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Bridging Clinical Severity and Cognitive Flexibility: A Mediation Analysis of Emotion Regulation in Affective Disorders

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Abstract

BACKGROUND/AIMS: Depression and anxiety are conditions that often accompany each other, and multiple factors have been implicated in their development. The present research investigates the interplay between emotion regulation (ER) deficits, cognitive flexibility, and the manifestation of neurotic symptoms.

MATERIALS AND METHODS: Patients meeting diagnostic and statistical manual of mental disorders, fifth edition diagnostic criteria for anxiety disorders (n=79) and depression (n=72), as well as a healthy control group (n=82). All groups completed a socio-demographic data form, the difficulties in ER scale-16, and the cognitive flexibility inventory (CFI). In addition, the patient groups completed the hamilton depression rating scale and the hamilton anxiety rating scale. Descriptive, mediation, and regression analyses were conducted using SPSS.

RESULTS: Scores on the CFI control subscale ($p<0.001$) and the CFI total score ($p=0.002$) differed significantly across groups. Post-hoc analyses indicated superior performance in the control group compared with both clinical groups across all measures, with no statistically significant difference between the anxiety and depression groups. Scores on the difficulties in ER scale also differed significantly among groups ($p<0.001$), with the control group showing lower scores than both clinical groups. Moreover, no significant difference was observed between the anxiety and depression groups. As cognitive flexibility increased, capacity for ER and levels of anxiety and depression decreased. Mediation analyses showed that ER ability mediated the association between cognitive flexibility and depressive symptoms, but did not mediate the association between cognitive flexibility and anxiety.

CONCLUSION: Cultivating ER strategies could mitigate the adverse effects of cognitive rigidity on depressive symptoms. Interventions aimed at improving cognitive flexibility may be considered a therapeutic option for anxiety by promoting greater internal control over anxiety symptoms. These findings are important for understanding how cognitive flexibility and ER contribute to depression and anxiety. In psychotherapy programs, these characteristics should be assessed and taken into account.

Keywords: Depression, anxiety, cognitive flexibility, emotion regulation, affective disorders

INTRODUCTION

Depression and anxiety are conditions that often co-occur, impair functioning, and may become life-threatening. Individuals with anxiety disorders tend to exhibit widespread responses to situations perceived as threatening, along with a range of biopsychosocial alterations.[1] They typically emerge early in life and, with their increasing prevalence, pose a substantial threat to quality of life.[2] The global population prevalence of anxiety disorders is estimated to be approximately 4%, and the number of affected individuals has increased by more than 55% over the past two decades.[3] When anxiety comes to be perceived

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as a threat, it may trigger a fight-or-flight response, manifested as psychophysiological reactions such as dizziness, increased heart rate, and sweating,[4] and these symptoms may contribute to the development of various physical conditions, including cardiovascular diseases, ophthalmologic and otologic disorders, dermatologic conditions, and genitourinary diseases.[5] Depression, likewise, poses a substantial public health challenge globally, standing out as one of the foremost causes of disability attributed to mental health conditions.[6] Symptoms of depression include unhappiness, decreased interest, feelings of guilt, sleep disturbances, changes in appetite, inability to enjoy life, and difficulty concentrating.[7] The lifetime risk of developing depression is estimated to be 15-18%. In recent years, depression has shown the most rapid increase among adolescents and young adults and has risen across all sex, racial/ethnic, income, and educational groups.[8] For these reasons, a better understanding of depression and anxiety, as well as of the factors influencing their treatment, is of considerable importance.

Depression and anxiety disorders can result from several factors. One such factor frequently associated with these disorders is difficulty in emotion regulation (ER).[9] ER refers to the conscious or automatic processes through which individuals manage their emotions, including when and how they experience and express them.[10] ER skills are widely considered essential for modifying negative emotional experiences in everyday life.[11] Variations in individuals' ER abilities have been suggested as factors that influence the onset and progression of depression and anxiety disorders. Impairments in these skills correlate with the symptom burden of depression and anxiety and have consequently been targeted in clinical interventions.[9] Beyond intra-individual factors, maladaptive strategies in interpersonal ER, such as excessive reassurance-seeking and co-rumination, have been consistently linked to the severity of both depressive and anxiety-related symptomatology.[12] It has been suggested that psychiatric disorders, including depression and anxiety, may, in part, result from failures to effectively select and implement ER strategies.[11] Conversely, adaptive ER strategies have been found to contribute to enhanced resilience against depression and anxiety.[13]

