

Research Paper: The Mediating Role of Cognitive Flexibility, Shame and Emotion Dysregulation Between Neuroticism and Depression



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ABSTRACT

Objectives: Cognitive flexibility, shame, and emotion regulation difficulties are considered potential mediating factors that may explain the relationship between neuroticism and depression severity. The aim of this study was to examine the mediating role of cognitive flexibility, shame and emotion dysregulation in the relationship between neuroticism and depression among university students.

Methods: A total of 271 students (102 males and 169 females) were selected by cluster random sampling from University of Tehran, Allameh Tabataba'i University, and Iran University of Science & Technology. Cognitive Flexibility Inventory (CFI), Test of Self-Conscious Affect-2 (TOSCA-2), Difficulties in Emotion Regulation Scale (DERS), NEO Five-Factor Inventory, and Beck Depression Inventory-II (BDI-II) were used to collect the data. Pearson correlation, multiple regression, and path analysis were applied for data analysis.

Results: It was found that neuroticism was significantly associated with depression and all three mediators ($P < 0.0001$). Neuroticism by means of emotion dysregulation was the only significant indirect effect on depression ($P < 0.0001$). First total mediation model had a poor fit to the data, $CMIN=87$, $P < 0.0001$, $CMIN/df=21.75$, $CFI=82$, $RMSEA=28$.

Discussion: These findings suggest that for student depression, emotion dysregulation might be important and future intervention works can examine the effects of targeting emotion dysregulation among university students with high levels of neuroticism and/or depression.

1. Introduction

Depression is one of the most common mental health disorders among university students [1], and many factors are responsible for increasing vulnerability to

depression. One fundamental component that is strongly related to depressive disorders is neuroticism [2, 3], a personality trait that can be characterized by the tendency to experience negative emotional states [4]. Other parts of neuroticism have been proposed such as the failure to control desires, inefficient coping with stress, an

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inclination for preemptive risk management strategies, the propensity to have doubtful thoughts, assess circumstances as unpleasant, and experience aversive emotional states [4]. This personality trait is broadly viewed as a risk factor for developing depression, anxiety and other forms of psychopathology [3]. Nevertheless, the mechanisms by which neuroticism may prompt depression are almost obscure [5]. Therefore, by accomplishing a full comprehension of the nature of neuroticism, the process through which neuroticism is connected to mental health such as depression must be recognized [3].

From a developmental psychopathology viewpoint, Hankin (2015) confirmed that risk factors for depression severity are over various systems and levels of examination, including hereditary, stress settings and mechanisms, biological stress procedures, temperament, feeling, reward, cognitive processes, and interpersonal influences. The most remarkable risk factor is cognitive processes that form an increase in depressive manifestations. This procedure mostly occurs through vulnerability-stress interactions in which cognitive vulnerability is more likely to become depression [6].

One potential factor underlying the effect of neuroticism on depression is cognitive flexibility. But it is interesting that there is no agreement about the specifics of defining or measuring cognitive flexibility [7]. As a rule, the capacity to change subjective sets to adjust to changing environmental stimuli seems to be the center segment for most operational definitions of cognitive flexibility [7]. It is associated with depressive symptomatology, in this way, with increased cognitive flexibility, severity of depression reduced and it has been appeared to be related both with positive state of mind and with employment of strategies facilitating the maintenance of positive state of mind [8]. To date, no study has evaluated cognitive flexibility as a potential explanatory factor underlying the association of neuroticism and depression among any age group.

In addition to cognitive flexibility, shame is another relevant factor to consider with regard to neuroticism and depression. It has been described as a self-conscious emotion that arises when flaws of the self are revealed to others [9]. Shame and guilt are similar or often thought to be the same constructs, but there is a generally accepted differentiation between these constructs. Shame involves internal, global, and stable attributions toward the self, whereas guilt is focused on a specific behavior and has internal, specific, and fairly stable attributions. Shame has been connected with pathological functioning while guilt appears to be relatively unrelated to poor psychological

function [10]. These reactions to shame have a tendency to exacerbate one's conditions. Shame plays a key role in the formation of depression [11] and is significantly correlated with neuroticism [12]. Further, evidence indicates that shame mediates the association between neuroticism and anxiety in an adolescent sample [13]. However, some studies have shown that shame does not mediate the relationship between neuroticism-depression [2]. Hence, more work is required to examine neuroticism, depression and shame among university students.

