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The correlation of neuroticism with symptoms of depression and anxiety in students according to the mediating role of worry and rumination

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Abstract

Different models and studies have tried to define symptoms of depression and anxiety through examining the correlation between cognitive and personality variables. In this respect, this study was conducted to determine the role of worry and rumination in the correlation between neuroticism and symptoms of depression and anxiety in students. The participants included 210 university students (164 females and 46 males). The students completed the Penn state worry questionnaire, Zung depression scale, ruminative responses scale of Nolen-Hoeksema and Morrow, Spielberger's trait anxiety subscale, and neuroticism subscale of the NEO personality inventory. The data were analyzed using structural equation modeling. The results showed that the neurotic and ruminative variables respectively showed the highest effect on depression. Based on the path analysis, the indirect effect of worry on depression was significant. The correlation of anxiety with variables of worry, rumination, and neuroticism in the structural equation modeling was insignificant and was consequently ignored. However, worry and neuroticism significantly correlated with rumination. The variables of worry, rumination, and neuroticism could predict depression in the students.

Keywords: Anxiety, Depression, Neuroticism, Rumination, Worry

Introduction

Most people may get depressed following different life situations [1]. Depression is a common psychiatric disorder that is not bound to a specific place, time, and person and involves all classes of the society [2]. The prevalence of depression in the Communities varies between 10% and 21% [3]. The prevalence of depression among Iran's general population is 0.37%-4.2% [4]. The prevalence of depression in Iranian students is 20%-61% [4]. The diagnosis of depression in DSM-IV-TR requires the persistence of depressive symptoms for at least two weeks. These symptoms include the depressive mood or diminished interest or pleasure. At least, four other symptoms, such as changes in sleep, appetite, and attention; feelings of worthlessness; suicidal ideation, and psychomotor agitation or retardation should appear [1]. Depression has been the focus of many studies not only for its relative high prevalence but also its harmful consequences, including hospitalization and

suicide. Depression reduces the abilities and productivity, forecloses the decision-making power, and diminishes people's self-care ability, and consequently, people lose their independence and self-confidence and become dependent and disabled [5].

Anxiety is usually defined as a scattered, ambiguous, and unpleasant feeling of fear and inquietude. Anxious people are worried particularly about unknown dangers. Moreover, anxious people show a combination of symptoms, such as palpitations, shortness of breath, diarrhea, anorexia, lethargy, dizziness, sweating, insomnia, frequent urination, and shaking [6]. Anxiety disorders are of the most common psychiatric disorders in the general population. About 30 million people in the United States suffer these disorders [7]. According to the study conducted in Iran, anxiety is second to depression in mental disorders with a prevalence of 2.3% [8]. University students face with various stressors, including expenses, difficulty in compliance with educational system, unclear future, pressures of courses, new lifestyle, disturbed hours of sleeping and waking, living in dormitories, shortage of time and recreational facilities, parents' expectation of their progress, exams, and assignments [9]. The severe or chronic anxiety is harmful and plays an important role in incidence of psychosomatic diseases, such as hypertension, coronary heart disease, and angina pectoris, and it is believed that the high level of anxiety affects students' health [9]. Different models and studies have tried to define symptoms of depression and anxiety through examining the correlation between cognitive and personality variables [10,11]. Based on the available studies conducted on clinical [11] and non-clinical [10] groups, Muris, Rassin, Roelofs, Franken, and Mayer [10] proposed a mediating model that discusses the correlation of variables with depression and anxiety. In that model, worry and rumination are mediators of the correlation of neuroticism with depression and anxiety as shown in Figure 1 and 2.

The first component in prediction of depression and anxiety is rumination. The metacognition approach toward emotional disorders introduced rumination as a major component in incidence and persistence of depression [12]. Rumination is a series of passive thoughts, which recur and impair adaptive problem-solving, and lead to more

