

Original Article

The relationship among cognitive flexibility, self-criticism and depression considering the moderating role of emotion regulation in female students with depression symptoms

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Abstract

Background: The goal of this study was to examine how self-criticism and cognitive flexibility relate to depression, taking into account the moderating effect of emotion control in depressed undergraduate females.

Methods: The present study's statistical population consisted of all female students at Isfahan Azad University in 1402 who exhibited signs of depression. 384 people were chosen using cluster random selection from the study's target population as a sample, using Cochran's formula. The research variables were measured using the Beck Depression Inventory, the Gross & John Emotion Regulation Questionnaire, the Gilbert et al. Self-Criticism Scale, the Dennis & Vander Wal Cognitive Flexibility Inventory, and the questionnaire on demographic characteristics. The acquired data were examined using the regression analysis technique and the statistical program SPSS version 27.

Results: Findings showed that there is a significant relationship between cognitive flexibility and self-criticism with depression, cognitive flexibility and self-criticism with emotion regulation, and also between emotion regulation and depression ($p < 0.01$). Also, the findings indicated that emotion regulation has a moderating role in the relationship between cognitive flexibility and self-criticism with depression ($p < 0.01$).

Conclusion: Based on the findings of this research, it can be concluded that the relationship between cognitive flexibility and self-criticism with depression is not a simple linear relationship and emotion regulation can affect this relationship.

Keywords: Cognitive Psychology; Depression; Emotional Regulation; Self-Assessment.

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Introduction

Entering university is a crucial stage of youth. It is often one of the most exciting periods in a young person's life (1). This period is the transition from adolescence to youth and the challenges of this period provoke or intensify depression. Thus, mental illnesses may be maximized and many mental health disorders may

appear (2). The most prevalent mental illness is major depressive disorder, which has significant negative effects on social, vocational, and personal spheres as well as significant costs to the economy, society, and individuals (3). Recurrence rates after the initial episode range from 50% to 90% in those who have three or more episodes,

making it a chronic condition (4). Cognitive flexibility is the capacity to switch between mental models by turning on pertinent information and blocking off unnecessary information. One adaptive capability that allows for behavioral reactions to the environment is the capacity to change focus from one current task to new components of a crucial circumstance (5). People with high cognitive flexibility, before reacting, manage negative thoughts and emotions by reformatting or re-evaluating, examine stressful situations from different perspectives, and use appropriate coping strategies (6). Studies have indicated that self-criticism is associated with depressive symptoms including cognitive distortions and negative schemas, which refer to negative self-evaluations, focus on weaknesses and shortcomings, and excessive worry about personal failures. It stems from the different perceptions between the real self and the ideal self (7). People may control their emotions when they happen and how they are felt and expressed by practicing emotion management. Depending on a person's demands or objectives at the time, emotion regulation can decrease, increase, or sustain the feeling of either happy or negative emotions (8). People suffering from depression use more maladaptive emotion regulation strategies and fail to apply effective strategies (9). Identifying the factors predicting depression and a better understanding of the relationship between the variables affecting it can provide us with valuable knowledge in the area of designing conscious interventions and about people who are more prone to depression. Thus, the present study investigated the relationship between emotion regulation, cognitive flexibility, self-criticism, and depression.

Methods

Research environment and statistical population

All female students having symptoms of depression at Isfahan Islamic Azad

University (Khorasgan) in the spring of 2023 comprised the statistical population of this cross-sectional and descriptive study. 700 people completed the Beck Depression Inventory (BDI-II) in order to choose a sample from the statistical population of students. 384 individuals with mild to severe depressive symptoms were chosen by convenience selection from among them, using Cochran's method. Female students in the 18–25 age range who were willing and able to provide their agreement to fill out the questionnaire, had symptoms of depression, and were not undergoing psychological or psychiatric therapy were among the inclusion criteria of the study. Not filling out the questionnaires, taking medication, getting psychiatric therapy throughout the study, not experiencing depressive symptoms, and being older than 25 were among the exclusion criteria.

