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Investigation of Anhedonia, Emotional Expression, and Emotion Regulation Difficulties in Individuals Diagnosed with Fibromyalgia

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ABSTRACT

Objective: This study aimed to examine the relationships between anhedonia, emotional expression ability and emotion regulation difficulties in individuals diagnosed with fibromyalgia (FM).

Methods: 82 patients with FM and 80 age, gender, and education-matched healthy controls were included in this cross-sectional, descriptive study. Participants completed the Sociodemographic Data Form, Expressing Emotions Scale (EES), Difficulties in Emotion Regulation Scale–Short Form (DERS-16), Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), and the Clinician-Administered Turkish version of the Snaith-Hamilton Pleasure Scale (SHAPS-C-TR).

Results: Higher SHAPS-C-TR scores (OR=1.836, 95% CI: 1.501–2.245; p<0.001) and BAI scores (OR=1.120, 95% CI: 1.020–1.230; p=0.017) were significantly associated with FM diagnosis. Conversely, higher EES scores were negatively associated with FM diagnosis (OR=0.941, 95% CI: 0.896–0.988; p=0.015). Even after controlling for depression, individuals with FM exhibited significantly higher anhedonia scores (F (1.159)=295.10, p<0.001, η^2=0.623).

Conclusion: Elevated levels of anhedonia and anxiety were significantly associated with FM, whereas greater emotional expressiveness appeared to be a protective factor. These findings underscore the importance of psychological assessment and interventions in FM management.

Keywords: Anhedonia, emotional expression, emotion regulation difficulty, fibromyalgia

INTRODUCTION

Fibromyalgia (FM) is a complex pain syndrome characterized by widespread musculoskeletal pain, chronic fatigue, sleep disturbances, depression, anxiety, and cognitive complaints (Wolfe et al. 1990). Although its exact etiology remains unclear, FM is increasingly conceptualized as a biopsychosocial disorder (Häuser et al. 2016). The fact that reported pain in FM does not always correspond with objective physical findings suggests that psychological processes may play a critical role in the onset and persistence of the condition (Bellato et al. 2012).

Recent studies have demonstrated that psychological processes such as emotion regulation, emotional expression,

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and anhedonia are closely associated with FM symptoms (Okur Güney et al. 2019; Boehme et al. 2020). Emotional suppression, unresolved stress, and repressed effects are believed to exacerbate FM symptoms and contribute to the chronicity of the disease (Şahin & Ermiş 2019). Moreover, studies in various clinical populations have shown that childhood trauma and emotion regulation difficulties play a critical role in the development of psychopathology (Dereboy et al. 2018; Gürdal et al. 2018; Oymak Yenilmez et al. 2019; Uzun et al. 2019), which underscores the clinical significance of the frequent trauma histories observed in FM patients (Walker et al. 1997; McBeth et al. 1999; Imbierowicz & Egle 2003).

Emotion regulation refers to the ability to determine when, with what intensity, and for how long emotions are experienced, as well as to manage these processes cognitively, behaviorally, and physiologically (Saccaro et al. 2024). It encompasses key components such as emotional awareness, emotional clarity, emotion control, and impulse regulation. Emotional awareness involves recognizing, distinguishing, and expressing one's own emotional state (Kuzucu 2011) as well as understanding the emotions of others (Wright et al. 2018), and it is critical for quality of life (Roberton et al. 2013). Emotional clarity refers to the capacity to comprehend one's feelings and to be aware of emotional reactions (Gratz & Roemer 2004). Emotion control facilitates the effective management of negative emotions, whereas impulse regulation helps prevent emotional reactions from translating directly into behavior. Individuals with emotion regulation difficulties may be more reactive to environmental stimuli, experience emotions more intensely, and have difficulty managing them (Linehan 1993). Such difficulties may amplify pain perception and negatively impact psychological well-being in FM patients (D'Agostino et al. 2017; Okur Güney et al. 2019). Similarly, in other psychosomatic conditions, such as restless legs syndrome and psoriasis, alexithymia, rumination, and impaired stress-coping strategies have been shown to adversely affect the clinical course (Baysak et al. 2020; Alkaş et al. 2024). These findings emphasize that somatic symptoms cannot be explained solely by physical factors and that psychological processes play a pivotal role in the maintenance of such disorders.