Similarly, the literature has shown that cognitive flexibility is another variable that may play a central role across multiple domains of psychopathology.[14] Cognitive flexibility represents the mental capacity for shifting and modifying one's patterns of thought in accordance with changing conditions in the environment. This construct reflects the capacity to perceive various possibilities within a given context, to remain open to changing circumstances, and to formulate new, more adaptive ways of thinking.[14] In individuals with depression, cognitive control has been reported to increase, whereas cognitive flexibility has been shown to decrease.[15] Conversely, mood state has been shown to influence cognitive flexibility in patients with major depressive disorder.[16] Similarly, anxiety, depending on its duration and intensity, may also lead to impairments in cognitive flexibility.[17] Processes commonly observed in depression, such as rumination and difficulty appropriately shifting attention between tasks, are likewise associated with reduced cognitive flexibility.[18] Moreover, cognitive flexibility has been shown to moderate the association between trait anxiety and depression, attenuating the impact of trait anxiety on depressive symptoms.[19]

In patients with anxiety disorders and depression who fail to achieve full clinical remission, psychological factors contributing to chronicity remain an important focus of investigation. Although the relationship between cognitive flexibility and ER, including their potential mediating roles in depression and anxiety, remains incompletely understood, an association between ER ability and cognitive flexibility has been demonstrated.[20] Earlier research indicates that greater cognitive flexibility is associated with fewer difficulties with ER and less severe depressive symptoms.[21] Both ER strategies and cognitive flexibility have emerged as significant correlates of depression and anxiety symptomatology.[22] In addition, significant associations have been reported among neuroticism, depression, ER, and cognitive flexibility.[23]

Mood and anxiety disorders vary widely in their causes and underlying biological mechanisms, making it challenging to identify markers that could be targeted in future treatments. Therefore, there is a substantial need to investigate risk factors and broader determinants of mental health. In this regard, the current study was designed to examine the relationships among the severity of anxiety and depression, ER, and perceived cognitive flexibility in patients diagnosed with anxiety disorders and depression. As a secondary aim, contingent upon identifying such associations, we sought to evaluate potential mediating factors that may influence clinical severity. Based on the current literature, we tested the following hypotheses:

- (H1) Patients diagnosed with depression and anxiety disorders exhibit significantly lower cognitive flexibility and ER compared to healthy controls.
- (H2) Perceived cognitive flexibility and ER are negatively associated with the severity of anxiety and depressive symptoms.
- (H3) ER mediates the relationship between perceived cognitive flexibility and depressive and anxiety symptom severity.

MATERIALS AND METHODS

This cross-sectional study included 151 patients and 82 healthy controls, recruited from among adults aged 18-75 years who presented to the Outpatient Psychiatry Clinic of Karabük Training and Research Hospital. Patients who met the diagnostic and statistical manual of mental disorders, fifth edition (DSM-5) diagnostic criteria for anxiety disorders or depression, met the research eligibility criteria, and provided written informed consent were enrolled. The inclusion criteria were: absence of psychiatric comorbidities (including intellectual disability, learning disorder, autism, psychosis, or bipolar disorder), absence of chronic medical illness (such as autoimmune disease, allergic disorders, hypertension, diabetes mellitus, etc.), absence of alcohol or substance use disorder, age over 18 years, and ability to read and write in Turkish.

Experienced psychiatrists conducted all diagnostic evaluations and excluded psychiatric comorbidities using DSM-5 criteria during standard clinical interviews. Clinicians administered the hamilton depression rating scale (HAM-D) and the hamilton anxiety rating scale (HAM-A), while participants completed self-report questionnaires individually, under researcher supervision. For patients diagnosed with anxiety disorders or depression who consented to participate and met the study criteria, a socio-demographic data form was completed, and the following measures were administered: the HAM-D, the HAM-A, the difficulties in ER scale (DERS)-short form, and the cognitive flexibility inventory (CFI).

Formal ethical approval was granted by the Karabük University Non-Interventional Research Ethics Committee (approval no: 2025/2422, date: 28.07.2025).