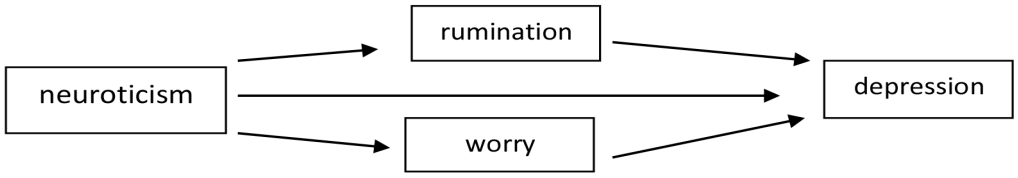

Figure 1 *Model of depression[13]*

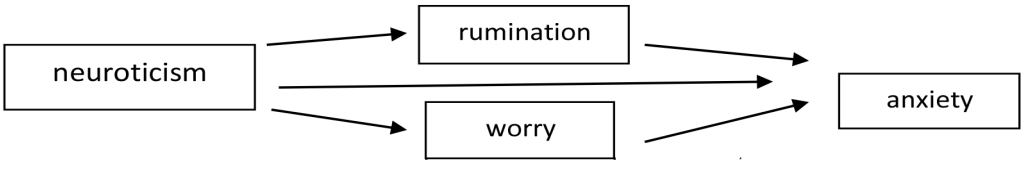

Figure 2 *Model of anxiety[13]*

negative thoughts. Such a manner of thinking is observed in some emotional disorders, including depression [13,14], obsession-compulsion disorder (OCD), generalized anxiety, and post-traumatic stress disorder [14]. Many models and definitions have been presented for rumination, and the most powerful theory in this regard is Nolen-Hoeksema's response styles theory. The theory defines rumination as recurring thoughts about symptoms, possible causes, and consequences of depression, which intensifies and perpetuates depression through increasing negative thinking, inefficient problem-solving, interfering with purposeful

behavior, and reducing the social support. Various trials and cross-sectional studies have shown that rumination is a powerful predictor of symptoms of depression and onset of severe depression periods and is followed by lower social support and optimism and higher neuroticism [15]. In this regard, Verstaeten et al. found that the mediating effect of rumination on the correlation between negative emotions and depression in adolescents was significant [16]. Results of the study conducted by Bagherinejad, Salehi, and Tabatabaei [16] also showed that rumination could predict the level of depression even after controlling the level of anxiety. Most studies performed on the correlation between rumination and mental disorders have emphasized on the correlation between rumination and depression, while, some other studies examined the correlation of rumination with anxiety [10] and also with both disorders [17]. However, other studies showed that rumination occurred both in clinical population [18] and in non-clinical population [19] and did not depend on any psychological disorders [18].
The second component for prediction of depression and anxiety is worry. Negative thoughts have been recently introduced as the key characteristic of anxiety and depression disorders. These thoughts may appear in anxiety as worry that is defined as a fearful expectation of the possible negative consequences of impending events [20]. Although ruminative thoughts are typically associated with feeling sad/depressed about past events, worrisome thoughts are associated with anxiety about imminent events [21]. Worry is a normal cognitive phenomenon that all people experience in a specific time of life although the severity, frequency, and controllability of worry in normal people differ from those in patients with generalized anxiety disorder [22]. Worry damages people's functioning. Moreover, worry is the main characteristic of generalized anxiety disorder (GAD) [23]. The prevalence of worry in America is 5%-10% [24], while, recent studies estimated it up to 25% [25]. Few studies have been performed on worry in Iran. Based on Ghaffari et al.'s study, over 35% of university students suffer moderate to severe worry, which was higher than that in reports of other countries [23]. In their study on university students, Nikbakht Nasrabadi et al. reported the level of severe worry and moderate worry as 4.8% and 34.3%, respectively [26]. Previous studies showed that worry was associated with the increased risk of mental, social, and occupational disorders, the increased use of health services and physical problems in the society [26], besides causing functional impairment and distress. Some other studies showed that worry reduced body's strength against infections and also stimulated thyroid, pancreas, and pituitary. Worry predicts the concurrent and imminent anxiety [27]. Studies show that worry is exclusively associated with anxiety and depression [27]. Fresco, Franke, Mennin, and Heimberg reported the correlation of worry with rumination, anxiety, and depression in their studies. Some scholars concluded that worry and rumination are manifestations of the vulnerability factor of neuroticism, which indicated the development of psychopathological symptoms, such as anxiety and depression [28]. Therefore, worry is another risk factor of neuroticism, which intends to have negative emotions, including fear, sorrow, arousal, anger, feelings of guilt, and feelings of permanent and generalized frustration. People with high degrees of worry are more likely to have illogical beliefs, lower ability to control impulses, and lower compatibility with others and stressful situations [29]. There is evidence showing that worry and rumination are fundamentally related to neuroticism [10,11]. In Muris et al.'s proposed model [10], the correlation of neuroticism with anxiety and depression was significant.
Generally, regarding the ambiguity of the correlation of rumination and worry with anxiety and depression, and that no study had examined the correlation of worry, rumination, and neuroticism with depression and anxiety simultaneously and these variables in combination in university students in Iran; the present study was conducted to examine whether worry and rumination played a mediating role in the correlation of neuroticism