Emotional expression refers to the verbal and nonverbal responses that follow the experience of an emotion (Israelashvili & Fischer 2022). Fibromyalgia patients often display marked difficulties in recognizing, differentiating, and expressing emotions (Kaya et al. 2010). Physiological burden from suppressed affect, lack of social support, and internalized anger, anxiety, or depressive mood may contribute to the exacerbation of FM symptoms (Gross 2001; Venta et al. 2013).

Anhedonia, defined as the diminished ability to experience pleasure or reduced sensitivity to reward (Winer et al. 2019), is a prominent emotional feature of FM and is closely linked to symptom severity (Boehme et al. 2020). In particular, deficits in the regulation of positive emotions have been shown to contribute to the development of anhedonia in these individuals (Raes et al. 2014).

Although existing literature indicates that anhedonia, emotion regulation difficulties, and problems with emotional expression significantly affect the clinical presentation of FM, studies assessing these processes in an integrated manner remain limited (Garland et al. 2020; Krupa et al. 2024). Among these patients, depressive symptoms, suppressed anger, alexithymia, and emotional avoidance can negatively influence both pain perception and overall psychological well-being (Güleç et al. 2004; Kaya et al. 2010; Boehme et al. 2020).

The unique contribution of the present study is its comprehensive examination of anhedonia, emotion regulation difficulties, and emotional expression in patients with FM, thereby addressing a gap in the literature. The findings are expected to guide clinical interventions and support the development of more effective psychosocial strategies for FM management.

METHODS

Study Design

The study sample consisted of 86 patients who presented to the Fatih State Hospital Physical Medicine and Rehabilitation Outpatient Clinic between May 2023 and October 2023 and were diagnosed with fibromyalgia (FM) according to the 2010/2016 American College of Rheumatology (ACR) criteria. Diagnosis was based on the Widespread Pain Index (WPI) and Symptom Severity (SS) scores: WPI ≥7 with SS ≥5, or WPI between 3–6 with SS ≥9, with symptoms persisting for at least three months, and no alternative medical condition explaining the pain (Wolfe et al. 2016). Diagnosis was established by a specialist in physical medicine and rehabilitation. In addition to the clinical evaluation, pain severity was assessed using the Visual Analog Scale (VAS), which allows patients to rate pain from 0 (none) to 10 (unbearable). Individuals with FM and a VAS score ≥5, indicating clinically significant pain, were included. This approach ensured the selection of cases whose symptoms

had a meaningful impact on daily life, thereby increasing the reliability of associations with psychological variables (Wolfe et al. 2016).

The control group consisted of 82 healthy individuals matched to the FM group for age, sex, and education level. Controls had no bodily pain complaints and no psychiatric consultation or treatment history in the previous six months. Participants were recruited voluntarily from hospital staff and their acquaintances. Prior to inclusion, self-reports of general health were obtained, and only individuals without active physical or psychiatric conditions were included.

Inclusion criteria for the FM group were: age 18–65, literacy, diagnosis confirmed by a physical medicine and rehabilitation specialist according to ACR criteria, and VAS ≥5. Individuals with acute psychotic, cognitive, or communication disorders were excluded. Additional exclusion criteria for the control group included any psychiatric diagnosis or treatment within the last six months, reports of bodily pain, or active chronic medical conditions that could influence study outcomes. Four participants from the FM group and two from the control group were excluded because they did not complete the questionnaires.

Ethics Approval

All participants received verbal and written information about the study and provided written informed consent via a form approved by the Clinical Research Ethics Committee. The study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the Sivas Cumhuriyet University Clinical Research Ethics Committee on April 24, 2023 (Decision No: 2023/20).

Data Collection Procedure

Fibromyalgia patients were referred to the psychiatry unit during their clinical follow-up for observational purposes; although a structured diagnostic interview was not conducted, a brief preliminary assessment was performed by the clinician-investigator to evaluate study eligibility and motivation. The Clinician-Administered Snaith-Hamilton Pleasure Scale (SHAPS-C-TR) was administered first. Subsequently, all participants individually completed the Sociodemographic Information Form, Expressing Emotions Scale (EES), Difficulties in Emotion Regulation Scale–Short Form (DERS-16), Beck Anxiety Inventory (BAI), and Beck Depression Inventory (BDI) in a quiet, distraction-free room. Standard instructions were followed carefully to ensure unbiased self-reporting.

Measures

Sociodemographic Information Form

Developed by the investigators, this form collected age, sex, marital status, parental status, education duration (in years), cohabitation status (alone or with family), employment status (employed, unemployed, student, retired), and chronic disease history (yes/no). Economic status was self-rated as "low," "medium," or "high." The need for mental health support was evaluated with the yes/no question: "Have you felt the need for psychological support in the past 6 months?"