Emotion regulation is the third and final potential risk factor underlying the neuroticism-depression relation. Gratz and Roemer (2004) characterized emotion regulation as "involving the (a) awareness and understanding of emotions, (b) acceptance of emotions, (c) ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions, and (d) ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses as desired in order to meet individual goals and situational demands". Therefore, emotion dysregulation is due to problems in these emotional skills [14]. How individuals regulate their negative emotions is an essential factor in developing depression [15]. Extensive studies have shown that emotion regulation mediates the connection between neuroticism and depression [2, 3, 13, 16]. The volume of research shows the value of examination of emotional strategies as mediators of the neuroticism-depression association; however, few studies have focused on emotion dysregulation as a broad factor or its subscales in the relationship. In this way, the measures that take advantage of the multidimensional nature of emotion dysregulation ought to be used.

It is necessary to demonstrate that these three mediators speak to discrete factors. Similar to cognitive flexibility identified with mental wellbeing, rigidity or inflexibility nature is identified with mental issues such as shame and [17]. However, investigations of shame have normally been centered around separating from guilt [17] but some studies have shown that these three mediators are distinct [13]. Furthermore, cognitive flexibility, shame and emotion dysregulation have been involved in various types of psychopathology such as bipolar disorder and borderline personality disorder [18], anxiety [13] bulimic symptoms [19], and alcohol and drug abuse [9].

The current study explored the relationship of cognitive flexibility, shame, and emotion dysregulation as potential mechanisms underlying the association between neuroticism and depression in students (Figure 1). Based on previous research conducted in children, these three

risk factors were chosen for investigations and considered as concurrent mediators [2, 13]. Also another study examined emotion regulation as a single mediator between the relationship of neuroticism-depression [20]. We hypothesized that each of these three variables would represent to distinct, however related, clarify the relationship between neuroticism and depression, over and above their shared variance.

2. Methods

Participants

Undergraduate and graduate university students were recruited from the University of Tehran, Allameh Tabataba'i University, and Iran University of Science & Technology for participation in this study using cluster random sampling. In other words, after specifying all public universities of Tehran, three state universities were randomly selected. Then from each university, three faculties were randomly selected. Finally, three bachelor and three master classes were selected. After coordinating with the academic and research affairs of the universities, giving explanations about the research, and obtaining informed consent, the questionnaires were given to students to complete. The inclusion criteria were adequate capability in Persian language to consent to study and completed necessary responses. The exclusion criteria were history of symptoms of psychotic disorders based on participants report, and medication and psychotherapy for depression. The sample consisted of 271 undergraduate and master students.

Measures

Cognitive Flexibility Inventory (CFI)

The test of cognitive flexibility inventory [7] is a brief 20-item self-report instrument designed to measure the aspects of cognitive flexibility in terms of considering and reacting to the world. The CFI has three subscales: the tendency to perceive difficult circumstances as controllable; the ability to perceive multiple alternative options for life occurrences and human behavior; and the capacity to produce multiple alternative solutions to difficult circumstances [7]. Dennis & Vander Wal (2010) [7] demonstrated CFI has a good internal consistency and convergent construct validity with the Cognitive Flexibility Scale (CFS). However, it has a poor convergent validity with neuropsychological measures of cognitive flexibility, suggesting that this instrument measures a different facet of cognitive flexibility compared with neuropsychological evaluation [21]. Further validity and re-

liability of Iranian version of the CFI are acceptable [22]. Internal consistency was good in this sample ($\alpha=0.83$).

Test of Self-Conscious Affect-2 (TOSCA-2)

The test of Self-Conscious Affect-2 [23] is a hypothetical scenario-based measure of situational shame- and guilt-proneness evoked by the behavioral mistake of individuals. It consists of 16 scenarios that present respondents with a range of situations that are likely to elicit shame and/or guilt, and it is rated on a 5-point Likert scale (1: Not likely; 5: Very likely) [23]. Internal reliability in this study was $\alpha=0.71$ for shame and $\alpha=0.70$ for guilt.