with symptoms of anxiety and depression; whether the predictive variables were valid, and whether symptoms of anxiety and depression in the students participating in this study were defined using the intended model. The results of this study provide appropriate applied knowledge for psychologists and clinicians for defining and conceptualizing anxiety and depression according to cognitive mediating variables and for cognitive therapy of depression and anxiety besides fundamental knowledge about the correlation of cognitive variables with depression and anxiety.

Method

This correlational study was conducted on a population students of Talesh Payam-e Noor University, Iran, in 2012-2013. Considering that the minimum sample size in structural equation modeling was 200 participant, 210 students (164 females and 46 males) majoring in humanities were selected through stratified random sampling in a way that the proportions were chosen as the strata, and their proportion in the society was also taken into account in the main sample. Upon obtaining participants' consent, the Penn state worry questionnaire, Zung self-rating depression scale, ruminative responses scale of Nolen-Hoeksema and Morrow, Spielberger's trait anxiety subscale, and neuroticism subscale of the NEO personality inventory were completed by the participants. About 10 participants were excluded from the statistical analysis due to their incomplete answers to the scales. In this respect, the studied participants comprised 200 students (157 females and 43 males). The structural equation modeling and LISREL 8.18 software were used to the data. Mean age of the participants was 23.04 ± 5.05 years (range: 18-48 years); mean age of male students was 23.33 ± 6.03 years (range: 18-43 years), and mean age of female students was 22.96 ± 4.76 years (range: 18-48 years).

The Penn State Worry Questionnaire (PSWQ) was developed with 16 items by Meyer et al. in 1990. The participants chose one of the options: strongly disagree, disagree, slightly disagree, agree, and strongly agree, which were scored 0, 1, 2, 3, and 4 points, respectively. The Cronbach's alpha and reliability coefficient of the retest after four weeks was 0.93. Hedayati et al. (quoted from 26) reported the Cronbach's alpha as 0.91 and 0.68, respectively. They reported a significant correlation coefficient of the test in relation to depression, anxiety, and self-esteem [26]. The present study also obtained the Cronbach's alpha as 0.81.

The revised Zung depression scale has been used in clinical and intercultural studies and also studies on the prevalence of depression in normal population. A 20-item self-report depression scale was developed from Zung depression scale to be used as a semi-structured instrument by the participants for rating depression. The participants chose one of the options, including never (1), sometimes (2), often (3), and always (4) for each item. Maximum and minimum score obtained by each participant in this scale was 20 and 80, respectively. The items 2, 5, 6, 11, 12, 14, 16, 17, 18, and 20 were scored inversely, that is, 4, 3, 2, and 1; and other items were scored directly, 1, 2, 3, and 4.

The validity of Zung depression scale was 0.73. Zung depression scale significantly correlated with Beck depression inventory and depression scale of Minnesota multiphasic personality inventory [30]. The internal consistency coefficient of the scale was obtained as 0.68 using the Cronbach's alpha.

Spielberger's state-trait anxiety scale was developed and validated in 1970. The scale consists of 40 items and two subscales, state anxiety and trait anxiety. In the present study, 20 itmes related to trait anxiety were used to measure anxiety. To answer the trait anxiety subscale, the participants should choose "almost never" (1), "sometimes" (2), "often" (3), and "almost always" (4), which shows their usual feeling. The scale had been normalized on females and males by Mehramadar in Mashhad in 1993. He reported the internal consistency of the trait anxiety and state anxiety using the Cronbach's alpha as 0.91 and 0.90, respectively. Spielberger et al. reported the Cronbach's alpha for the trait anxiety as 0.90. Moreover, they