Difficulties in Emotion Regulation Scale–Short Form (DERS-16)

The DERS-16 is a 16-item self-report instrument assessing difficulties in emotion regulation (Bjureberg et al. 2016). It comprises five subscales: Clarity (e.g., "I have difficulty understanding my feelings"), Goals (e.g., "When I'm upset, I have difficulty getting work done"), Impulse (e.g., "When I'm upset, I feel out of control"), Strategies (e.g., "When I'm upset, I start to feel very bad about myself"), and Non-acceptance (e.g., "When I'm upset, I feel weak"). Items are rated on a 5-point Likert scale (1=almost never, 5=almost always), with higher scores indicating greater emotion regulation difficulties. Internal consistency was α=0.92 and test-retest reliability r=0.85 (Bjureberg et al. 2016). The Turkish adaptation was conducted by Yiğit & Güzey Yiğit (2017).

Expressing Emotions Scale (EES)

The EES, developed by King & Emmons (1990) and adapted to Turkish by Kuzucu (2011), evaluates tendencies to express positive, negative, and intimacy-related emotions. The scale consists of 16 items rated on a 7-point Likert scale. The Turkish version demonstrated a three-factor structure explaining 36% of total variance and had an internal consistency coefficient of 0.85.

Clinician-Administered Snaith-Hamilton Pleasure Scale (SHAPS-C-TR)

The SHAPS, developed by Snaith et al. (1995) and adapted to Turkish by Gürcan et al. (2022), measures anhedonia by comparing participants' pleasure in various domains during the past week to their usual experience. Unlike the self-report format, the clinician-administered version includes structured guidance for identifying activities, their occurrence, and the level of enjoyment. Responses are rated as "Less," "Same," or "More," with only "Less" scored as 1. Total scores range from 0–14, with higher scores indicating more severe anhedonia. Internal consistency was reported as α=0.765, and the scale

correlated significantly with depression severity (Gürcan et al. 2022).

Beck Anxiety Inventory (BAI)

The BAI is a 21-item self-report measure of the severity and frequency of anxiety symptoms, developed by Beck et al. (1988) and adapted to Turkish by Ulusoy et al. (1998). Each item is rated from 0 (not at all) to 3 (severely). Total scores range from 0 to 63.

Beck Depression Inventory (BDI)

The BDI, developed by Beck & Mendelson (1961), assesses depressive symptoms using 21 items with four-point severity scales. The Turkish validation was conducted by Hisli (1989). Scores range from 0–63, with higher scores indicating more severe depressive symptoms. Cronbach's alpha was 0.80, and a cut-off of 17 has been suggested.

Statistical Analysis

Descriptive statistics (frequency, percentage, mean, standard deviation) were calculated for all variables. Normality was evaluated using skewness and kurtosis values (acceptable range ±1.5). Group comparisons of categorical demographic variables were conducted with chi-square tests, or Fisher's Exact Test when expected cell frequencies were <5.

For psychometric variables, Levene's test revealed violation of homogeneity of variance ($p < 0.001$) for all measures; therefore, Welch's t-tests were used for group comparisons. To ensure robustness, heteroskedasticity-consistent (HC3) standard error corrections were applied in all parametric models, including General Linear Model (GLM) and ANCOVA.

Pearson correlation analysis examined associations between psychometric measures in FM and control groups. Psychometric variables significantly associated with FM diagnosis were further analyzed with multiple binary logistic regression. Multicollinearity was evaluated via Variance Inflation Factor (VIF) and all values were <10, confirming model stability.

The significance threshold was initially set at $p < 0.05$. To reduce Type I error from multiple comparisons, Bonferroni correction was applied to subscale analyses, resulting in an adjusted alpha of $p < 0.005$. Although some subscale p-values approached significance post-correction, overall GLM models remained significant with satisfactory explanatory power.

To assess whether group differences in anhedonia were independent of depression, ANCOVA was conducted with depression as a covariate. Assumptions of covariance independence and slope homogeneity were verified. Because homogeneity of variance was again violated, robust HC3 corrections were applied in ANCOVA interpretations.

All analyses were conducted using IBM Statistical Package for Social Sciences (SPSS) program version 26.0, with syntax scripts utilized where necessary. Effect sizes were reported as partial eta squared (η^2p).