Difficulties in Emotion Regulation Scale (DERS)

DERS [14] consists of 36 items and contains six subscales including (a) non-acceptance of emotional responses, (b) difficulties engaging in goal-directed behavior, (c) impulse control difficulties, (d) lack of emotional awareness, (e) limited access to emotion regulation strategies, and (f) lack of emotional clarity. The respondents specified their level of agreement with each phrase using scales ranging from 1 to 5 (Almost Never to Almost Always). DERS has excellent psychometric properties including great internal consistency, good test-retest reliability, and discriminant validity in nonclinical samples [14]. Also, it is a generally utilized self-report measures of emotion dysregulation, and its good psychometric properties have been confirmed in the Iranian students [24]. Internal consistency was excellent in the current study ($\alpha=0.92$).

Neuroticism

Neuroticism was assessed via a measure developed by Costa & McCrae, 1992 [25]. It is a subscale of the NEO Five-Factor Inventory that was designed to evaluate personality traits identified in the universal Five-Factor Model [25]. Neuroticism is made up of 8 items, which are rated on a 5-point Likert scale from "Disagree Strongly" to "Agree Strongly" and summed for a total score. The neuroticism subscale has high reliability and validity with Cronbach's α of .80 and has been validated for use in Iranian university students [26]. Internal consistency was good in this sample ($\alpha=0.80$).

Beck Depression Inventory-II (BDI-II)

Beck, Steer and Brown (1966) created the 21-item instrument to measure the physiological and psychological symptoms of depression in a self-report format [27]. Each item is scored from 0 to 3. The values from 0 to 13

are regarded as normal, 14-19 as mild to moderate, 20-28 as moderate to severe, and 29-63 as very severe. The one-week test-retest reliability of this measure was 0.93. Additionally, it had a high correlation coefficient with the Hamilton scale ($r=0.71$). The internal consistency and Cronbach's alpha coefficients of the BDI-II indicate that this measure has high reliability and validity for the Iranian population [28]. Internal consistency was excellent for this sample ($\alpha=0.86$).

3. Results

There were 13 outliers, and in order to enhance the empirical benefits, such as reducing errors of inference and enhancing accuracy of estimates [29], eliminated. Data normality was evaluated and skewness and kurtosis were appropriate within 1 and -1. Results have shown that 102 males, 169 females were participated, and their ages ranged from 18 to 36 (Mean age=23.3; SD=3.5). Regarding participants' degree, 172(63.5) were undergraduate, and 99(36.5) were master students. The means, standard deviations and bivariate correlations among variables are showed in Table 1.

Depression had a significant correlation with neuroticism ($r=0.66$, $P<0.0001$), cognitive flexibility ($r=-0.36$, $P<0.0001$), shame ($r=0.39$, $P<0.0001$), and emotion dysregulation ($r=0.59$, $P<0.0001$). Cognitive flexibility was significantly associated with shame ($r=-0.37$, $P<0.0001$) and emotion dysregulation ($r=-0.40$, $P<0.0001$). Though based on shared variance (r^2), represented a distinct construct. Shame also had a significant association with emotion dysregulation ($r=0.45$, $P<0.0001$).

For the evaluation effect of cognitive flexibility, shame, emotion dysregulation, and neuroticism on depression, multiple regression was conducted, and another model was run with three subscales of Cognitive Flexibility Inventory (CFI) and six subscales of difficulty in emotion dysregulation scale (DERS) (Table 2). Using the enter method, it was found that only neuroticism and DERS explained a significant amount of the variance in the value of depression ($F=61.32$, $P<0.0001$, $R^2=0.48$, R^2 Adjusted=0.47).

To examine whether the CFI, TOSCA- SHAME and DERS mediated the neuroticism-depression relationship, a total mediation model was evaluated. The model's fit was estimated (Figure 1), and Amos 22 was conducted for this purpose. The results showed that the total mediation model had a poor fit to the data, $CMIN=87$, $P<0.0001$, $CMIN/df=21.75$, $GFI=88$, $AGFI=55$, $NFI=82$, $CFI=82$, $RMSEA=28$. In this model, only emotion dysregulation was the mediator between the relationship of neuroticism-depression ($P<0.0001$). It is necessary that models could fit the data equally well or better evaluated. Therefore, the path of TOSCA-shame and CFI to depression had the non-significant coefficient removed, and new paths were determined (Figure 1).