obtained the coefficients of retest for the trait anxiety from 0.73 to 0.86 [30]. Abolghasemi [30] reported the Cronbach's alpha, split-half coefficient, and retest reliability coefficient for the trait anxiety subscale as 0.81, 0.79, and 0.64, respectively. Spielberger et al. used the concurrent criterion validity to examine the validity of the scale. They reported the correlation of trait anxiety and state anxiety subscales with mental fatigue scale of Minnesota multiphasic personality inventory as 0.79 and 0.81, respectively [30]. In their study on university students, Damon, Hall, and Stout [30] concluded that Spielberger's trait anxiety subscale correlated with the test anxiety inventory, worry, and affectivity by 0.54, 0.52, and 0.47, respectively ($p<0.01$). Abolghasemi used the progress- inhibiting and facilitating anxiety test to examine the validity of trait-state anxiety scale and showed that the correlation between trait anxiety subscale and the inhibiting ($r=0.56$) and facilitating ($r=-0.28$) anxiety subscale was significant [30]. The present study obtained 0.56 for the Cronbach's alpha.

Nolen-Hoeksema and Morrow developed a self-report questionnaire that evaluated four different styles of reaction to the negative mood in 1991. The response styles questionnaire (RSQ) consists of two subscales, including ruminative response scale and distraction response scale (DRS). The ruminative response scale contains 22 items, and the participants are asked to rank each item from 1 (never) to 4 (often). According to experimental evidence, the ruminative response scale has a high internal consistency, and the Cronbach's alpha ranges 0.88-0.92. Different studies showed that the retest correlation coefficient for ruminative responses is 0.67 [15]. The Cronbach's alpha was 0.81 in the present study.

The brief version of NEO personality inventory: NEO personality inventory, developed by McCrae and Costa in 1992, consists of 60 items scoring within the 5-point Likert scale. The inventory measures 5 major personality factors, including neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Each factor contains 12 items. The neuroticism subscale of the inventory was used to measure neuroticism. Costa and Mc Crae reported the Cronbach's alpha from 0.68 (for agreeableness) to 0.86 (for neuroticism) in 1992. The inventory was normalized in Iran by Garousi who validated the inventory on 208 university students using test-retest method with 3 months interval as 0.83 for the neuroticism factor. The concurrent validation of this inventory and Myers-Briggs type indicator questionnaire, Minnesota multiphasic personality inventory, California psychological inventory-revised, Guilford-Zimmerman temperament survey, list of streaks, and interpersonal streak scale showed a high correlation [Quoted from 31]. The Cronbach's alpha for this subscale was obtained as 0.54.

Results

Table 1 shows the mean, standard deviation, and correlation matrix of rumination, worry, and neuroticism with symptoms of depression and anxiety

As shown in Table 1, anxiety had a significant positive correlation with rumination ($r=0.544$, $p<0.01$), neuroticism ($r=0.467$, $p<0.01$), and worry ($r=0.334$, $p<0.01$). Moreover, depression had a significant positive correlation with neuroticism ($r=0.493$, $p<0.01$), rumination ($r=0.355$, $p<0.01$), and worry ($r=0.219$, $p<0.01$). The goodness of fit indexes obtained from the data using the structural equation modeling will be presented within a theoretical model later in this study. Among the various fit indexes, the Chi-square index ($\chi 2$), comparative fit index (CFI), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), root-mean-square residual (RMR), and root-mean-square error of approximation (RMSEA) were used in this study.

According to the results shown in Table 2, which shows GFIs of the proposed model, the $\chi 2$ / df for the following good models should be 3, while, it was much higher than 3 in this study. Moreover, the RMSEA, which has been usually over 0.10 in weak models, was obtained as 0.445 in this study. The GFI, Tucker-Lewis index (TLI), and AGFI were not valid. The obtained RMR, which has been lower than 0.05 for good models, was not valid in this study. Regarding the obtained indexes, the data collected using the initial model of the study

Table 1 *Mean, standard deviation and correlation matrix rumination, worry and neuroticism with anxiety and depression*

	Mean	SD	1	2	3	4	5
Rumination(1)	47.44	11.24	-				
Worry(2)	31.87	9.17	0.46**	-			
Neuroticism(3)	19.56	4.57	0.38**	0.15*	-		
Anxiety(4)	45.52	7.75	0.45**	0.33**	0.46**	-	
Depression(5)	44.8	7	0.35**	0.21**	0.49**	0.56**	-

*p<0.01, **p<0.05

Table 2 Statistical parameters fitness compliance

RMSEA	RMR	AGFI	GFI	CFI	p-value	χ2
0.445	13.46	0.082	0.91	0.72	0.001	40.23

were not fit enough for explaining depression.