Measures

Socio-demographic data form: All participants completed a form designed by the authors to collect socio-demographic and clinical information. The data form recorded demographic variables, including gender, relationship status, and academic background; occupational status; comorbid medical or psychiatric conditions; substance use patterns (e.g., smoking and alcohol consumption); prior psychiatric interventions; and any forensic or suicidal history.

Hamilton depression rating scale: This scale was introduced by Hamilton in 1960 to evaluate depression severity. While the original version comprised 17 items, extended versions consisting of 21 and 24 items were later developed.[24] The Turkish adaptation and psychometric evaluation were carried out by Akdemir et al.[25]

Hamilton anxiety rating scale: The HAM-A was developed by Hamilton to assess the severity and distribution of anxiety symptoms and to measure changes in symptom intensity over time. It consists of 14 items assessing both psychic and somatic symptoms. Each item is rated by the interviewer.[26] The Turkish validity and reliability evaluation was performed by Yazıcı et al.[27]

Difficulties in emotion regulation scale-16: Originally introduced by Bjureberg et al.[28] in 2016, consists of 16 items rated on a 5-point Likert-type scale. The scale encompasses five distinct subdimensions, namely clarity, goals, impulse, strategies, and non-acceptance, each capturing a different facet of ER difficulty. Total scores range accordingly, with higher scores indicating greater overall difficulty in ER.[28] The measurement invariance and structural integrity of the tool in a Turkish-speaking cohorts were examined and established by Yiğit and Guzey Yiğit.[29]

The cognitive flexibility inventory: Originally developed by Dennis and Vander Wal[30] in 2010, consists of 20 items designed to evaluate cognitive flexibility. Responses are provided on a Likert-type scale ranging from 1 to 5, with six items (2, 4, 7, 9, 11, and 17) requiring reverse scoring. The inventory produces three distinct scores reflecting overall cognitive flexibility, perceived control, and the ability to generate alternatives; higher scores correspond to greater cognitive flexibility.[30] The Turkish adaptation was carried out by Gülüm and Dağ.[31]

Statistical Analysis

All statistical procedures were carried out using IBM SPSS Statistics version 30.0, while mediation analyses were performed with the PROCESS Macro (v4.2) developed by Andrew F. Hayes. Normality of continuous variables was assessed using both visual inspection methods (including histograms and Q-Q plots) and formal statistical tests. Continuous variables deviating from normality were expressed as median (minimum-maximum), while categorical variables were reported as counts and percentages (n, %). Differences in continuous variables among the three groups were examined using the Kruskal-Wallis test. For variables with significant overall group differences, pairwise comparisons were conducted using Dunn-Bonferroni-adjusted post-hoc tests, and the adjusted p-values were reported. Categorical variables were compared across study cohorts using Pearson's chi-square test; however, when expected cell counts were low, the Fisher-Freeman-Halton exact test was performed using Monte Carlo simulation. Associations between variables were examined using Spearman's rank-order correlation coefficient (rho). In correlation analyses, missing data were handled using the pairwise method. The mediating role of the DERS in the association between total CFI scores and HAM-A and HAM-D scores was tested using PROCESS Model 4, controlling for age, total years of education, and sex. Indirect effects were evaluated based on 95% bootstrap confidence intervals (CIs) generated from 5,000 resamples; an indirect effect was regarded as statistically meaningful when the corresponding CI did not encompass zero. The alpha level for determining statistical significance was set at 0.05 (two-tailed).

RESULTS

Statistical analyses indicated that the anxiety (n=79), depression (n=72), and control (n=82) groups were comparable in terms of age and sex distributions; however, educational level differed significantly across groups ($p<0.001$). A notable disparity in prior psychiatric hospitalizations was evident: the prevalence reached 12.5% among depressed individuals, compared with 2.5% among those with anxiety and 0% among controls ($p<0.001$). The prevalence of known medical illnesses was significantly lower in the control group (anxiety: 41.8%, depression: 34.7%, control: 9.8%; $p<0.001$). Relevant group results are outlined in Table 1.

Regarding scale scores, group differences reached statistical significance for CFI-control scores ($p<0.001$) and CFI-total scores ($p=0.002$). Follow-up comparisons indicated that the control group scored notably higher than both clinical groups on these measures, with no statistically significant difference between the anxiety and depression groups. DERS scores also differed significantly across groups ($p<0.001$), with the control group showing lower scores than both clinical groups, and no significant difference was observed between the anxiety and depression groups. Relevant group results are outlined in Table 2.

