental groups and the control group (each group, 20 people). In purposeful sampling, the goal is to select people who are a rich source of information so that they can actively participate in the study and allow the researcher to understand their experience better (Cozby & Bates, 2017). The inclusion criteria included having MS disease, diagnosis of MS for a maximum of 6 months, lack of previous training in both ACT and CBT approaches, being at least 20 and at most 50 years old, ability to speak Persian, conscious consent, and desire to participate in the research, not suffering from any severe mental disorders such as psychosis (According to the statement of the person or the companion or the diagnosis of the interviewer in the initial interview), not taking psychoactive drugs, and not suffering from another chronic disease at simultaneously. The exclusion criteria included the emergence of physical problems for the members of the group that disrupt the psychotherapy process, using certain drugs during the treatment of MS that affect the mood, absence of more than two sessions during the intervention, concurrent participation in other psychological training programs or clinical

trials, and unwillingness to continue participating in the research for any reason. In order to analyze the statistical data, covariance analysis and post hoc test methods were used, and the 21st version of Spss software was used to analyze the research data. The ethics code of the current study is IR.PNU.REC.1401.020. The following questionnaires were used to collect data.

### Measures

*Psychosocial Adjustment to Illness Scale (PAIS):* This questionnaire was developed by Drogits in 1986 with 46 questions, whose scoring method is based on a 4-point Likert scale. It has seven subscales, which include health care orientation (8 questions), work environment (6 questions), home environment (8 questions), sexual relations (6 questions), the extent of family relationships (5 questions), social environment (6 questions), and psychological helplessness (7 questions). The lowest score is 46, and the highest is 184, with the low score indicating higher psychosocial adjustment. The validity and reliability of this scale have been evaluated and reported as favorable by Derogatis (1986) and Rodrigue, Kanasky, Jackson, and Perri (2000). Faqih, Saadat Jo, and Dastjardi (2012) confirmed the validity of this scale in Iran by ten professors at Birjand University of Medical Sciences and calculated its reliability with Cronbach's alpha coefficient of 0.94. The reliability of this tool in the present study was calculated using Cronbach's alpha of 0/87.

*Expanded Disability Status Scale (EDSS):* This scale is used to evaluate the level of disability of MS patients, and along with it, medical records and doctor's diagnoses are used. The range of a person's score ranges from 0 (regular neurological examination) to 10 (death due to MS disease) (Ashjzadeh, Heydarifard, Feridouni & Farjam, 2016). In their research, Meyer-Moock, Feng, et al.



**Table 1.** Summary of the content of acceptance and commitment intervention

Sessions	Content of training sessions
1	Introducing the trainer and the group members to each other and establishing a therapeutic relationship, introducing ACT and its objectives and principles, explaining the rules governing treatment sessions, providing information about MS and its types, reviewing treatments related to MS and their costs and benefits, mental training, rest and hospitality, and assigning homework to list the things they did to control their illness and which ones were useful and which ones were not.
2	Discussing the experiences and evaluating them, the degree of the individual's willingness to change, examining the client's expectations from ACT training, summarizing the discussions raised in the meeting, and presenting homework using the metaphor of a tug-of-war with a giant.
3	Recognizing the ineffective strategies of control and realizing their futility, explaining the concept of acceptance and its difference with the concepts of failure, despair, denial, and resistance, and presenting the homework of the metaphor of the chess sheet and chess pieces.
4	Introduction and understanding of self-conceptualized fusion, application of cognitive breakdown techniques, intervention in the functions of problematic chains of language and metaphors, and presentation of homework using the cloud and sky metaphor.
5	Showing the separation between self, internal experiences, and behavior, viewing the self as context and providing homework to be aware of their breathing and looking at their bodily sensations without judgment.
6	Identifying the life values of patients, specifying and focusing on these values, paying attention to their power of choice, using mindfulness techniques with an emphasis on the present, and providing homework to specify life values.
7	Examining the values of each person and deepening the previous concepts, explaining the difference between values, goals and common mistakes in choosing values, recognizing possible internal and external obstacles in following values, and listing their most important values and possible obstacles in following them up.
8	Understanding the nature of desire and commitment, identifying behavioral plans by values and making a commitment to act on them, stating the points made about the concept of recurrence and preparation to deal with it, sharing the experiences of group members with each other and the achievements and expectations that were not fulfilled.

