



# Effectiveness of Acceptance and Commitment Therapy on Pain Anxiety, Perfectionism, and Aggression of Women with Fibromyalgia

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## ABSTRACT

**Aims:** Fibromyalgia is a chronic pain disorder characterized by widespread musculoskeletal pain, fatigue, and tenderness in localized areas. The objective of this study is to investigate the effectiveness of Acceptance and Commitment Therapy (ACT) on pain anxiety, perfectionism, and aggression among women diagnosed with fibromyalgia.

**Method and Materials:** The current research design was semi-experimental with a pre-test-post-test design with a control group. The statistical population of the research included women with fibromyalgia in Ardabil province of Iran in 2024. In this study, 34 women with fibromyalgia were selected through purposive sampling and divided into experimental (n=17) and control (n=17) groups. The experimental group participated in eight 90-minute sessions of ACT, while the control group did not undergo any intervention. Data collection involved administering the assessment Pain Anxiety Symptoms Scale (PASS), Perfectionism Inventory (PI), and Eysenck Aggression Questionnaires (EAQ). The collected data were then analyzed using multivariate analysis of covariance in SPSS-27.

**Findings:** The results showed that ACT significantly decreases cognitive (F=41.42, P=0.001,  $\eta^2=0.61$ ), avoidance (F=37.21, P=0.001,  $\eta^2=0.59$ ), fear (F=54.71, P=0.001,  $\eta^2=0.68$ ), physiological anxiety (F=46.72, P=0.001,  $\eta^2=0.64$ ), perfectionism (F=63.20, P=0.001,  $\eta^2=0.71$ ), and aggression (F=52.11, P=0.001,  $\eta^2=0.66$ ) in women with fibromyalgia.

**Conclusion:** This research offers valuable insights into the effectiveness of ACT in enhancing psychological well-being among women diagnosed with fibromyalgia. Subsequent studies should delve deeper into the enduring effects of ACT and its viability within comprehensive treatment strategies for fibromyalgia, striving to deliver tailored and holistic care for individuals grappling with this complex condition.

**Keywords:** Fibromyalgia, Pain Anxiety, Perfectionism, Aggression, Acceptance and Commitment Therapy

## Introduction

Fibromyalgia is a complex and often misunderstood disorder that predominantly affects women, with estimates suggesting that up to 90% of those diagnosed are female (1). This chronic condition is characterized by widespread pain, fatigue, sleep disturbances, and cognitive difficulties, often referred to as fibro fog (2). The exact cause of fibromyalgia remains elusive, but it is believed to involve a combination of genetic, environmental, and psychological factors (3). Women with fibromyalgia face unique challenges, not only because of the severity and range of symptoms but also due to the societal and healthcare biases that can affect their diagnosis and treatment (1).

Research indicates that fibromyalgia prevalence varies across different demographics: in the general population, rates range from 0.2% to 6.6%, while in women, they range from 2.4% to 6.8%. Urban areas show prevalence rates between 0.7% and 11.4%, whereas rural areas exhibit rates between 0.1% and 5.2%. Special populations demonstrate values ranging from 0.6% to 15% (4). Sadr et al. (5) found that more than 92% of Iranian female fibromyalgia patients had at least one psychiatric disorder, with sleep disorders being the most prevalent (90.57%), followed by Mood disorders (52.83%), personality disorders (40.25%), and anxiety disorders (16.98%). Pain anxiety is a profound and multifaceted challenge for

Women living with fibromyalgia, a chronic condition marked by widespread pain, fatigue, and cognitive impairments <sup>(6)</sup>. In the context of fibromyalgia, pain anxiety refers to the persistent and excessive fear of pain, which not only exacerbates the physical symptoms but also significantly impacts mental health and quality of life <sup>(7)</sup>. For women, who constitute the majority of fibromyalgia sufferers, the burden of pain anxiety is often compounded by biological, psychological, and social factors that uniquely influence their experience of the disease <sup>(8)</sup>. The relationship between pain and anxiety is bidirectional: anxiety can heighten the perception of pain, while chronic pain can lead to increased anxiety <sup>(9)</sup>. This cyclical interaction can create a relentless loop of suffering for women with fibromyalgia <sup>(10)</sup>. Hormonal fluctuations, particularly those associated with menstrual cycles, pregnancy, and menopause, can exacerbate both pain and anxiety symptoms, making management more challenging <sup>(11)</sup>.