RESULTS

A total of 162 participants were included in the study: 82 in the fibromyalgia (FM) group and 80 in the control group (CG). The mean age was 43.52±10.68 years for the FM group and 43.75±10.61 years for the CG, with no significant difference between the groups ($p=0.893$). No significant differences were observed for other demographic variables, including education duration, sex, marital status, or parental status ($p > 0.05$).

However, a significant group difference emerged for cohabitation status: the proportion of participants living alone was higher in the CG than in the FM group ($p=0.037$). Statistically significant differences were also observed for economic status ($p=0.002$), employment ($p=0.042$), chronic disease history ($p=0.001$), and receipt of mental health support within the past six months ($p < 0.001$). Participant demographics are presented in Table 1.

Fibromyalgia patients demonstrated significantly higher scores than the CG on SHAPS-C-TR, BAI, BDI, total DERS-16, and its subscales (Clarity, Goals, Impulse, and Strategies), and lower scores on the EES (all $p < 0.001$). The Non-acceptance subscale approached significance after Bonferroni correction ($p=0.002$), but the overall GLM model remained significant ($\eta^2p=0.074$).

These findings indicate that FM patients experience greater anhedonia, depression, anxiety, and emotion regulation difficulties than healthy controls. Psychometric comparisons are detailed in Table 2.

As a result of the multiple binary logistic regression analysis, the overall model was found to be statistically significant (Nagelkerke $R^2=0.85$, $\chi^2=165.76$, $p < 0.001$), with a classification accuracy of 92.6%. Increases in SHAPS-C-TR scores (OR=1.836, $p < 0.001$) and BAI scores (OR=1.120, $p=0.017$) were significantly associated with a higher likelihood of being in the fibromyalgia group. On the other hand, higher scores on the Expressing Emotions Scale were significantly and negatively associated with the likelihood of being in the fibromyalgia group (OR=0.941, $p=0.015$). The regression coefficients of the remaining variables did not reach statistical

Table 1. Comparison of demographic and psychological characteristics between the fibromyalgia and control groups

		Fibromyalgia group		Control group			
		Mean	**SD**	**Mean**	**SD**	**Analysis**	**P**
Age (years)		43.52	10.68	43.75	10.61	t=-0.14	0.893
Education (years)		10.21	3.87	11.04	4.19	t=-1.31	0.192
		n	**%**	**n**	**%**	**Analiz**	**p**
Sex	Female	72	87.8	72	90.0	χ^2=0.20	0.657
	Male	10	12.2	8	10.0		
Marital status	Married	69	84.1	62	77.5	χ^2=1.16	0.282
	Single	13	15.9	18	22.5		
Parental status	Yes	71	86.6	65	81.3	χ^2=0.86	0.355
	No	11	13.4	15	18.8		
Cohabitation	With family	75	91.5	64	80.0	χ^2=4.37	0.037
	Alone	7	8.5	16	20.0		
Employment status	Employed	24	29.3	28	35.0	Fisher's exact test	0.042
	Unemployed	51	62.2	52	65.0		
	Student	5	6.1	0	0.0		
	Retired	2	2.4	0	0.0		
Economic status	Low	7	8.5	1	1.3	Fisher's exact test	0.002
	Medium	74	90.2	69	86.3		
	High	1	1.2	10	12.5		
Chronic illness history	Yes	28	34.1	10	12.5	χ^2=10.57	0.001
	No	54	65.9	70	87.5		
Psychological support (last 6 mo.)	Yes	65	79.3	0	0.0	Fisher's exact test	<0.001
	No	17	20.7	80	100.0		
BAI severity	Low	31	37.8	64	80.0	Fisher's exact test	<0.001
	Moderate	26	31.7	16	20.0		
	High	25	30.5	0	0.0		
BDI severity	Low	44	53.7	61	76.3	Fisher's exact test	<0.001
	Moderate	17	20.7	16	20.0		
	High	21	25.6	3	3.8		
EES level	Low	9	11.0	4	5.0	Fisher's exact test	<0.001
	Moderate	61	74.4	32	40.0		
	High	12	14.6	44	55.0		

BAI: Beck anxiety inventory; BDI: Beck depression inventory; SD: standard deviation; χ^2: chi-square test; p: significance level; statistical significance was set at p <0.05.

significance. The associations between these variables and fibromyalgia diagnosis were evaluated using multiple binary logistic regression analysis, and the results are presented in Table 3.