(2014) reported the Kappa coefficient of this scale between 0.23 and 0.76. Asghari and Rashidi (1999) have reported the Kappa coefficient of this scale as 0.90 in Iran.

*Acceptance and Commitment Therapy (ACT) protocol:* This protocol includes a set of activities based on the therapeutic protocol of Hayes et al. (2011) during eight 120-minute training sessions and one session per week for patients with MS in the experimental group. A summary of the content of the ACT curriculum is shown in Table 1.

**Cognitive Behavioral Therapy (CBT) protocol:**

This protocol includes a set of activities based on the cognitive-behavioral intervention protocol developed by Wright, Brown, Thase et al. (2017).

This protocol consists of eight one-hour sessions conducted once a week. The summary of the content of the CBT training program is shown in Table 2.

In order to analyze the data, analysis of covariance methods were used to test research hypotheses and post hoc tests for pairwise comparisons between experimental groups. SPSS 21 version was used to analyze the research data.

**Table 2.** Summary of training contents of acceptance and commitment intervention

Sessions	Content of training sessions
1	Introducing and explaining the basic principles of cognitive behavioral therapy, introducing the basic concepts of cognitive-behavioral therapy, including spontaneous thoughts and cognitive errors, setting the schedule of sessions, and discussing the rules of sessions.
2	Determining the agenda of the meeting, evaluating, formulating, and providing a conceptual framework about the participant, conceptualizing the participant's issues, and filling out the formulation worksheet.
3	Determining the agenda of the meeting, selecting goals and determining treatment goals with the help of the patient, preparing notebooks for treatment, and planning activities
4	Determining the agenda of the meeting, identifying and recognizing their thoughts, practicing recording thoughts, and assigning them to the patient as homework.
5	Determining the agenda of the meeting, changing and correcting spontaneous thoughts, teaching the creation technique of logical substitution, and introducing the weekly activity registration form as homework.
6	Determining the agenda of the meeting, identifying cognitive errors, reviewing evidence, and preparing confrontation cards.
7	Determining the agenda of the meeting, designing the graded assignment, and using the visual confrontation technique.
8	Review of uncompleted activities, homework, and treatment notebook, the answer to patient's questions, and summary.

### Ethical statements

The present clinical trial with ID IR.PNU.REC.1401.020 has been registered at Payam Noor University, Dubai branch, and they participated in the research with informed consent.

### Results

In this research, the data of 60 people were analyzed. Examining the demographic indicators showed that 60% of the participants were women and 40% were men. In terms of education, 18.33% of them had a middle school certificate, 31.66% had a diploma, 36.66% had a bachelor's degree, and 13.33% had a master's degree or higher. Of them, 33.33% had a 1-2 years' history of illness, 38.33% had a history of 3-4 years, and 28.3% had five years and above.

Table 3 shows the mean and standard deviation of the research variables. Table 3 shows the mean and standard deviation of the research variables.

As Table 3 shows, We can state that the mean scores of expanded disability in the acceptance and commitment group decreased in the post-test compared to the pre-test. It also reduced from 2.60 in the pre-test to 1.60 in the post-test in the cognitive-behavioral group. The mean scores of psychosocial adjustment to illness in the acceptance and commitment group increased from 24 in the pre-test to 134.75 in the post-test; in the cognitive-behavioral group, it increased from 25 in the pre-test to 111 in the post-test.