Perfectionism, characterized by an unyielding drive for flawlessness and an overemphasis on achieving high standards, significantly impacts women with fibromyalgia <sup>(12)</sup>. For women, who make up the majority of fibromyalgia sufferers, perfectionism can exacerbate symptoms and complicate the management of the disorder, intertwining psychological stress with physical suffering <sup>(13)</sup>. The connection between perfectionism and fibromyalgia in women is complex, influenced by both intrinsic psychological traits and extrinsic societal pressures <sup>(14)</sup>. Women with fibromyalgia often feel compelled to meet unrealistic standards in various aspects of their lives, including professional, familial, and social roles <sup>(15)</sup>. This relentless pursuit of perfection can lead to heightened stress, anxiety, and self-criticism <sup>(16)</sup>. These psychological burdens are particularly detrimental because stress and anxiety are known to intensify fibromyalgia symptoms, creating a debilitating cycle where perfectionism worsens physical pain, and chronic pain heightens perfectionistic tendencies <sup>(17)</sup>.

Aggression is an often unspoken yet critical aspect of the psychological experience for

women with fibromyalgia <sup>(18)</sup>. While fibromyalgia's physical symptoms are well-documented, the emotional and psychological impacts, such as heightened aggression, can be equally debilitating and complex <sup>(19)</sup>. For women, who constitute the majority of fibromyalgia patients, the intersection of chronic pain and aggressive tendencies presents unique challenges that affect their quality of life, interpersonal relationships, and overall mental health <sup>(20)</sup>. The unrelenting nature of fibromyalgia can lead to significant emotional distress, where the constant pain and fatigue undermine a woman's ability to engage in daily activities and fulfill her roles in personal and professional spheres <sup>(21)</sup>. This ongoing struggle can give rise to feelings of anger and frustration, often resulting in aggressive behaviors or responses <sup>(22)</sup>. Aggression, in this context, is not limited to outward expressions of anger but also includes internalized forms such as self-criticism and negative self-talk <sup>(23)</sup>.

Acceptance and Commitment Therapy (ACT) has emerged as a promising intervention for managing fibromyalgia <sup>(24)</sup>. Unlike traditional therapies that focus primarily on symptom reduction, ACT emphasizes psychological flexibility, encouraging individuals to accept their experiences and commit to actions aligned with their values, despite ongoing pain and discomfort <sup>(25)</sup>. This approach is particularly relevant for women with fibromyalgia, who often face unique challenges and societal pressures that exacerbate their condition <sup>(26)</sup>. Acceptance and Commitment Therapy offers a holistic framework that addresses both the physical and psychological aspects of fibromyalgia <sup>(24)</sup>. By fostering acceptance of pain and reducing the struggle against it, ACT helps women break free from the cycle of suffering and avoidance behaviors <sup>(27)</sup>. The therapy encourages mindfulness practices and value-based living, which can enhance overall quality of life and emotional resilience <sup>(25)</sup>. For women with fibromyalgia, this means learning to navigate their condition with greater flexibility and less emotional turmoil <sup>(28)</sup>. One of the core components of ACT is the concept of cognitive diffusion, which helps individuals

detach from unhelpful thoughts and beliefs about their pain <sup>(29)</sup>. This can be particularly beneficial for women who may internalize societal expectations and feel guilty or inadequate when their condition prevents them from fulfilling their roles <sup>(26)</sup>. Through ACT, women can learn to observe these thoughts without being controlled by them, reducing their impact on mood and behavior <sup>(30)</sup>. Acceptance and Commitment Therapy also emphasizes committed action, guiding individuals to engage in meaningful activities that align with their values, despite their pain <sup>(31)</sup>. This approach can empower women with fibromyalgia to reclaim aspects of their lives that may have been sidelined due to their condition <sup>(27)</sup>. By focusing on what truly matters to them, women can find renewed purpose and motivation, which can buffer against the negative impacts of chronic pain <sup>(32)</sup>.