Procedure

In the first stage, three faculties of humanities, basic sciences, and technical engineering were selected. In the second stage, at least one field of study was selected from each faculty. In the third stage, some female students were selected in each field using the convenience sampling method. Then, the questionnaires were implemented with the arrangements made before and in compliance with the ethical standards, including the consent of the participants, good behavior, and confidentiality of information among female students who met the inclusion criteria of the present study. Questionnaires were administered face-to-face and started on April 26, 2023, and lasted for about two weeks. Demographic information questionnaire and Beck's Depression Inventory (BDI-II) (1996) were first distributed among female students. Then, 384 students who had mild to moderate depression symptoms based on the scores obtained from the Beck Depression Inventory were selected as the final sample of the study. After scoring the Beck Depression Inventory (BDI-II), the emotion

regulation questionnaire, self-criticism scale, and cognitive flexibility were distributed among students who had mild to moderate symptoms. After returning the questionnaires, the questionnaires were scored and analyzed using appropriate statistical methods.

Data collection tools

A) Demographic information questionnaire

In the present study, demographic variables including age, field of study, and marital status were investigated using a researcher-made questionnaire.

B) Beck Depression Inventory (BDI-II)

This 21-item measure of depression was developed by Beck et al. to gauge an individual's level of depression. It is used to gauge a patient's feedback and symptoms. Its elements were created by watching and compiling the typical behaviors and attitudes of individuals with depression. There are 21 things in all, each pertaining to a distinct ailment. Using a four-point Likert scale ranging from zero to three, the subjects respond. These products fall under categories including depression, pessimism, guilt, helplessness and failure sentiments, insomnia, appetite loss, and self-loathing. This exam has a minimum score of 0 and a maximum score of 63. Higher depression is indicated by a higher score on this scale. With a mean of 0.76, the internal consistency of this tool was observed to range from 0.73 to 0.92. According to the study, the patient group's alpha coefficient was 0.86, while the non-patient group's was 0.81. In the Hamidi et al. investigation, the test's internal consistency was determined using the half-split and Cronbach's alpha techniques, yielding results of 0.93 and 0.64, respectively (10). The association between the Beck inventory's total score and the general health questionnaire's score yielded a convergent validity of 0.8. Overall, the questionnaire's internal consistency coefficients, along with other statistical

features and Cronbach's alpha coefficient, indicate that the inventory has good validity in the Iranian population and that results can be relied upon for statistical and psychometric analysis.

C) Self-Criticism Scale (SCS)

This 22-item scale was created by Gilbert et al. (11). The Likert scale has five points, ranging from severely disagreeing (scoring 0) to strongly agreeing (score 4). On this scale, zero is the lowest possible score, and 88 is the greatest. On this scale, a higher score denotes greater self-criticism. Gilbert et al. (2011) used the Cronbach's alpha technique to determine the reliability coefficient of this questionnaire, which came out to be 0.90. Using Cronbach's alpha coefficient, Rajabi & Abbasi (12) determined the reliability of this questionnaire to be 0.83 for the entire sample and 0.78 and 0.85 for males and females, respectively. Its substantial validity coefficient (-0.36) on 50 participants using the Rosenberg Self-Esteem Scale was discovered.

D) Cognitive Flexibility Inventory (CFI)

The purpose of this test, developed by Dennis & Vander Wal (13), is to assess cognitive flexibility under difficult circumstances. It has 20 items with a 7-point Likert scale that ranges from strongly disagree (score 1) to strongly agree (scoring 7). It also has three subscales: perceptions of alternatives, controllability, and behavior justification. On this scale, 20 is the lowest possible score, and 140 is the highest. On this scale, greater flexibility is indicated by a higher score. The concurrent validity of this scale with the Beck Depression Inventory (BDI-II) was determined by Dennis & Vander Wal (13) to be -0.39, while its convergent validity with the Martin and Robin cognitive flexibility scale was determined to be 0.75. Additionally, they determined the reliability of this scale using the test-retest technique (0.81, 0.75, and 0.7) and Cronbach's alpha method (0.91, 0.91, and 0.84, respectively) for the

full scale and sub-scales of perception of controllability and perception of alternative possibilities. The problem-solving processing (with 13 items) and perception of controllability (with 6 items) components of the cognitive flexibility scale (19 items) were named in the study by Kohandani & Abolmaali Alhosseini (14). The two components of problem-solving processing and sense of controllability had internal consistency values of 0.893, 0.779, and 0.81, respectively, as did the scale's overall score. Additionally, using the Cronbach's alpha approach, the reliability of this scale was found to be 0.84 in the study conducted by Qasimpour et al. (15).