To check the normality of the data, the Kolmogorov-Smirnov test was used, and the results showed that

the distribution of scores in the variables was normal. The results of Levin's test to measure the equality of the error variance of the variables investigated in this research showed that the significance level of the F statistic is higher than 0.05 and the error variance of the groups is equal to each other and no difference has been observed between them. Table 4 presents Levine's test result to check the homogeneity of

$F=37.93$  at the level of  $P=0.047$ , and in the six-month follow-up phase with the value of  $F=13.12$  at the level of  $P=0.039$ . This means that the intervention based on acceptance and commitment and cognitive behavioral therapy have significantly increased the psychosocial adjustment to illness compared to the control group. But to determine the differences between these three groups, it was necessary to

**Table 3.** Mean and standard deviation of research variables

Variable	Stage	ACT group		CBA group		Control group	
		M	SD	M	SD	M	SD
Expanded disability	Pre-test	2.30	0.67	2.60	0.50	2.55	0.51
	Post-test	1.30	0.47	1.60	0.50	2.75	0.55
	Three-month follow-up	1.30	0.48	1.40	0.50	2.40	0.68
	Six-month follow-up	1.75	0.85	1.75	0.78	2.60	0.50
psychosocial adjustment to illness	Pre-test	24	0.62	25	0.56	26	0.81
	Post-test	134.75	5.59	111	2.12	24	0.52
	Three-month follow-up	107.20	3.57	92	2.38	35	0.41
	Six-month follow-up	100.20	3.50	85	3.74	29	0.38

variances.

The contents of Table 4 show that the error variance of the variables in the studied groups is homogeneous because the obtained F is not significant at the  $P<0.05$  level.

Table 5 shows the results of the multivariate covariance analysis test to investigate the differences between the experimental and control groups in psychosocial adjustment to illness.

The results of Table 5 show that the effects of the

conduct a pairwise comparison between groups, which is demonstrated in Table 6.

According to the results of Table 6, in the post-test stage, the effectiveness of acceptance and commitment therapy from the group that underwent cognitive behavioral therapy is significant at a mean difference of 23.11 at the level of  $P=0.024$ . Also, the effects of acceptance and commitment therapy are meaningful compared to the control group at a mean difference of 57.36 and  $P=0.019$ . Finally, the

**Table 4.** Levine's test for the assumption of homogeneity of variances

Variable	F	df. 1	df. 2	Sig.
psychosocial adjustment to illness	6.41	2	57	0.73
expanded disability	4.39	2	57	0.79

group on the variable of psychosocial adjustment to illness are significant in the post-test stage with the value of  $F=28.89$  at the level of  $P=0.019$ , in the three-month follow-up stage with the value of

results of this table show the greater effectiveness of acceptance and commitment therapy compared to cognitive behavioral therapy on psychosocial adjustment to the illness. The results of the

**Table 5.** Results of multivariate analysis of covariance of psychosocial adjustment to illness

Variable	Stage	Source	Sum square	df	Mean square	F	P	Eta coefficient
psychosocial adjustment to illness	Post-test	Group	1428.31	1	1428.31	28.89	0.019	0.813
		Error	121.117	57	49.43			
		Total	1549.427	60				
	Three-month follow-up	Group	1222.90	1	1222.90	37.93	0.047	0.615
		Error	314.241	57	32.24			
		Total	1537.141	60				
	Six-month follow-up	Group	1195.128	1	1195.128	13.12	0.039	0.521
		Error	631.09	57	91.08			
		Total	8261.218	60				

multivariate covariance analysis test to investigate the differences between the experimental and control groups in expanded disability are presented in Table 7.

Table 7 shows that the effects of the group on the reduction of expanded disability were significant in the post-test stage with  $F=8.80$  at the level of  $P=0.049$ , in the three-month follow-up stage with