In essence, this article catalyzes positive change in the understanding, management, and support of individuals living with fibromyalgia. By addressing critical psychological dimensions, advocating for patient-centered care, reducing stigma, informing policy, and contributing to scientific knowledge, the article has far-reaching implications that extend beyond the confines of academia, ultimately benefiting individuals, families, healthcare systems, and society as a whole. While fibromyalgia research often emphasizes physical symptoms, there's a dearth of literature focusing on its psychological dimensions, particularly in women. This article fills a crucial gap by examining the effectiveness of ACT in mitigating pain anxiety, perfectionism, and aggression—a novel approach in the field.

### Method and Materials

The design of the current research was semi-experimental with a pre-test-post-test design with a control group. The statistical population of the research included women with fibromyalgia in Ardabil province of Iran in 2024. After referring to pain clinics and reviewing the files of women with fibromyalgia, patients who met the inclusion criteria were selected as the final sample of

the study. Among these people, 34 patients were selected and randomly (in the form of a lottery) divided into the experimental group (n=17) and the control group (n=17). The sample size was determined based on the results of the G\*Power software <sup>(33)</sup> and considering the points raised for the sample size in covariance analysis. The criteria for entering the research included receiving expert diagnosis, not receiving psychological interventions, interest in participating in the study, and personal satisfaction. Moreover, the absence of more than two meetings and the unwillingness to continue cooperation in the research were considered as criteria for leaving the participants. Additionally, ethical considerations were strictly adhered to throughout this research endeavor, ensuring that participants had the autonomy to discontinue therapy sessions at any point if they felt unwilling to continue. In essence, the Helsinki Principles were fully honored in this study. Finally, the obtained data were analyzed by multivariate analysis of covariance by SPSS-27. In this study, the following tools were used.

**Pain Anxiety Symptoms Scale (PASS):** Pain-related anxiety symptom scale is a 20-question self-report tool, which was created by McCracken et al in 1992 to assess pain-related anxiety and fear reactions in people with chronic pain <sup>(34)</sup>. This scale evaluates anxiety symptoms related to pain and includes four subscales, cognitive, avoidance, fear, and physiological anxiety. Participants should answer the questions of this scale on a Likert scale from never (score 0) to always (score 5). The range of scores of the short form is between 0 and 100. Furthermore, the internal consistency of the short form using Cronbach's alpha was calculated as 0.91 for the whole scale and between 0.75 and 0.86 for the subscales <sup>(34)</sup>. In Iran, the reliability of the questionnaire was reported using Cronbach's alpha coefficient for the total score of the pain anxiety scale of 0.88 for the sub-scales between 0.67 and 0.77 <sup>(35)</sup>. In the present study, Cronbach's alpha coefficient was reported for the cognitive (0.81), avoidance (0.88), fear (0.89), and physiological anxiety (0.83) subscales.

**Perfectionism Inventory (PI):** This scale was created in 2004 by Hill et al. to examine the dimensions of perfectionism, which includes 58 items <sup>(36)</sup>. This questionnaire has been validated and validated based on a four-option Likert scale from completely disagree (score 1) to completely agree (score 4). If the calculated score is 58 to 116, the person's perfectionism is low. If the calculated score is in the range of 116 to 174, the person's perfectionism is average, and if the calculated score is 174 or higher, the person's perfectionism is high. The results of calculating the reliability and validity of this scale in the research of Hill et al <sup>(36)</sup> indicate that the reliability coefficient was obtained between 0.83 and 0.91 using Cronbach's alpha method. In the surveys conducted inside Iran, this scale has good validity (0.84) and reliability (0.89) <sup>(37)</sup>. In the upcoming study, Cronbach's alpha coefficient of 0.87 was reported for this questionnaire.