Variance inflation factor (VIF) values for the independent variables included in the regression analysis ranged between 1.20 and 7.42, indicating no severe multicollinearity. According to James et al. (2013), VIF values up to 10 are considered acceptable. Additionally, the model demonstrated good fit to the data based on the Hosmer-Lemeshow goodness-of-fit test (χ^2=12.59, *df*=8, *p*=0.127). Linearity of the continuous predictors with the logit was tested using the Box-Tidwell procedure. For this purpose, interaction terms between each continuous independent variable and its natural logarithm [X × ln (X)] were added to the model. All p-values for these interaction terms were above 0.05, indicating that the assumption of linearity in the logit was met (James et al. 2013).

The results of the analysis indicated that, when controlling for depression levels, individuals diagnosed with fibromyalgia had significantly higher anhedonia scores compared to the control group (F (1,159)=295.10, p <0.001, η^2=0.623). Although the contribution of the depression variable to the model was also statistically significant (F=19.80, p <0.001), it explained a considerably smaller portion of the variance compared to the effect of group (η^2=0.042).

Table 2. Comparison of psychometric measures between patients with fibromyalgia and healthy controls

	Fibromyalgia group		Control group					
	Mean	SD	Mean	SD	t	p	η^2p	Effect size
SHAPS-C-TR	11.23	2.97	2.31	2.67	**20.12**	**<0.001**	0.697	Medium
BAI	21.66	14.37	9.95	5.31	**6.85**	**<0.001**	0.229	Large
BDI	20.01	12.98	11.48	8.04	**5.02**	**<0.001**	0.138	Large
DERS-16-total	42.56	16.07	30.59	9.40	**5.77**	**<0.001**	0.180	Large
DERS-16-clarity	5.12	2.52	3.46	1.16	**5.37**	**<0.001**	0.153	Medium
DERS-16-goals	10.15	3.86	7.16	2.39	**5.90**	**<0.001**	0.179	Medium
DERS-16-impulse	7.18	3.88	5.15	1.84	**4.24**	**<0.001**	0.109	Medium
DERS-16-strategies	12.93	5.68	9.16	3.77	**4.96**	**<0.001**	0.131	Large
DERS-16-nonacceptance	7.18	3.50	5.65	2.74	**3.10**	**0.002**	0.074	Medium
EES	56.91	17.50	70.45	14.69	**-5.33**	**<0.001**	0.146	Large

EES: expressing emotions scale; DERS-16: difficulties in emotion regulation scale –short form; BAI: Beck anxiety inventory; BDI: Beck depression inventory; SHAPS-C-TR: clinician-administered Turkish version of the Snaith-Hamilton pleasure scale; M: mean; SD: standard deviation; t: independent samples t-test; p: significance level; η^2p: partial eta squared. Bonferroni correction was applied for multiple comparisons, and a significance threshold of p <0.005 was adopted. According to Cohen (1988), effect sizes were interpreted as follows: small=0.01, medium=0.06, large=0.14.

Table 3. Predictors of fibromyalgia diagnosis (results of multiple binary logistic regression analysis)

	β	SH	Wald	df	p	OR	95% CI		
							LL	UL	Box-Tidwell p
SHAPS-C-TR	0.608	0.103	35.029	1	**<0.001**	**1.836**	**1.501**	**2.245**	0.708
BAI	0.114	0.048	5.674	1	**0.017**	**1.120**	**1.020**	**1.230**	0.102
BDI	-0.089	0.050	3.169	1	0.075	0.915	0.830	1.009	0.261
DERS-16-clarity	0.451	0.304	2.196	1	0.138	1.569	0.865	2.848	0.672
DERS-16-goals	0.247	0.161	2.345	1	0.126	1.280	0.933	1.755	0.101
DERS-16-impulse	-0.154	0.165	0.865	1	0.352	0.857	0.620	1.186	0.063
DERS-16-strategies	-0.181	0.132	1.878	1	0.171	0.835	0.644	1.081	0.582
DERS-16-nonacceptance	0.005	0.181	0.001	1	0.980	1.005	0.705	1.432	0.570
EES	-0.061	0.025	5.929	1	**0.015**	**0.941**	**0.896**	**0.988**	0.377

EES: expressing emotions scale; DERS-16: difficulties in emotion regulation scale –short form; BAI: Beck anxiety inventory; BDI: Beck depression inventory; SHAPS-C-TR: clinician-administered Turkish version of the Snaith-Hamilton pleasure scale. β: regression coefficient, SE: standard error, Wald: Wald test statistic, OR: odds ratio, LL–UL: 95% confidence interval. The multiple binary logistic regression model showed good overall fit (Nagelkerke R^2=0.85, χ^2=165.76, p <0.001) with a classification accuracy of 92.6%.