E) Emotion Regulation Questionnaire (ERQ)

This questionnaire was designed by Gross & John (36) It includes ten questions and two sub-scales of suppression and reappraisal. It is scored on a 7-point Likert scale from strongly disagree (score 1) to strongly agree (score 7). The maximum and minimum scores in this questionnaire are 70 and 10, respectively. The higher score indicates higher emotion regulation ability. In the study by Gross & John (36), the internal correlation for the reappraisal and the suppression sub-scales was obtained at 0.79 and 0.73, respectively, and its test-retest reliability with a 3-month interval was obtained at 0.69 for the whole scale. In Iran, Qasimpour et al. (15), obtained Cronbach's alpha coefficient of this scale at 0.52 and 0.79, respectively, for the two subscales of suppression and reappraisal and 0.71 for the whole scale.

Statistical Analysis

In this study, after collecting the data, they were statistically analyzed by Pearson's correlation method and step-by-step regression analysis in SPSS-26 software.

Ethical considerations

In this study, all relevant ethical considerations, including confidentiality of personal information, informed consent and

the right to withdraw from the study were observed. The present article was derived from a master's thesis in psychology entitled "Investigating the relationship between cognitive flexibility and self-criticism and depression considering the moderating role of emotion regulation in female students with depressive symptoms". It was published in 14022023 with a code of ethics IAU.KHUISF.REC.1402.122 and registered in Isfahan Islamic Azad University (Khorasgan).

Results

Data analysis showed that the mean of the cognitive flexibility variable was 70.92, the mean of the self-criticism variable was 49.50, the mean of the emotion regulation variable was 38.66, and the mean of depression was 32.93, Table 1.

In model 1, cognitive flexibility ($\beta = -0.876$, $p < 0.001$) and self-criticism ($\beta = -0.257$, $p < 0.001$) significantly predict depression. The relationship between cognitive flexibility and self-criticism is direct. In model 2, with the inclusion of the emotion regulation variable, the interaction between emotion regulation and cognitive flexibility ($\beta = -0.608$, $p < 0.001$) and the interaction between emotion regulation and self-criticism ($\beta = -0.094$, $p < 0.001$), the effect of cognitive flexibility increased from 0.905 to 1.248 (with a negative relationship) and self-criticism decreased from 0.215 to -0.094. In model 1, a higher level of self-criticism was linked to a higher level of depression. However, in model 2, the impact of despair and self-criticism has been lessened due to an increase in the

Table 1. Descriptive indices of the research sample group in the dimensions of the research variables

Row	Dimensions of the variables	Mean	SD	SE
1	depression	32.93	0.41	7.93
2	Cognitive flexibility	70.92	0.42	8.21
3	self-criticism	49.50	0.75	14.72
4	Emotion regulation	38.66	0.46	8.94

Table 2. The result of the stepwise regression model for the moderating role of emotion regulation in the relationship between cognitive flexibility, self-criticism, and depression

Model	Components	B	SE	β	t	p	R	R ²	F	p
Model 1	Constant	-33.942	3.151	-	-10.771	<0.001	0.78	0.61	296.47	<0.001
	Cognitive flexibility	-0.864	0.036	-0.876	23.703	<0.001				
	Self-criticism	0.139	0.020	0.257	6.962	<0.001				
Model 2	constant	-29.152	2.457	-	-11.863	<0.001	0.87	0.77	429.85	<0.001
	Cognitive flexibility	-1.099	0.036	-1.137	-30.657	<0.001				
	Emotion regulation and cognitive flexibility	-0.007	0.000	-0.608	-17.869	<0.001				
	Emotion regulation and self-criticism	-0.001	0.000	-0.094	-3.082	0.002				

interplay of emotion regulation. Significant interactions exist between emotional regulation, self-criticism, and the whole model, as well as between emotional regulation and cognitive flexibility ($p < 0.001$). Also, as demonstrated, the factors of cognitive flexibility and self-criticism explain 60.9% of the variations in depression Table 2.

The results revealed that in model 1, cognitive flexibility ($p < 0.001$, $\beta = -0.798$) significantly and negatively predicts depression. In model 2, with the inclusion of emotion regulation and the interaction between emotion regulation and cognitive flexibility, the effect of the cognitive flexibility variable increased ($\beta = -1.479$, $p < 0.001$). The interaction effect of emotion regulation and cognitive flexibility and the whole model is significant ($p < 0.001$). Also, as seen, the variable of cognitive flexibility alone explains 63.7% of depression changes. With the inclusion of the emotion regulation variable and the interaction effect of emotion regulation and cognitive flexibility, this value increases to 72.9%, Table 3.