The results related to alternative model have been shown in Table 3. In this model, all direct and indirect effects were significant at the <0.001 level. If value of $CMIN/df$ is between 2 to 3, it will be acceptable ($CMIN/df$ was =2.8). Values higher than 0.95 in NFI and CFI indicate good model fit (respectively was 0.98 and 0.99).

Table 1. Means, standard deviations, and bivariate correlations (n=271)

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
BDI-II	13.1	80.3	1										
Neuroticism	22.1	70.8	0.657**	1									
CFI	104.1	12.1	-0.362**	-0.423**	1								
Shame	41.2	8.6	0.387**	0.415**	-0.365**	1							
DERS	89.3	20.5	0.585**	0.664**	-0.401**	0.449**	1						
Awareness	13.8	3.8	0.179**	0.075	-0.095	0.020	0.318**	1					
Clarity	13	3	0.267**	0.192**	0.082	0.135*	0.394**	0.486**	1				
Non acceptance	13.4	5.4	0.389**	0.471**	-0.240**	0.380**	0.778**	0.108*	0.238**	1			
Strategies	18.9	7	0.564**	0.692**	-0.427**	0.402**	0.863**	0.089	0.187**	0.603**	1		
Impulse	15.2	5.2	0.458**	0.540**	-0.436**	0.337**	0.801**	0.002	0.052	0.513**	0.675**	1	
Goals	15.1	4.5	0.449**	0.549**	-0.333**	0.453**	0.796**	-0.003	0.068	0.544**	0.654**	0.679**	1

** P<0.01 level; * P<0.05 level; BDI-II: Beck Depression Inventory-II; CFI: Cognitive Flexibility Inventory; DERS: Difficulties in Emotion Regulation Scale

Table 2. Standardized regression coefficients for depression

Y	Model	SE	Beta	t	Sig.
1	Neuroticism	0.065	0.451	7.353	0.000
	Cognitive Flexibility Inventory (CFI)	0.033	-0.050	-0.983	0.326
	TOSCA- shame	0.049	0.079	1.534	0.126
	Difficulties in Emotion Regulation Scale (DERS)	0.025	0.231	3.746	0.000
2	Alternative	0.063	-0.033	-0.630	0.529
	Control	0.060	-0.253	-4.377	0.000
	Alternatives for behaviors	0.178	0.121	2.412	0.017
	Awareness	0.120	0.069	1.245	0.214
	Clarity	0.157	0.189	3.307	0.001
	Non acceptance	0.095	-0.022	-0.347	0.729
	Strategies	0.088	0.321	4.334	0.000
	Impulse	0.128	0.092	1.129	0.260
Goals	0.145	0.057	0.723	0.471	

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4. Discussion

The current study evaluated the three possible mediating mechanisms underlying neuroticism and depression among undergraduate and graduate university students. The results demonstrate that emotion dysregulation mediates this relationship, but shame was not a significant mediator. These findings concur with another study on adolescents that found shame does not have a mediating role in the neuroticism-depression relationship [2]. Unexpectedly, cognitive flexibility also was not the

mediator. This could be due to the measure used in this study (Cognitive Flexibility Inventory). As mentioned earlier, CFI measures a different facet of cognitive flexibility compared with neuropsychological tools [21]. Future works should examine cognitive flexibility as a mediator of depression using neuropsychological measures. Beside this, some study suggests that flexibility in general were not related to depression and were just seen in moderate to severely depressed individuals [30]. In this study, depression in students was mild, although shame and cognitive flexibility significantly correlated