Correlation Analysis Results in the Fibromyalgia Group

According to the results of the correlation analysis, SHAPS-C-TR (anhedonia scale) scores showed significant positive correlations with the following variables in the fibromyalgia group:

- BAI (Beck Anxiety Inventory): r=0.292, p <0.001
- BDI (Beck Depression Inventory): r=0.365, p <0.001
- DERS-16 Total Score: r=0.413, p <0.001

In the analyses conducted for the control group (CG), anhedonia scores (SHAPS-C-TR) were also found to be positively correlated with anxiety (BAI), depression (BDI), and the subdimensions of the Difficulties in Emotion Regulation Scale – Short Form (DERS-16). However, the strength of these correlations was lower compared to those observed in the fibromyalgia (FM) group.

In addition, depression levels (BDI) were significantly positively correlated with difficulties in emotion regulation (DERS-16) (r=0.642, p <0.001). Moreover, negative correlations were identified between scores on the Expressing Emotions Scale (EES) and certain subdimensions of the DERS-16 (r=–0.341, p <0.001) (Table 5).

Table 4. ANCOVA results for group differences in anhedonia levels after controlling for depression

	Sum of squares (SS)	df	Mean square (MS)	F	p	η^2
Group	2248.34	1	2248.34	295.10	<0.001	0.623
Depression	151.07	1	151.07	19.80	<0.001	0.042
Residual	1211.00	159	7.62			

SS: Sum of squares; df: degrees of freedom; MS: mean square; F: F-statistic; p: significance level; η^2: effect size (eta squared).

Table 5. Correlations between psychological measures (r)

Fibromyalgia	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1- SHAPS-C-TR									
2-BAI	0.292**								
3-BDI	0.365**	0.651**							
4-DERS-16-total	0.413**	0.518**	0.642**						
5-DERS-16-clarity	0.307**	0.420**	0.628**	0.754**					
6-DERS-16-goals	0.290**	0.323**	0.438**	0.799**	0.479**				
7-DERS-16-impulse	0.346**	0.404**	0.421**	0.785**	0.470**	0.570**			
8-DERS-16-strategies	0.402**	0.567**	0.659**	0.905**	0.657**	0.663**	0.576**		
9-DERS-16-nonacceptance	0.322**	0.351**	0.477**	0.827**	0.628**	0.512**	0.595**	0.691**	
10-EES	0.002	-0.028	0.071	0.146	0.081	0.153	0.152	0.092	0.125
CG									
1- SHAPS-C-TR									
2-BAI	0.231*								
3-BDI	0.306**	0.566**							
4-DERS-16-total	0.318**	0.462**	0.642**						
5-DERS-16-clarity	0.158	0.494**	0.592**	0.562**					
6-DERS-16-goals	0.252*	0.379**	0.624**	0.705**	0.479**				
7-DERS-16-impulse	0.364**	0.390**	0.500**	0.735**	0.412**	0.339**			
8-DERS-16-strategies	0.305**	0.299**	0.482**	0.907**	0.345**	0.512**	0.615**		
9-DERS-16-nonacceptance	0.140	0.372**	0.407**	0.835**	0.335**	0.410**	0.535**	0.730**	
10-EES	-0.171	-0.055	-0.038	-0.341**	-0.009	-0.078	-0.319**	-0.449**	-0.265*

FM: fibromyaljia group; CG: control group; SHAPS-C-TR: clinician-administered Turkish version of the Snaith-Hamilton pleasure scale; BAI: Beck anxiety inventory; BDI: Beck depression inventory; DERS-16: difficulties in emotion regulation scale –short form and its subscales (clarity, goals, impulse, strategies, nonacceptance); EES: expressing emotions scale; r: Pearson correlation coefficient; *: p <0.05; **: p <0.01.

DISCUSSION

Our study clearly demonstrated that psychological characteristics such as anhedonia, anxiety, depressive symptoms, difficulties in emotion regulation, and the ability to express emotions differ significantly in individuals diagnosed with fibromyalgia (FM) compared to healthy controls. These findings suggest that FM may present a more complex clinical picture that involves not only physical symptoms but also psychological and emotional processes. In clinical practice, it is crucial to consider not only the physical symptoms of FM patients but also these comprehensive psychological features during assessment.