**Eysenck Aggression Questionnaire (EAQ):** This questionnaire is a 30-question tool that was designed in 1975 and has three answers: yes (score 2), I don't know (score 1), and no (score 0). Regarding questions 2, 3, 8, 9, 12, 15, 23, and 27, scoring is reversed. The minimum score is 0 and the maximum score is 60. Scores of 25 to 35 indicate moderate aggression, scores less than 25 indicate low aggression and more than 35 indicate high

aggression <sup>(38)</sup>. Cronbach's alpha coefficient of this questionnaire has been reported in Iran as 0.87 <sup>(39)</sup>. In the present study, the reliability of the tool was obtained using Cronbach's alpha coefficient of 0.84.

For intervention, the ACT program was implemented for the intervention group. To do this intervention, after selecting the participants in both experimental and control groups, research questionnaires were completed by members of both groups in the form of a pre-test. Due to the unfavorable conditions of the disease, it was tried to collect the pre-test scores in person and online (questionnaire link in Google form). ACT sessions by a therapist specializing in chronic diseases in the psychology clinic were then performed in eight 90-minute weekly sessions for the experimental group. At the same time, the control group did not receive any intervention. To prevent the exchange of information between the members of the groups, they were asked not to discuss the content of the meetings with each other. For this reason, there was no dropout in the groups. The ACT intervention was designed based on the ACT programs proposed by Hayes et al <sup>(40)</sup> and also considering the key characteristics (Table 1). To comply with ethical principles, after collecting the post-test, intervention sessions were also held for the control group.

**Table 1)** Summary of sessions based on the Acceptance and Commitment Therapy (40)

Session	Target	Topic	Change expected behavior
1	Familiarity with group rules and generalities of acceptance and commitment	Familiarity of members with each other and the therapist, group rules, goals and group structure, Therapeutic commitments, introductory talks about acceptance and commitment	Learn about acceptance and commitment.
2	Familiarity with some of the therapeutic concepts of acceptance and commitment Including the experience of avoidance, fusion, and psychological acceptance	Assessing clients' problems from the perspective of acceptance and commitment therapy, extracting experience, avoidance, mixing and values of the individual, making a list of advantages, disadvantages, and practices problem control	Do not try to avoid negative emotions.
3	Implement acceptance and commitment therapy techniques such as separation Cognitive, psychological awareness, self-embodiment	Specify inefficiency, and control negative events using metaphors, cognitive separation training, psychological awareness, and self-visualization	Accepting negative behaviors and emotions
4	Teaching therapy techniques, emotional awareness, awareness Wisely (metaphor of your victim)	Separating evaluations from personal experiences and taking a position of observing thoughts without judgment To leads to mental flexibility and positive emotions	Pay attention to current experiences and moment-by-moment
5	Teach your healing techniques as a background and practice Mindfulness techniques and distress	Connect with the present consider yourself as a field and teach the methods of mind awareness and tolerance of anxiety to	Accepting negative emotions and thoughts without prejudice and judgment



	tolerance training	accept negative emotions	
6	Teaching therapeutic techniques of personal and clear values	Identifying the life values of clients and measuring values based on their importance, preparing a list of obstacles in the realization of values, and creating positive emotions	Strive for psychological flexibility.
	Creating values and teaching emotion regulation (metaphor Bad cup)		
7	Teaching techniques of personal values and practice	Provide practical solutions to overcome obstacles while using metaphors and planning for a commitment to pursue values and create a sense of meaning in life.	Gain psychological flexibility
	Commitment and increase interpersonal efficiency (metaphor chess board)		
8	Review and practice therapeutic techniques taught with	A report on the steps of pursuing values, asking clients to explain the results of the sessions and applying the techniques taught in the real world of life to create a sense of meaning and positive emotions	Get rid of emotions and thoughts Negative and gaining psychological flexibility
	Emphasis on regulating emotions and a sense of meaning in Real life		