Results showed that in model 1, self-criticism ($p < 0.001$, $\beta = -0.179$) predicts depression significantly. In model 2, with the interaction of emotion regulation and self-criticism, the effect of both variables decreased and was removed from the equation. The interaction effect of emotion regulation and self-criticism ($\beta = -0.443$) and the whole model is significant ($p < 0.001$). Also, as can be seen, the self-criticism variable explains 2.3% of depression changes. In model 2, the interaction of two variables of emotion regulation and self-criticism predicts 19.7% of the changes in the depression variable Table 4.

Discussion

It is clear from the study's findings that depression is one of the conditions that affects students most frequently. The diagnosis is made when an individual experiences persistent low mood, diminished enjoyment or interest in enjoyable activities, emotions of guilt or unworthiness, low energy, difficulty concentrating, changes in appetite, slowness or psycho-motor restlessness, disturbed sleep patterns, or thoughts of suicide (3).

Table 3. Stepwise regression model results for the moderating role of emotion regulation in the relationship between cognitive flexibility and depression

Model	Components	B	SE	β	t	p	R	R ²	F	p
Model 1	constant	87.648	2.125	-	41.424	<0.001	0.80	0.64	671.71	<0.001
	Cognitive flexibility	-0.771	0.030	-0.789	-25.917	<0.001				
Model 2	constant	122.424	8.627	-	14.808	<0.001	0.85	0.73	341.10	<0.001
	Cognitive flexibility	-1.429	0.123	-1.479	-11.626	<0.001				
	Emotion regulation	-0.727	0.186	0.820	-3.989	<0.001				
Model 3	Interaction between emotion regulation and cognitive flexibility	0.015	0.003	1.338	5.228	<0.001				

Table 4. Stepwise regression model for the moderating role of emotion regulation in the relationship between self-criticism and depression

Model		B	SE	β	t	p	R	R ²	F	p
Model 1	constant	37.698	1.400	-	26.92	<0.001	0.179	0.032	12.60	<0.001
	self-criticism	0.096	0.027	0.179	3.55	<0.001				
Model 2	constant	43.793	1.181	-	37.09	<0.001	0.443	0.197	93.44	<0.001
	The interaction of emotion regulation and self-criticism	-0.006	0.001	-0.443	-9.67	<0.001				

Result of this study showed that cognitive flexibility and self-criticism significantly predict depression. The relationship between cognitive flexibility and self-criticism is direct. Self-criticism, cognitive psychotherapy, and psychodynamic psychotherapy are thought to be susceptibility factors for depression (16). Self-criticism is assumed to be a transdiagnostic factor that contributes to the outcome of psychotherapy. Numerous studies show that self-criticism is associated with a range of mental health problems (38-40). A summary of empirical findings is crucial for a better understanding of how self-criticism predicts the overall therapy effect. Prior to the present study, no summary was available for the relationship between self-criticism and the outcome of psychotherapy.

A fundamental challenge to the study of self-criticism is the lack of a clear definition and the heterogeneous nature of the construct. The discussion of the phenomenon of self-criticism can be traced back to ancient Greek philosophers (Chang, 2008), although empirical research on self-criticism has been gaining attention in the psychopathology and psychotherapy literature since the 1970s (17). Kannan & Levitt, describe self-criticism as a tendency to have high expectations and question one's performance (17). High levels of self-criticism are linked to negative reactions to one's failures, an inability to derive satisfaction from successful performance, an excessively critical assessment of one's own behavior, and the belief that one has performed poorly and set unachievable

standards of behavior for oneself (7). Additionally, low self-esteem (19), drug misuse (20), fear of unfavorable appraisal (18), and alcohol intake are linked to self-criticism. Furthermore, negative consequences in interpersonal relationships, such as a decline in social support, an increase in stress, and social isolation, are linked to self-criticism (21). In this regard, the self-expansion model proposed by Aron et al., has two distinct but related principles: the motivational principle and the inclusion-of-other-in-self principle (4). The criticism-oriented model proposed by Shahar, suggests that the self-criticism tendency is caused by a combination of early experiences of criticism from parents or caregivers, along with the lack of development of an authentic self (22). The source of self-criticism is the parent's criticism of the child and the child's unsuccessful efforts to create a true self through authenticity and self-knowledge (23).