In our multiple binary logistic regression analysis, levels of anhedonia and anxiety were found to be significantly associated with the likelihood of being in the FM group, while the level of emotional expression showed a negative relationship. Although scores on the Difficulties in Emotion Regulation Scale (DERS-16) were higher in the FM group, it is noteworthy that this variable did not emerge as an independent predictor in the multivariate model. This finding may indicate that difficulties in emotion regulation are not specific determinants of FM but rather structures that share common variance with other psychological factors such as anxiety, depression, and anhedonia.

In our study, the mean total anhedonia score (SHAPS-C-TR: 11.23) was found to be higher in the FM group compared to the control group, strongly supporting the likelihood of reduced hedonic capacity in individuals with FM. Considering the still limited number of empirical studies directly addressing the relationship between FM and anhedonia (Boehme et al. 2020; Berwick et al. 2022; Krupa et al. 2024), our findings

provide a noteworthy contribution to the literature. Previous studies have observed a reduction in hedonic experience in response to rewarding stimuli such as gentle touch, which may be related to differences in cognitive and emotional appraisal processes (Boehme et al. 2020). Although earlier research has often conceptualized anhedonia as a symptom of depression (Yepez et al. 2022), our ANCOVA results revealed that anhedonia scores remained significantly elevated in the FM group even after controlling for depression. This suggests that anhedonia in FM may be viewed as an independent feature of emotional processing that cannot be explained solely by depression. Our overall findings regarding anhedonia imply that the hedonic deficits experienced in FM may encompass a broader spectrum of pleasures rather than being limited to specific sensory inputs.

The elevated anxiety levels observed in the FM group are consistent with the literature, as depression (20–80%) and anxiety (13–63.8%) are known to be prevalent in FM (Madenci et al. 2007; Kleykamp et al. 2021; Henao-Pérez et al. 2022). A history of depression has also been shown to increase the risk of FM by more than six-fold (Chang et al. 2015; HR=6.28). While depression levels were found to be high at the group mean level in our study, they did not emerge as independent predictors in the multivariate regression, suggesting that depression may not be a specific determinant of FM but rather may be related to shared variance with anxiety, anhedonia, and emotion regulation difficulties. Overall, our findings indicate that individuals with FM exhibit a complex pattern of emotional dysfunction involving overlapping mood disturbances such as anxiety, depression, and anhedonia, as well as difficulties in emotion regulation. This pattern encompasses broad emotional and cognitive difficulties that negatively affect the individual's quality of life and overall functioning.

The lower levels of emotional expression observed in the FM group highlight difficulties in emotional processes. Increased pain sensitivity in FM patients has been found to be related not only to physiological factors but also to impairments in emotional functioning. The literature reports that these individuals often exhibit deficits in problem-solving, emotional awareness, and emotional expression (Güleç et al. 2004; Puşuroğlu et al. 2023). Findings related to alexithymia also align with this picture (Wagner & Lee, 2008). Emotion regulation refers to the processes by which individuals manage their emotional experiences and expressions, either consciously or unconsciously, with emotional expression being a key component of regulation (Gross 1999). Studies in Turkish samples also indicate that alexithymia and difficulties in emotional expression are prevalent among FM patients (Güleç et al. 2004; Madenci et al. 2007; Puşuroğlu et al. 2023). Difficulties in emotional expression may reflect broader disruptions in emotion regulation and may contribute to adverse health outcomes (Pinto et al. 2023).

According to a proposed model in the literature, an overactive threat system and an underactive soothing system may lead to persistent hyperactivation of cortical and subcortical structures within the brain's saliency network, which detects and processes salient, important, or prioritized stimuli, thereby contributing to the onset and maintenance of FM symptoms (Pinto et al. 2023). In our study, DERS-16 and the Emotional Expression Scale (EES) results indicated marked impairments in emotion processing among FM patients. Individuals with FM were found to have lower levels of emotional expression and weaker emotion regulation mechanisms. In particular, elevated scores on the DERS-16 "emotional clarity" subscale suggest difficulties in identifying emotions. This pattern is consistent with a model of emotional dysregulation characterized by an imbalance between the threat and soothing systems. Furthermore, difficulties in the "goal-directed behavior" and "impulsivity" subscales imply impaired functionality and reduced behavioral control under stress. Weakness in the "emotional regulation strategies" subscale may indicate a lack of effective coping mechanisms, while high levels of "nonacceptance of emotional responses" suggest that emotional avoidance may perpetuate saliency network hyperactivity and thereby contribute to the persistence of FM symptoms.