Findings

The mean and standard deviation of the age of the experimental and control groups were 39.85±5.96 and 40.37±6.78, respectively. The mean and standard deviation of pre-test-post-test scores of anxiety, perfectionism, and aggression and other study variables of women with fibromyalgia in the experimental

and control groups are presented in Table 2. Also in this table, the Shapiro-Wilk test (S-W) results are reported to check the normality of the distribution of variables in the two groups. According to this table, Shapiro-Wilk statistics is not significant for all variables. Therefore, it can be concluded that the distribution of variables is normal (Table 2).

Table 2) Descriptive indices of the study’s variables in control and experimental groups

Variables		Groups	Mean	SD	S-W	P
Cognitive	Pre-test	Experimental	18.58	1.55	0.106	0.081
		Control	18.71	1.63	0.114	
	Post-test	Experimental	15.58	1.75	0.101	0.056
		Control	18.47	1.39	0.095	
Avoidance	Pre-test	Experimental	17.28	1.50	0.142	0.069
		Control	17.41	1.94	0.130	
	Post-test	Experimental	14.23	1.29	0.112	0.077
		Control	17.18	1.33	0.096	
Fear	Pre-test	Experimental	19.41	1.57	0.087	0.056
		Control	19.29	1.60	0.116	
	Post-test	Experimental	16.11	1.87	0.143	0.060
		Control	19.52	1.62	0.089	
Physiological anxiety	Pre-test	Experimental	15.70	1.94	0.102	0.061
		Control	15.76	1.84	0.099	
	Post-test	Experimental	12.88	1.69	0.118	0.083
		Control	15.64	1.74	0.123	
Perfectionism	Pre-test	Experimental	115.52	9.78	0.079	0.075
		Control	115.23	8.65	0.119	
	Post-test	Experimental	105.82	9.25	0.093	0.085
		Control	115.71	9.14	0.118	
Aggression	Pre-test	Experimental	35.52	2.42	0.102	0.068
		Control	35.64	2.38	0.129	
	Post-test	Experimental	30.58	2.17	0.098	0.094
		Control	35.41	2.34	0.115	

Multivariate analysis of covariance was used to evaluate the effectiveness of ACT on pain anxiety, perfectionism, and aggression of women with fibromyalgia. The results of the Levin test to examine the homogeneity of variance of dependent variables in groups showed that the variance of pain anxiety (F=1.106, P=0.301), perfectionism (F=3.69, P=0.064), and aggression (F=2.96, P=0.095)

were equal in the groups. The results of the box test to evaluate the equality of the covariance matrix of dependent variables between the experimental and control groups also showed that the covariance matrix of the dependent variables is equal (Box M= 31.66, F=1.20, P=0.180). The significance of the box test is greater than 0.05, so this assumption is valid. Furthermore, the results of the Chi-

square-Bartlett test to examine the sphericity or significance of the relationship between anxiety, perfectionism, and aggression showed that the relationship between them is significant ( $\chi^2=227.30$ ,  $df=996$ ,  $P<0.05$ ). Another important assumption of multivariate analysis of covariance is the homogeneity of regression coefficients. It should be noted that the homogeneity test of regression coefficients was examined through the interaction of dependent variables and independent variables (intervention method) in the pre-test and post-test. The interaction of these pre-tests and post-tests with the independent variable was not significant and indicated the homogeneity of the regression slope. Therefore, this assumption also holds. Due to the establishment of multivariate analysis of covariance, the use of this test will be allowed. Then, to find out the differences between the groups, a multivariate analysis of covariance was performed (Table 3).

According to Table 3, the results showed the effect of the independent variable on the dependent variables; In other words, experimental and control groups have a significant difference in at least one of the variables of anxiety, perfectionism, and aggression, which according to the calculated

effect size, 73% of the total variance of experimental and control groups is due to the effect of the independent variable. Furthermore, the statistical power of the test is equal to 1, which indicates the adequacy of the sample size. However, to determine in which areas the difference is significant, a univariate analysis of the covariance test was used in the MANCOVA, the results of which are reported in Table 4.