**Table 6.** Pairwise comparisons of research groups in the variable of psychosocial adjustment to illness

Measurement step	Basic group	Comparison group	Mean difference	standard error	Sig.	
Post-test	ACT	CBT	23.11	0.351	0.24	
		Control	57.36	0.512	0.019	
	CBT	ACT	-23.11	0.351	0.024	
		Control	29.24	0.641	0.026	
	3-month follow-up	Control	ACT	-57.36	0.512	0.019
			CBT	-29.24	0.641	0.026
ACT		CBT	18.13	0.324	0.09	
		Control	50.08	0.421	0.015	
6-month follow-up	CBT	ACT	-18.13	0.324	0.09	
		Control	24.36	0.147	0.039	
	Control	ACT	-50.08	0.421	0.015	
		CBT	-24.36	0.147	0.039	
	ACT	CBT	15.02	0.451	0.00	
		Control	46.21	0.684	0.049	
CBT	ACT	-15.02	0.451	0.00		
	Control	19.30	0.354	0.016		
Control	ACT	-46.21	0.684	0.049		
	CBT	-19.30	0.354	0.016		



the value of  $F=9.04$  at the level of  $P=0.384$ , and in the six-month follow-up stage with the value of  $F=13.73$  at the  $P=0.001$  level. This means that the intervention based on acceptance and commitment and cognitive behavioral therapy, compared to the control group, has caused a significant reduction in the expanded disability of the participants. To determine the differences between these three groups, a pairwise comparison between groups was conducted, which is shown in Table 8.

The results of the statistical analysis showed that ACT had a greater effect on the psychosocial adjustment to the illness of patients with MS compared to CBT. The results of this research are aligned with the results of Soltanizadeh, Hosseini, and Kazemi Zahrani (2021), Idrisi (2020); Shakerenjad et al. (2017), and Pakenham et al. (2018).

In explaining the greater effectiveness of ACT compared to CBT, it can be said that ACT generally helps people have a proper understanding of emotions

**Table 7.** Results of multivariate analysis of covariance of expanded disability

Variable	Stage	Source	Sum square	df	Mean square	F	P	Eta coefficient
Expanded disability	Post-test	Group	1021.214	1	1021.214	8.80	0.049	0.214
		Error	231.152	57	116.009			
		Total	1252.366	60				
	Three-month follow-up	Group	1047.024	1	1047.024	9.04	0.022	0.384
		Error	210.215	57	108.21			
		Total	1257.239	60				
	Six-month follow-up	Group	1432.251	1	1432.251	13,73	0.001	0.423
		Error	134.214	57	104.241			
		Total	1566.465	60				

Table 8 shows that the effectiveness of acceptance and commitment therapy in reducing the extended disability of the group that underwent cognitive behavioral therapy is significant in the post-test stage at a mean difference of 0.95 at the level of  $P=0.024$ . Also, the effects of acceptance and commitment therapy to reduce extended disability are significant compared to the control group at an average difference of 3.02 at the  $P=0.000$  level. Finally, the results of this table show the greater effectiveness of acceptance and commitment therapy compared to cognitive behavioral therapy in reducing expanded disability.

## Discussion and Conclusion

The present study aimed to compare the effectiveness of CBT and ACT on psychosocial adjustment to the illness and expanded disability of patients with MS.

and does not mix them with language and let them experience these emotions fully. The complete experience of emotions is done by the friends of acceptance, entanglement, and self-as-context so that they can moderate the expression of emotions and change the relation of the participants with their thoughts, beliefs, and emotions (Soltanizadeh et al., 2021), which improves mental states, increases interpersonal interactions, and ultimately increases psychosocial adaptation to the disease. It can also be said that ACT helps people to pay full attention to situations through increasing mindfulness without judgment because one of the reasons that negatively affect people's psychological adjustment and mental health is feelings such as guilt and failure. Using ACT due to mechanisms such as acceptance, increasing awareness, desensitization, being in the moment, observing without judgment, and letting go