Correlation analyses showed significant positive relationships among psychological symptom measures in the FM group. The positive correlations between SHAPS-C-TR (anhedonia) scores and anxiety (BAI), depression (BDI), and DERS-16 scores suggest that when hedonic capacity is reduced, other psychological symptoms may also be elevated. This finding indicates that anhedonia in FM may not simply be a component of depression but may co-occur with emotional regulation difficulties and anxious affectivity within a broader psychopathological framework. Although similar correlations were observed in the control group, the coefficients were lower compared to the FM group. This suggests that psychological symptom clusters may be more tightly interconnected in FM. Additionally, the negative correlations between EES and DERS-16 subscales indicate that deficits in emotional expression are associated with emotion regulation difficulties, suggesting that internal emotional dysregulation may be reinforced by impaired external expression. Particularly strong relationships in the "impulse control" and "strategy" subscales suggest that individuals with FM experience difficulties in behavioral regulation under stress.

Our study reveals that FM is not only characterized by physical symptoms but also by complex and intertwined disturbances in emotional processing, emphasizing the need for integrative intervention approaches. Traditionally assessed predominantly through physical symptoms, FM is approached in this study through psychological constructs such as anxiety, depression, emotion regulation difficulties, emotional expression, and particularly anhedonia. The finding of clinically significant elevated levels of anhedonia in FM patients contributes substantially to the literature.

In light of these findings, more concrete suggestions can be made for clinical practice. It is recommended that, in addition to depression and anxiety scales, tools measuring anhedonia (e.g., SHAPS-C-TR) and difficulties in emotion regulation (e.g., DERS) be routinely included in the assessment of FM patients. This would allow for a more comprehensive psychological profile. In terms of intervention strategies, beyond conventional pain management approaches, therapies targeting these psychological domains should be prioritized. Within Cognitive Behavioral Therapy (CBT), modules aimed at improving emotion regulation (e.g., emotion identification, expression, and cognitive restructuring) and those addressing anhedonia through activity scheduling may be beneficial. Moreover, approaches such as Acceptance and Commitment Therapy (ACT) (Pinto et al. 2023) may positively impact emotion regulation difficulties and anhedonia by helping patients reduce pain-related emotional avoidance and maintain a value-driven life. Dialectical Behavior Therapy (DBT) (Turan ve Bilican 2023), with its modules on emotion regulation, distress tolerance, and mindfulness, may also support FM patients in coping with emotional and behavioral challenges. Such therapies may help enhance not only the physical but also the emotional functioning and quality of life of FM patients.

As with many studies, including our own, that examine psychological approaches to fibromyalgia syndrome, the cross-sectional design limits our ability to infer causality. This limitation makes it difficult to draw definitive conclusions about the long-term effects of the therapies (CBT, ACT, DBT) on FM symptoms and the causal relationships among the studied variables. Therefore, future research should be designed longitudinally. Longitudinal studies will allow tracking of symptom changes over time in response to these interventions and provide stronger evidence for their long-term benefits and mechanisms of action. These studies have the potential to elucidate the role of psychological interventions in fibromyalgia management, offering valuable insights for clinical practice and informing the development of more precise and targeted treatment strategies.

CONCLUSION

In conclusion, our study demonstrated that individuals diagnosed with fibromyalgia exhibit high levels of anhedonia and anxiety, alongside a diminished ability to express emotions. Furthermore, the significant correlations observed between psychological variables suggest that in fibromyalgia, these symptom clusters may reinforce one another, contributing to a complex clinical picture. This finding highlights the importance of addressing not only physical symptoms but also psychological and emotional processes in the management of fibromyalgia.

Although the potential benefits of psychosocial interventions in fibromyalgia treatment have been emphasized, the level of empirical support for these approaches varies. For instance, Cognitive Behavioral Therapy (CBT) has been supported by systematic reviews as being moderately effective in improving pain management and psychological functioning in fibromyalgia. Third-wave approaches such as Acceptance and Commitment Therapy (ACT) have shown promising results in reducing emotion-related avoidance and enhancing functionality; however, evidence for their use in fibromyalgia remains limited and is primarily based on a small number of controlled trials.

Future long-term and randomized controlled studies may more clearly determine the effectiveness of psychosocial interventions aimed at improving anhedonia, emotional expression difficulties, and emotion regulation skills in patients with fibromyalgia. In this context, the development and implementation of holistic, multidisciplinary, and individualized treatment strategies are crucial for enhancing the quality of life in individuals with fibromyalgia.

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