According to the data presented in Table 4, the F statistics demonstrate significance for cognitive ( $F=41.42$ ), avoidance ( $F=37.21$ ), fear ( $F=54.71$ ), physiological anxiety ( $F=46.72$ ), perfectionism ( $F=63.20$ ), and aggression ( $F=52.11$ ) at the 0.001 level. These results suggest a noteworthy distinction between the groups concerning these factors. Furthermore, the calculated effect sizes reveal that 61% of cognitive, 59% of avoidance, 68% of fear, 64% of physiological anxiety, 71% of perfectionism, and 66% of aggression are independent of the variable's influence. Consequently, it can be inferred that ACT could significantly affect pain anxiety (cognitive, avoidance, fear, and physiological anxiety), perfectionism, and aggression in women with fibromyalgia.

**Table 3)** The Results of Multivariate Analysis of Covariance on Mean Post-Test Scores

Test	Value	F	df	Error df	P	Effect Value
Pillai's Trace	0.733	9.584	6	21	<0.001	0.73
Wilks Lambda	0.267	9.584	6	21	<0.001	0.73
Hotelling Trace	2.738	9.584	6	21	<0.001	0.73
Roy's Largest Root	2.738	9.584	6	21	<0.001	0.73

**Table 4)** Results of Univariate Analysis of Covariance on the Mean of Post-test Scores of Dependent Variables in Experimental and Control groups

Variables	SS	SS Error	DF	MS	MS Error	F	P	Effect Value
Cognitive	62.565	39.27	1	62.565	1.51	41.42	<0.001	0.61
Avoidance	62.592	43.73	1	62.592	1.68	37.21	<0.001	0.59
Fear	97.596	46.38	1	97.596	1.78	54.71	<0.001	0.68
Physiological anxiety	57.920	32.44	1	57.920	1.24	46.72	<0.001	0.64
Perfectionism	818.372	336.63	1	818.372	12.94	63.20	<0.001	0.71
Aggression	174.315	86.96	1	174.315	3.34	52.11	<0.001	0.66

## Discussion

The objective of this study is to investigate the effectiveness of ACT on pain anxiety, perfectionism, and aggression among women diagnosed with fibromyalgia. The results of this investigation provide valuable insights into how ACT can alleviate various dimensions of pain anxiety (including

cognitive, avoidance, fear, and physiological anxiety) in women managing fibromyalgia.

Fibromyalgia, characterized by chronic widespread pain and a range of other symptoms including fatigue and cognitive difficulties, often exacerbates pain anxiety, leading to a diminished quality of life. This study's findings are significant in several

ways, shedding light on the multifaceted impact of ACT on cognitive, avoidance, fear, and physiological dimensions of pain anxiety<sup>(7)</sup>. Firstly, the reduction in cognitive anxiety suggests that ACT's focus on altering one's relationship with pain-related thoughts rather than attempting to eliminate them can lead to significant improvements<sup>(25)</sup>. By encouraging acceptance and mindfulness, ACT helps individuals with fibromyalgia reduce the frequency and intensity of catastrophic thinking about pain, thereby mitigating the cognitive burden associated with chronic pain<sup>(28)</sup>. Secondly, the observed decrease in avoidance behaviors highlights ACT's role in promoting psychological flexibility. Fibromyalgia patients often engage in avoidance strategies to prevent pain, which can lead to increased disability and social isolation. ACT's emphasis on values-based action helps individuals to engage in meaningful activities despite their pain, thereby reducing avoidance behaviors<sup>(6)</sup>. This shift not only enhances their physical functionality but also improves their social and emotional well-being<sup>(32)</sup>.