One of the most prominent theoreticians of the construct was Sidney J. Blatt, who took up the idea that "cognitive-affective" mental representations or schemas of self and others develop in the context of early parent-child relations and gain complexity throughout the life span. In psychology, there are several definitions for emotion regulation. The researchers claim that the expression and management of emotions are two completely different processes that occur simultaneously and serve the same purposes, rather than in a sequential fashion. Emotion creation and emotion regulation, however, are two distinct processes, according to Garnefski et al.

(24). Five emotion control techniques that occur at various points throughout an emotion experience are introduced in Gross's process model of emotion regulation. These comprise responding modulation, expanding attention, changing the way one thinks, and changing situations. (25). Experiential-dynamic model of emotion regulation, which is based on the findings of emotional neuroscience, psychodynamic psychotherapy, and modern experimentation, believes that events cause pre-adapted emotional responses that are present from birth (26).

Cognitive flexibility is one aspect of executive functioning that encompasses the ability to produce diverse ideas, consider response alternatives, and modify behaviors to manage changing circumstances. These processes are likely to be important for implementing cognitive restructuring. The present study investigated the impact of cognitive flexibility on older adults' ability to learn cognitive restructuring (41). According to some definitions, cognitive flexibility is the capacity to modify one's thinking to fit new circumstances and to break free from automatic reactions or ways of thinking that don't make sense in new situations (13). Resilience, inventiveness, and improved decision-making are all correlated with cognitive flexibility (27). Numerous scholars contend that cognitive flexibility is a necessary condition for numerous psychological processes and is among the most important elements influencing academic achievement (28). Cognitive flexibility can affect job selection and self-confidence, at least at certain stages of students' university studies (29). Cognitive flexibility is also associated with using adaptive coping styles (6), understanding the views of others, empathy and social interaction (30), optimal job performance (31), and the severity of symptoms at the start of psychological treatments (32). In some study result showed that Few participants

showed changes in cognitive flexibility over treatment. Those with poorer cognitive flexibility may not find cognitive restructuring as useful to alleviate emotional distress as those with better cognitive flexibility. However, those with poorer cognitive flexibility can still benefit from standardized CBT, even if their use of cognitive restructuring is less effective (42).

Cognitive inflexibility causes black-and-white thinking, inability to adapt, panic during crucial changes in life, and one-sided thinking (13). A lot of neuropsychiatric disorders have it, including eating disorders, obsessive-compulsive disorder, schizophrenia, attention deficit hyperactivity disorder, depression, and autism spectrum disorders (33). According to the findings, there is a negative and substantial correlation between cognitive flexibility and depressive symptoms. This problem suggests that as flexibility levels rise, depression symptoms diminish. For the subscales of cognitive flexibility, this is also true. Therefore, there was a substantial and negative association between the degree of depressive symptoms and the impression of alternatives, controllability, and conduct legitimacy. The findings of the investigations conducted by Rezaeei et al. (34), Maramis et al. (35), Gross & John (36), and Dennis & Vander Wal (13) are in agreement with this outcome. This finding can be explained by the conclusion that depressed individuals are unable to view difficult circumstances as under their control, are unable to defend multiple options in the face of life's events and other people's actions, and are unable to consider other options when faced with challenging circumstances (34). Kashdan & Rottenberg, believe that the primary characteristic of depression is the lack of flexibility in different areas. Depressed people report widespread low mood or inability to enjoy life and often consider their environment unchanging (37).

Limitations

The present study was conducted in Isfahan City using a cross-sectional method and its participants were selected using convenience sampling. Thus, we should treat with caution in generalizing its results. As another limitation, the sample of the study included female students, so it is recommended that a similar study be conducted on male students.

Conclusion

The study's findings suggest that self-criticism and cognitive flexibility are directly related to depression and that emotion control may have an impact on this link. Therefore, teaching depressed individuals to challenge faulty thinking patterns with flexibility in cognition improves depressive symptoms.

Authors' contribution

Negar Sadat Mirshafiei developed the study concept and design. Maryam Mohammadi acquired the data. Negar Sadat Mirshafiei and Maryam Mohammadi analyzed and interpreted the data, and wrote the first draft of the manuscript. All authors contributed to the intellectual content, manuscript editing and read and approved the final manuscript.

Informed consent

Questionnaires were filled with the participants' satisfaction and written consent was obtained from the participants in this study.

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Conflict of interest

The authors declare that they have no conflict of interests.

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