To assess the associations among clinical variables, Spearman correlation analysis was performed. As years of education increased, the ability to generate alternative ways of thinking increased ($r=0.136$). Higher levels of cognitive flexibility (including both subdimensions) were associated with lower levels of ER difficulties, anxiety, and depression. In contrast, deficits in ER were directly correlated with both anxiety and depression scores ($r=0.367$ and $r=0.382$, respectively). The correlation results for the study variables are presented in Table 3.

Indirect effects were evaluated using SPSS PROCESS Macro v4.2, Model 4. Two separate mediation models were constructed in which the total CFI score served as the independent variable (X), the DERS score as the mediator (M), and the HAM-D and HAM-A scores as the outcome variables (Y). All models were adjusted for age, total years of education, and sex. Coefficients are presented as unstandardized B values with corresponding 95% CIs. The indirect effect ($a \times b$) was estimated using 5,000 bootstrap samples; mediation was determined to be significant when the bootstrap CI did not include zero. In PROCESS Model 4 mediation analyses, controlling for covariates (age, total years of education, and sex), the effect of total CFI score on DERS was significant in both models [path a: B=-0.5963, 95% CI (-0.7556, -0.4371), $p<0.001$].

In the model with HAM-D as the outcome, DERS positively predicted HAM-D after controlling for total CFI score [path b: B= 0.1350, 95% CI (0.0550, 0.2150), $p=0.0011$], whereas the direct effect of total CFI score on HAM-D was not significant (c': B=-0.0153, $p=0.741$). In contrast, the indirect effect was significant [$a \times b$ =-0.0805; boot CI (-0.1501, -0.0306)], indicating that the association between total CFI score and HAM-D was mediated by DERS. In the model with HAM-A as the outcome, the effect

Table 1. Socio-demographic and clinical characteristics of anxiety, depression, and health control

Variables		Anxiety (n=79)	Depression (n=72)	Control (n=82)	p	Intergroup
Median (min-max)						
Age		47 (18-71)	44 (18-70)	40 (18-60)	0.094[a]	
Gender	Female Male	52 27	42 30	53 29	0.595	
Duration of education (years)		8 (5-18)	12 (2-10)	12 (2-22)	0.636[a]	
		n (%)	n (%)	n (%)		
Education level	Primary school and below high school associate's degree and above	42 (53.2) 15 (19.0) 22 (27.8)	33 (45.8) 15 (20.8) 24 (33.3)	9 (11.0) 26 (31.7) 47 (57.3)	**<0.001**[c]	**Primary school and below** Anxiety %53.2[a] Depression %45.8[a] Control %11.0[b] **High school** Anxiety (%19.0)[a] Depression (%20.8)[a] Control (%31.7)[a] **Associate' degree and above** Anxiety (%27.8)[a] Depression %33.3)[a] Control (%57.3)[b]
Marriage status	Married Single Widow Divorced Separated	46 (58.2) 24 (30.4) 5 (6.3) 4 (5.1) 0 (0.0)	45 (62.5) 19 (26.3) 3 (4.2) 3 (4.2) 2 (2.8)	64 (78.0) 13 (15.9) 1 (1.2) 3 (3.7) 1 (1.2)	0.126	
Working status	Employed Unemployed	28 (35.4) 51 (64.6)	31 (43.1) 41 (56.9)	43 (52.4) 39 (47.6)	0.093	
Psychiatric hospitalization	No Yes	77 (97.5) 2 (2.5)	63 (87.5) 9 (12.5)	82 (100) 0 (0.0)	**<0.001**	Anxiety (%2.5)[a] Depression (%12.5)[b] Control (%0)[a]
History of suicide	No Yes	77 (97.5) 2 (2.5)	68 (94.4) 4 (5.6)	81 (98.8) 1 (1.2)	0.263	
Physical illness	No Yes	46 (58.2) 33 (41.8)	47 (65.3) 25 (34.7)	74 (90.2) 8 (9.8)	**<0.001**[c]	Anxiety (%41.8)[a] Depression (%34.7)[a] Control (%9.8)[b]
Smoking	No Yes	46 (58.2) 33 (41.8)	39 (54.2) 33 (45.8)	55 (67.1) 27 (32.9)	0.242	
Alcohol use	No Yes	67 (84.8) 12 (15.2)	61 (84.7) 11 (15.3)	76 (92.7) 6 (7.3)	0.217	