The reduction in fear of pain is another critical outcome. Fear-avoidance models suggest that the fear of pain can be more debilitating than the pain itself<sup>(9)</sup>. ACT addresses this by helping individuals confront their fears in a controlled manner, thereby reducing the anticipatory anxiety associated with pain. This reduction in fear is likely to contribute to a more active and fulfilling life, as patients are less constrained by their fear of exacerbating their pain<sup>(31)</sup>. Lastly, the alleviation of physiological anxiety, such as muscle tension and autonomic arousal, is particularly noteworthy<sup>(6)</sup>. Chronic pain conditions like fibromyalgia often result in heightened physiological responses to pain, which can exacerbate the perception of pain. ACT's techniques, such as mindfulness and relaxation exercises, likely contribute to a reduction in these physiological responses, thereby decreasing overall pain perception and improving daily functioning<sup>(30)</sup>.

The findings of this study indicate a significant decrease in perfectionism among women diagnosed with fibromyalgia following ACT.

This reduction in perfectionism is noteworthy, given the pervasive nature of perfectionistic tendencies and their association with chronic pain conditions such as fibromyalgia.

Perfectionism, characterized by high personal standards and critical self-evaluations, can exacerbate stress and contribute to the severity of chronic pain symptoms<sup>(14)</sup>. For women with fibromyalgia, perfectionism often manifests as an unrelenting drive to meet unrealistic standards despite the physical limitations imposed by their condition<sup>(12)</sup>. This drive can lead to increased pain, fatigue, and emotional distress, creating a vicious cycle that worsens their overall health and quality of life<sup>(17)</sup>. ACT, with its core principles of acceptance, mindfulness, and commitment to values-based action, offers a therapeutic approach that contrasts sharply with the rigid and self-critical mindset of perfectionism<sup>(32)</sup>. By fostering acceptance of their physical and psychological experiences, ACT helps individuals with fibromyalgia recognize and detach from perfectionistic thoughts. This process reduces the internal pressure to meet unattainable standards and encourages a more compassionate and realistic self-view<sup>(29)</sup>.

The decrease in perfectionism observed in this study suggests that ACT effectively addresses the cognitive and emotional patterns underpinning perfectionism<sup>(16)</sup>. Through mindfulness exercises, participants learn to observe their thoughts and feelings without judgment, reducing the automatic response to strive for perfection. Additionally, by clarifying their values and committing to actions aligned with these values, individuals can shift their focus from unattainable goals to more meaningful and achievable pursuits<sup>(28)</sup>. This shift away from perfectionism likely contributes to improved psychological flexibility, enabling individuals to adapt more readily to the limitations imposed by fibromyalgia<sup>(30)</sup>. As they become less preoccupied with perfectionistic standards, they may experience less stress and anxiety, which can positively influence their pain perception and overall well-being<sup>(25)</sup>. The reduction in perfectionism can also lead to improved self-esteem and a greater sense of

accomplishment, as individuals set and achieve realistic goals <sup>(15)</sup>.

The results of the present study suggest that women with fibromyalgia observed a decrease in their aggression levels following the implementation of ACT. This finding is particularly significant given the complex interplay between chronic pain and psychological factors such as aggression. Chronic pain conditions like fibromyalgia often lead to increased irritability and frustration, which can manifest as aggression <sup>(19)</sup>. This aggression not only affects the individual's mental health but also impacts their relationships and overall quality of life <sup>(23)</sup>. ACT, with its core principles of acceptance, mindfulness, and values-based action, provides a framework that helps individuals manage their emotional responses more effectively <sup>(26)</sup>. By encouraging acceptance of pain and other difficult emotions rather than resisting or fighting them, ACT reduces the emotional reactivity that can lead to aggressive behavior <sup>(32)</sup>. Mindfulness practices taught in ACT enable individuals to observe their thoughts and feelings without immediate reaction, creating a space for more considered and less impulsive responses <sup>(24)</sup>. The observed decrease in aggression levels can be attributed to several mechanisms inherent in ACT. Firstly, the acceptance component helps individuals acknowledge and accept their pain and emotional states, reducing the internal struggle and frustration that often lead to aggression <sup>(27)</sup>. By accepting their pain, individuals can focus their energy on managing their condition rather than fighting against it, which can reduce feelings of helplessness and anger <sup>(29)</sup>.