**Table 8.** Pairwise comparisons of research groups in the variable of expanded disability

Measurement step	Basic group	Comparison group	Mean difference	standard error	Sig.	
Post-test	ACT	CBT	0.95	0.610	0.024	
		Control	3.02	10.173	0.00	
	CBT	ACT	-0.95	0.610	0.024	
		Control	2.34	0.228	0.017	
	3-month follow-up	Control	ACT	-3/02	0.173	0.00
			CBT	-2.34	0.228	0.017
ACT		CBT	1.15	0.396	0.006	
		Control	4.01	0.111	0.035	
CBT		ACT	-1.15	0.396	0.006	
		Control	2.97	0.532	0.044	
6-month follow-up	Control	ACT	-4.01	0.111	0.035	
		CBT	-2.97	0.532	0.044	
	ACT	CBT	1.81	0.189	0.013	
		Control	4.62	0.604	0.009	
	CBT	ACT	-1.81	0.189	0.013	
		Control	3.35	0.284	0.01	
	Control	CBT	-4.62	0.604	0.009	
		CBT	-3.35	0.284	0.01	

can increase the psychosocial adaptation of patients with MS (Idrisi, 2020). It can also be pointed out that in ACT intervention, people communicate their values after treatment and do things by their values. And these values become more stable over time, and people's actions become more aligned with their values (Twohig & Levin, 2017). Then, this harmony with the values and behaviors based on the established values helps the individuals to be more psychologically and socially compatible with their illness. While CBT is symptom-oriented, and the goal of this intervention is to reduce the symptoms of the disease and does not focus on people's values (Beck, 2020), as soon as the symptoms of the disease become less than usual, the treatment is considered successful.

Another finding showed that ACT had a higher effect on reducing the expanded disability of patients with MS compared to CBT. The results of this research are in line with the results of Davoudi et al.'s research (2019), Keihani et al. (2019), and

Sheppard, Forsyth, Hickling, et al. (2010).

ACT uses the skills of mindfulness, acceptance, and cognitive entanglement to increase psychological resilience. At high levels of acceptance, people notice their thoughts and feelings without trying to control or avoid them. The influence of thoughts and emotions on behavioral performance likely causes the expanded disability of MS patients to decrease. In other words, the ACT enhances the ability to communicate their experience at present and based on the possibilities of the moment according to the individual's desires and consistent with their values. Therefore, it seems likely that behavioral commitment exercises with the techniques of flexibility and acceptance, as well as discussions about the individual's values and goals and the need to specify them, all lead to the reduction of expanded disability in MS patients (Jahangiri, 2018). In explaining the greater effectiveness of ACT compared to CBT on the reduction of expanded disability, we can state that the use of ACT and its

practical mechanisms has caused individuals instead of suppressing emotions and avoiding a healthy encounter with them, stop their attempts to search for the causes of their problems and to accept their feelings without trying to remove and change them, which lead to the increase of the expanded disability and hence, they can achieve a peace that they have not experienced much before (Veehof, Trompetter, Bohlmeijer, et al., 2016). While in CBT, instead of action, the focus is on the thoughts and beliefs of the individual, and the effort is to replace dysfunctional thoughts with dysfunctional thoughts (Wenzel, 2017). And, probably, the reason for the superiority of ACT over CBT is focusing on practical mechanisms and acceptance of emotions that can be reduced by healthy exposure to the expanded disability.

In general, it can be said that both ACT and CBT interventions significantly improved the psychosocial adjustment to illness and reduced the extended disability of MS patients. Compared to the control group, both interventions were able to create a significant difference in the scores of psychosocial illness and extended disability in the post-test stage. Compared to these two intervention approaches, ACT compared to CBT intervention was able to have more effectiveness on the research variables and these changes remained constant in the follow-up phase.

### Limitations

Regarding the limitations of the research, it can be said that self-reporting tools were used in this study to measure psychosocial adjustment to illness and expanded disability. In such measures, people may be biased toward answering questions in questionnaires. It is also possible that people do not have enough introspection and do not answer the items responsibly, which reduces the accuracy of the results to some extent. Another limitation of the study was the use of the same therapist in

both interventions, while basically, an independent therapist should have implemented each intervention.

### Suggestion

It is suggested to implement other treatment methods in future research, implement CBT and ACT jointly in a separate experimental group, and compare their effects separately in further studies.

### Conflict of interest and acknowledgments

The authors claim that there is no conflict of interest in the extant study. In the end, all the participants who gave their time to the research are appreciated and thanked.

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