[a]Kruskal-Wallis test, [b]Dunn-Bonferroni test, [c]Chi-square test.
Because continuous variables did not show a normal distribution, group comparisons were performed using the Kruskal-Wallis test; for variables with significant overall group differences, pairwise comparisons were evaluated using Dunn's post-hoc test with Bonferroni correction. Categorical variables were evaluated applying the chi-square test; when expected cell counts were low, the Fisher-Freeman-Halton exact test (Monte Carlo method) was used. Adjusted p-values were interpreted according to the Bonferroni correction.
min-max: Minumum-maximum.

Table 2. Comparison of cognitive flexibility and emotion regulation scores among anxiety, depression, and healthy control

Variables	Anxiety (n=79)	Depression (n=72)	Control (n=82)	p	Intergroup
Median (min-max)					
CFI-control	21 (7-34)	21 (11-59)	28 (8-35)	**<0.001**[a]	[b]Anxiety < control **p<0.001** Depression < control **p<0.001** Anxiety < depression p=0.864
CFI-alternative	52 (26-65)	51 (24-65)	52 (17-65)	0.614[a]	
CFI-total	73 (9-95)	72 (42-99)	79 (45-100)	**0.002**[a]	[b]Anxiety < control **p=0.001** Depression < control **p=0.003** Anxiety < depression p=0.866
DERS-16	38 (16-79)	41.50 (16-79)	24 (16-80)	**<0.001**[a]	[b]Anxiety < control **p<0.001** Depression < control **p<0.001** Anxiety < depression p=0.618

[a]Kruskal-Wallis test, [b]Dunn-Bonferroni test.
Because continuous variables did not show a normal distribution, group comparisons were performed using the Kruskal-Wallis test; for variables with significant overall group differences, pairwise comparisons were evaluated using Dunn's post-hoc test with Bonferroni correction. Adjusted p-values were interpreted according to the Bonferroni correction.
DERS: Difficulties in emotion regulation scale, CFI: Cognitive flexibility inventory, min-max: Minumum-maximum.

Table 3. Results of the spearman correlation analysis (correlation coefficients)

	1	2	3	4	5	6	7	8
1. CFI-control	1.000							
2. CFI-alternative	0.266**	1.000						
3. CFI- total	0.667**	0.831**	1.000					
4. DERS-16	-0.729**	-0.276**	-0.539**	1.000				
5. HAM-A	-0.293**	-0.222**	-0.344**	0.367**	1.000			
6. HAM-D	-0.375**	-0.228**	-0.332**	0.382**	0.414**	1.000		
7. Age	0.083	0.045	0.088	-0.158*	-0.020	-0.094	1.000	
8. Duration of education	0.020	0.136*	0.084	0.040	-0.045	-0.122	-0.429**	1.000

*p<0.05, **p<0.001. Values are presented as Spearman's rho (two-tailed) correlation coefficients. Sample sizes varied by variable: for CFI control, CFI alternatives, CFI total, DERS, age, and years of education, n=233; for correlations including HAM-A and HAM-D, n=151. Missing data was handled using the pairwise method.
CFI: Cognitive flexibility inventory, DERS-16: Difficulties in emotion regulation scale-16, HAM-A: Hamilton anxiety rating scale, HAM-D: Hamilton depression rating scale.

of DERS on HAM-A was not significant (path b: B=-0.0266, p=0.644); the mediating effect was not supported [a × b =0.0158; boot CI (-0.1794, 0.1004)]. In this model, the direct effect of total CFI score on HAM-A remained significant [c': B= -0.3469, 95% CI (-0.4762, -0.2176), p<0.001], suggesting that the association between total CFI score and HAM-A was explained by a direct effect independent of DERS. Table 4 presents the mediating role of ER in the association of total CFI scores with HAM-D and HAM-A.