Secondly, ACT's emphasis on mindfulness encourages a non-judgmental awareness of the present moment. This mindfulness practice helps individuals to become more aware of their triggers and habitual responses, allowing them to interrupt the cycle of aggression before it escalates <sup>(31)</sup>. This heightened awareness and presence can lead to more adaptive coping strategies and emotional regulation <sup>(19)</sup>. Thirdly, the values-based action component of ACT directs

individuals to engage in behaviors that are consistent with their values, even in the presence of pain. By aligning actions with values, individuals may find greater meaning and purpose, which can mitigate feelings of frustration and aggression <sup>(25)</sup>. This alignment can also enhance their sense of agency and control, further reducing aggressive tendencies <sup>(30)</sup>. Moreover, the decrease in aggression levels observed in this study aligns with previous research indicating that psychological interventions aimed at enhancing emotional regulation can have beneficial effects on aggression <sup>(22)</sup>. For individuals with fibromyalgia, chronic pain can often exacerbate emotional dysregulation. Therefore, interventions like ACT that promote emotional balance and psychological flexibility are particularly valuable <sup>(32)</sup>.

While this study provides valuable insights into the effectiveness of ACT for women with fibromyalgia, several limitations should be acknowledged. Firstly, the sample size was relatively small, consisting of 34 participants from a specific geographical area. This may limit the generalizability of the findings to broader populations of women with fibromyalgia. Additionally, the study utilized a semi-experimental design with a pre-test-post-test control group, which may have inherent biases and limitations in controlling for confounding variables. Moreover, the reliance on self-reported measures for assessing pain anxiety, perfectionism, and aggression may introduce subjective biases and social desirability effects, potentially influencing the accuracy of the results.

Future research endeavors should address these limitations and further explore the efficacy of ACT in managing fibromyalgia-related psychological challenges. Firstly, studies with larger and more diverse samples should be conducted to enhance the generalizability of findings across different demographic groups and geographical regions. Additionally, employing a randomized controlled trial design would strengthen the study's internal validity and allow for better control of confounding variables. Furthermore, incorporating objective measures, such as clinical



assessments or physiological markers, alongside self-reported measures, could provide a more comprehensive understanding of treatment outcomes. Longitudinal studies are also needed to investigate the enduring effects of ACT over time and its role in preventing symptom relapse in women with fibromyalgia. Lastly, exploring the integration of ACT with other therapeutic modalities, such as pharmacological interventions or physical therapy, may offer insights into the development of more holistic and personalized treatment approaches for fibromyalgia management.

The findings of this study demonstrate the significant benefits of ACT in reducing pain anxiety, perfectionism, and aggression among women diagnosed with fibromyalgia. By addressing these psychological challenges, ACT offers a promising approach to enhancing the overall well-being and quality of life for individuals living with fibromyalgia. Moving forward, further research is needed to explore the mechanisms underlying the therapeutic effects of ACT in fibromyalgia management and to investigate its long-term efficacy. Additionally, studies examining the effectiveness of ACT in diverse populations and settings would contribute to a better understanding of its broader applicability and potential for personalized treatment approaches. Overall, this study underscores the importance of addressing psychological factors in the management of fibromyalgia and highlights the potential of ACT as a valuable therapeutic intervention in this context. By incorporating ACT into comprehensive treatment plans, healthcare providers can offer more holistic and effective support to individuals living with fibromyalgia, ultimately improving their overall well-being and quality of life.

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### Authors' Contribution

In this study conceptualization and Supervision by NR, FR; Methodology by MMJ, VSN; Investigation by VSN, ZB, and writing

the original draft, review, and editing by all authors were done.

### Conflict of Interest

There were no conflicts of interest among the authors.

### Ethical Permission

Ethical principles in manuscript writing have been adhered to the guidelines of the National Ethics Committee and the COPE regulations.

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