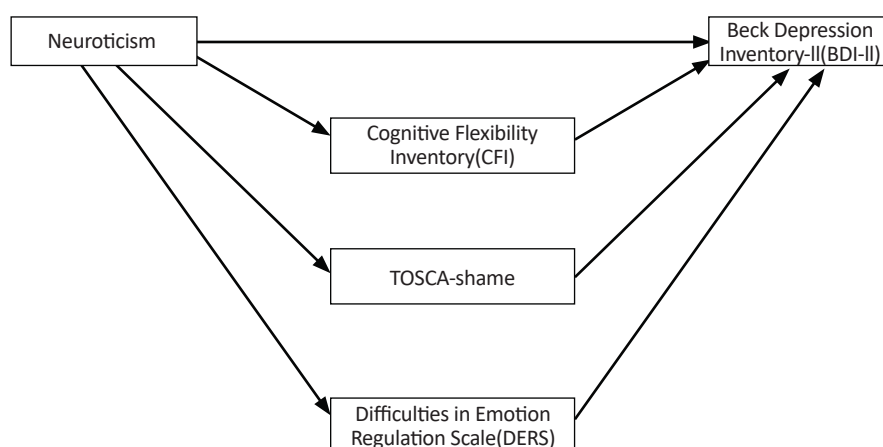


Figure 1. Proposed model

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Table 3. Fit indices for structural models of depression

	CMIN	Sig.	CMIN/df	GFI	AGFI	NFI	CFI	RMSEA
Default model	8.4	0.038	2.80	0.99	0.94	0.98	0.99	0.08

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CMIN: Chi-Square; CMIN/df: Ratio of Chi-Square statistic to degrees of freedom; GFI: Goodness of Fit Index; AGFI: Adjusted Goodness of Fit Index; NFI: Normed Fit Index; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation

with depression. In summary, assessing each of the three variables simultaneously distinguished emotion dysregulation as the main critical mediator of the neuroticism/depression relationship, over and above the effects of cognitive flexibility and shame.

Neuroticism significantly predicted depression, which is consistent with previous studies [5, 30], and it was predicted by all three proposed mediators. Neuroticism is a comprehensive personality trait that is associated with many types of psychopathology, and this study has shown how neuroticism leads to depression. Specifically, increased neuroticism is related to greater emotion dysregulation, which, in turn, is related to greater depression. In comparison, shame and cognitive flexibility might be more applicable for different issues identified with neuroticism, such as anxiety or addiction [2, 31].

Shame and cognitive flexibility with indirect path to depression were removed in the proposed model, and two new paths (CFI to shame and shame to DERS) were added. In line with predictions, cognitive flexibility was significantly associated with shame, which was significantly associated with emotion dysregulation; this is consistent with past work [13]. This study examined CFI and DERS sub-factors as predictors of depression. Two subscales of cognitive flexibility (Control and alternatives for human behaviors) were the predictors of depression. The lack of strategies to regulate emotions and clarity were the two significant predictors replicating prior studies [32]; the other four sub-scales of DERS (impulse control, nonacceptance, awareness, and difficulties in goal directed behavior) were not.

These findings suggest that emotion regulation difficulty was a significant mediator on the neuroticism/depression relationship, which is in line with theories that explain how neuroticism may be related to depression. For example, personality trait neuroticism inclines individuals to experience negative mental states and life occasions [25]. Emotion dysregulation may keep people from involving in more appropriate and adaptive behavior; this is consistent with Hofmann et al. (2012)'s model of depression

and anxiety [33]. Nevertheless, emotion dysregulation may be most relevant for students with depression.

The capacity to regulate emotions may help to prevent more severe depression and adaptively cope to neuroticism in alignment with theoretical models that emphasize on the procedures of cognitive flexibility and emotion dysregulation. Flexibility has been found to boost after both cognitive-behavioral treatment (CBT) and acceptance and commitment therapy (ACT); However, ACT resulted more prominent flexibility at follow-up [34]. With regards to emotion dysregulation, many treatments such as contextual emotion regulation therapy [35] and emotion regulation therapy [36] may be useful but needs further development.

The current study is limited in that data were self-reported and cross-sectional, preventing the examination of causal hypotheses. Future research is needed to analyze these factors longitudinally, and more studies should be done on the population of depressed patients. Finally, further research is needed to better uncover the significance of these findings for other problems such as people with eating disorders and substance use.

5. Conclusion

The results of this study revealed that the neuroticism significantly predicted difficulties in emotion regulation, which in turn predicted depression. The relationship between neuroticism and depressive symptoms was not mediated by cognitive flexibility and shame. These results suggest that emotion regulation ought to be considered among the association of temperamental factors, such as neuroticism, and psychological symptoms of depression.

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Conflict of Interest

The authors declared no Conflicts of interest.

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