DISCUSSION

In this study, the relationships among ER, cognitive flexibility, and symptoms of depression and anxiety were examined in clinically diagnosed patient groups and a healthy control group. Both clinical groups, relative to the control group, exhibited reduced internal control (CFI-control), lower cognitive flexibility (CFI-total), and poorer ER abilities; however, no significant differences were observed between the anxiety and depression groups in these domains. Increases in cognitive flexibility and ER capacity were found to be associated with lower anxiety and depression scores. Mediation analyses indicated that the relationship between cognitive flexibility and depressive symptoms may have been mediated by ER ability, whereas the association between cognitive flexibility and anxiety appeared to be driven by a direct effect independent of ER.

Cognitive flexibility, defined as the ability to shift mentally between tasks in response to environmental demands, is thought to facilitate thinking and problem-solving and enhances resilience to adverse life events.[32] These findings suggest that cognitive flexibility may not merely be an accompanying characteristic, but also an important regulatory mechanism shaping the co-occurrence of anxiety and depression. Indeed, cognitive flexibility may reduce the risk that trait anxiety culminates in depression, thereby limiting the extent to which anxiety acts as a risk factor for depressive symptoms.[19] Corroborating this view, diminished cognitive flexibility has been linked to greater depressive symptomatology in those with social anxiety.[33] Previous studies have similarly reported that higher anxiety and depression levels are related to lower levels of cognitive flexibility.[34] In line with the literature, our findings showed that the control group had a higher internal locus of control and greater cognitive flexibility than both clinical groups. No significant difference in cognitive flexibility was found between the anxiety and depression groups. Reduced cognitive flexibility may contribute to the deepening of depressive symptoms by allowing negative automatic thoughts to become more persistent, maintaining threat-focused interpretations, and diminishing the effectiveness of cognitive restructuring. The cognitive rigidity observed in the clinical groups may therefore increase vulnerability to the onset of these disorders or contribute to their chronicity. For this reason, future studies

Table 4. The mediating role of emotion regulation in the association of total CFI scores with HAM-D and HAM-A: PROCESS Model 4 mediation analyses (covariates: age, years of education, and sex)

Section	Road/model	Effect (B)	SE	t	p	95% lower CI	95% upper CI
Model summary	M model: DERS	R=0.5892	R^2=0.3471	F (4,146) =19.4046	<0.001		
Model summary	Y model: HAM-D	R=0.3887	R^2=0.1511	F (5,145) =5.1624	0.0002		
Roads	a: CFI total → DERS	-0.5963	0.0806	-7.4021	<0.001	-0.7556	-0.4371
Roads	b: DERS → HAM-D (X control)	0.1350	0.0405	3.3342	0.0011	0.0550	0.2150
Roads	c': CFI total → HAM-D (M control)	-0.0153	0.0462	-0.3316	0.741	-0.1067	0.0760
Indirect effect	a×b: CFI-total → DERS → HAM-D	-0.0805	Boot SE=0.0301		Boot strap	Boot LLCI=-0.1501	Boot ULCI=-0.0306
Section	**Road/model**	**Effect (B)**	**SE**	**t**	**p**	**95% lower CI**	**95% upper CI**
Model summary	M model: DERS	R=0.5892	R^2=0.3471	F (4,146) =19.4046	<.001		
Model summary	Y model: HAM-A	R=0.4651	R^2=0.2163	F (5,145) =8.0056	<.001		
Roads	a: CFI-total → DERS	-0.5963	0.0806	-7.4021	<.001	-0.7556	-0.4371
Roads	b: DERS → HAM-A (X control)	-0.0266	0.0573	-0.4637	0.644	-0.1398	0.0867
Roads	c': CFI-total → HAM-A (M control)	-0.3469	0.0654	-5.3026	<.001	-0.4762	-0.2176
Indirect effect	a × b: CFI-total → DERS → HAM-A	0.0158	Boot SE=0.0834		Boot strap	Boot LLCI=-0.1794	Boot ULCI=0.1004

DERS: Difficulties in emotion regulation scale, HAM-D: Hamilton depression rating scale, HAM-A: Hamilton anxiety rating scale, CFI: Cognitive flexibility inventory, CI: Confidence interval, SE: Standard error.

should examine the impact of cognitive flexibility on illness course and outcomes (e.g., symptom severity, functioning, relapse, and treatment response) using longitudinal designs. Furthermore, given that cognitive flexibility may support the development of alternative coping and cognitive reappraisal strategies that mitigate the impact of adverse experiences, it could serve as a protective resource against mental disorders and be considered a target variable in psychoeducation and psychotherapy programs.

One of the strategies consistently associated with enhanced resilience against depression and anxiety is the presence of effective ER skills.[13] The adaptive deployment of ER strategies has been found to correspond with lower depressive symptom severity at all assessment time points.[35] In groups receiving ER-based interventions, psychiatric symptoms improved while reliance upon maladaptive ER strategies decreased.[36] Viewed through this lens, effective ER may be a relevant factor supporting clinical recovery. Consistent with this, ER ability was lower in the clinical groups than in the control group in the current study, and no meaningful difference emerged between the anxiety and depression groups. Given the substantial symptomatic overlap between depression and anxiety disorders, particularly with regard to cognitive functioning and emotional dysregulation, the failure to detect a meaningful difference between the two clinical groups is perhaps unsurprising. Moreover, shared dispositional characteristics such as neuroticism, which has been associated with both disorders,[23] may further account for the observed DER. The results of this study underline the relevance of ER among individuals with anxiety and depression; nevertheless, these findings warrant further confirmation through longitudinal research conducted with larger and more representative samples. Screening for ER difficulties, developing appropriate psychotherapy programs, and incorporating ER skills training into treatment may therefore be beneficial. Given the well-established comorbidity between major depressive disorder and anxiety disorders, skills-based interventions targeting ER may provide benefits for both conditions.

Extant research suggests that cognitive flexibility and ER strategies are pivotal correlates of affective health, potentially influencing the clinical profiles of anxiety and depression.[22] Furthermore, evidence suggests a mediating intersection between these two domains, in which impairments in executive cognitive control may inherently undermine an individual's capacity for effective emotional modulation.[20] Previous research examining the effects of cognitive flexibility on the two key components of ER-strategy use and flexibility- has shown that cognitive flexibility predicts the flexibility component of ER.[37] In addition, EEG findings suggest that ER and cognitive processes share overlapping neural circuits.[38] Consistent with the literature, our study observed an association between ER and cognitive flexibility. Our findings suggest that the association between total cognitive flexibility and depressive symptom severity is largely mediated by ER, presenting a pattern consistent with full mediation in depression. Clinically, this finding suggests that cognitive flexibility may influence depressive symptom severity less by directly reducing symptoms and more by altering the individual's cognitive appraisal and processing style, and related regulatory processes. Accordingly, interventions aimed at enhancing cognitive flexibility in depression might yield better outcomes when they also target cognitive processes linked to ER.

In contrast, a different pattern emerged for anxiety symptoms. Relationships between cognitive flexibility and anxiety symptoms did not appear to be explained by ER, but rather by a more direct relationship. Prior work has highlighted that cognitive flexibility may operate as an important moderating factor within the relationship between ER and anxiety symptoms.[39] In anxiety, processes such as threat perception, intolerance of uncertainty, attentional bias, and avoidance tend to play a more prominent role; therefore, cognitive flexibility may influence symptom severity through a mechanism independent of the cognitive components assessed by measures of ER. These findings suggest that the relationships of cognitive flexibility with depression with anxiety do not operate through the same mechanism. In depression, the mediating role of cognitive processes, as represented by ER, appears more prominent in the association between symptom severity and

cognitive flexibility; by contrast, in anxiety disorders, the effect of cognitive flexibility appears to follow a more independent and direct pathway. This distinction could also have implications for treatment planning: whereas ER may be particularly critical alongside efforts to enhance cognitive flexibility in the treatment of depressive symptoms, approaches aimed at strengthening cognitive flexibility alone may make a more direct contribution in the treatment of anxiety symptoms.

Evaluating cognitive flexibility with self-report tools rather than performance-based assessments directly affects the interpretation of our findings. This choice reflects the study's primary aim. Rather than measuring neurocognitive processing speed or executive functions in a laboratory setting, the study primarily examined patients' subjective assessments of their adaptive cognitive abilities in daily life. Such self-report measures offer insight into how individuals perceive their ability to cope with difficulties, a core component of cognitive-behavioral models for depression and anxiety. However, the observed relationships primarily reflect perceived cognitive flexibility rather than objective neurocognitive capacity. Therefore, our results indicate that subjective cognitive rigidity is associated with symptom severity rather than with definitive neurocognitive deficits. Reliance on subjective evaluation remains a limitation, highlighting the need for future research incorporating objective neuropsychological batteries.

Finally, these findings should be interpreted within the limitations of a cross-sectional design. Although mediation models may suggest possible mechanisms linking variables, longitudinal and/or experimental studies are required to draw causal inferences. Future research should further investigate which cognitive components mediate the effects of cognitive flexibility on depression and anxiety. In addition, examining the role of other potential mediators such as rumination, intolerance of uncertainty, avoidance, attentional bias, and cognitive reappraisal may contribute to the development of more targeted interventions.

Study Limitations

This study has several limitations. First, the cross-sectional design, the relatively small sample size, and the single-center setting limit the generalizability of the findings. Second, psychiatric diagnoses and the exclusion of comorbidities were based on clinical psychiatric evaluations rather than structured diagnostic interviews such as the SCID-5. Therefore, diagnostic heterogeneity cannot be entirely excluded. Similarly, the lack of detailed categorization within the clinical groups, specifically the absence of subclassification for anxiety subtypes and depressive specifiers (e.g., melancholic or atypical features), may obscure more nuanced relationships between the variables. Third, cognitive flexibility was assessed only through a self-report instrument rather than performance-based executive function measures (such as the wisconsin card sorting test, trail making test part B, or stroop test). The self-report instrument may primarily reflect subjective cognitive appraisal rather than objective neuropsychological capacity. Because patients were receiving psychotropic medications at different treatment stages, the potential impact of these medications on cognitive and emotional processing could not be separately evaluated; thus, caution is warranted when interpreting findings related to executive functioning. Future longitudinal studies that employ structured clinical interviews and objective neuropsychological batteries and include larger samples are required to draw causal inferences.

CONCLUSION

The current findings suggest that cognitive flexibility and ER may exert direct and/or mediating effects on anxiety and depression. From a preventive standpoint, interventions targeting improvement in ER and cognitive flexibility may contribute to reducing the likelihood of onset of depressive and anxiety disorders, while also alleviating the severity of existing symptoms. The findings highlight the potential value of personalized interventions that prioritize an individual's cognitive flexibility and ER capacity in the management of depression and anxiety. I ncorporating techniques designed to enhance cognitive adaptability within traditional psychotherapeutic frameworks may significantly optimize therapeutic outcomes for patients with low cognitive flexibility. Beyond clinical treatment, however, these skills should be viewed as core components of primary prevention. Implementing psychoeducational programs within educational and occupational settings, aimed at bolstering these faculties in at-risk populations before the onset of clinical symptoms, could alleviate the long-term burden on public mental health services. Future longitudinal studies are needed to evaluate the effectiveness of such intervention programs. Investigating the underlying neurobiological processes may help identify biological pathways that clarify the shared roles of ER and cognitive flexibility in anxiety and depression, which may, in turn, provide guidance for future pharmacological treatment approaches.

MAIN POINTS

- Patients with depression and anxiety exhibit significant deficits in cognitive flexibility and emotion regulation (ER) compared to healthy individuals.
- ER significantly mediates the effect of cognitive flexibility on depressive symptoms, but not on anxiety.
- Higher cognitive flexibility directly reduces anxiety levels by promoting greater internal control of symptoms.
- Psychotherapeutic and preventive interventions should specifically target cognitive adaptability and ER to improve clinical outcomes.

ETHICS

Ethics Committee Approval: Ethical approval for the study was obtained from the Karabük University Non-Interventional Research Ethics Committee (approval no: 2025/2422, date: 28.07.2025) and institutional permission was granted from the mentioned research center.

Informed Consent: Written informed consent was obtained from all participants included in the study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: N.D., Z.K.A., D.C., M.A., R.T., Concept: N.D., Z.K.A., Design: N.D., Z.K.A., Data Collection and/or Processing: N.D., Z.K.A., D.C., M.A., R.T., Analysis and/or Interpretation: N.D., Z.K.A., D.C., M.A., R.T., Literature Search: N.D., Z.K.A., D.C., M.A., R.T., Writing: N.D., Z.K.A., D.C., M.A., R.T.

DISCLOSURES

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