Based on the modification indexes and the review of literature, the final modified model was presented in Figure 3. Furthermore, GFIs of the final modified model along with statistical indexes were shown in Table 3.

As shown in Table 3, χ2/df index was lower than 3. Moreover, the RMSEA was obtained as 0.05, which has been lower than 0.05 for good models. The CFI, TLI, and AGFI were calculated as 1,

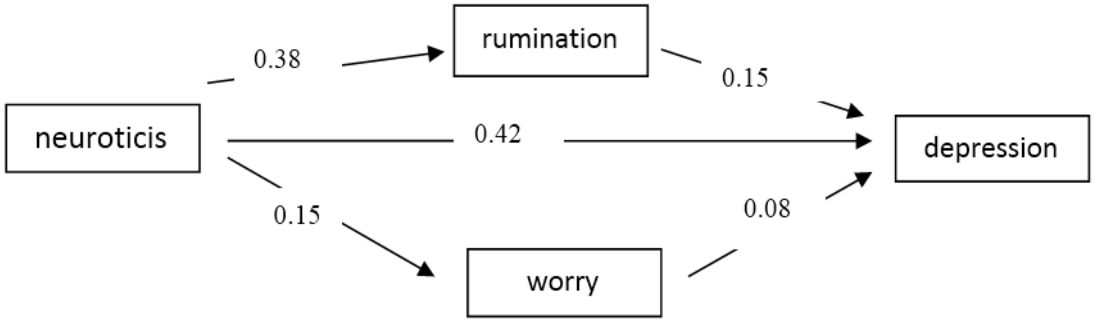

Figure 3 *The primary model parameters predict depression*

0.98, and 0.96, respectively. These indexes have been over 0.9 for good models. The RMR has been 0.05 for good models, while, a lower value was obtained in this study. Considering the above-mentioned indexes, the final modified model was fit for the obtained data. In the following, based

Table3 *Statistical indicators of initial model of depression*

RMSEA	RMR	AGFI	GFI	CFI	P	χ2/df
0.052	0.02	0.96	1	1	0.22	1.52

on the revised indicators and research background, the modified model presented in Figure 3. In addition, indicators of goodness of fit of the final model modified with statistical indicators presented in Table 3. Figure 4 shows path coefficients for the proposed correlations between variables in the model. The final modified model and its statistical indexes are presented in Figure 4. According to the figure, neuroticism, among the exogenous variables of the study, directly influenced the depression (β=0.42). Of the independent endogenous variables, only rumination had a direct impact (β=0.19). The analysis of the total effects of exogenous and endogenous variables showed that neuroticism (β=0.42) and rumination (β=0.19) respectively had the highest effect on depression. Furthermore, the correlation of worry and neuroticism with rumination had not been predicted in the initial proposed model; however, the theoretical and conceptual models were formulated on the basis of previous studies, that is, a model could be formulated for a correlation in a subject

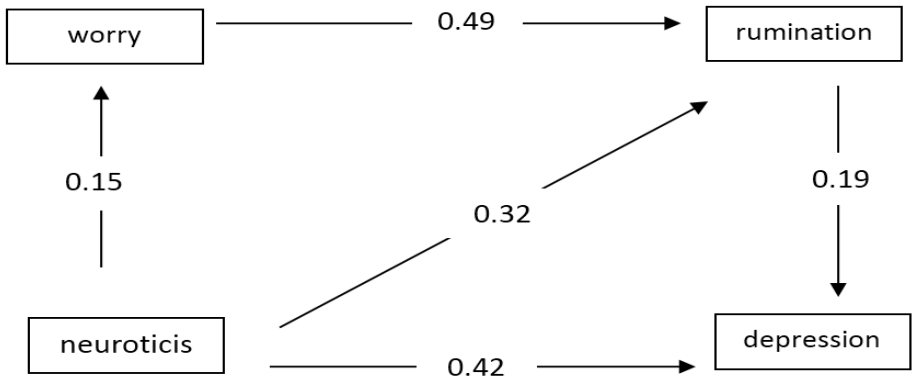

Figure 4 *Path and estimate of the parameters of final model and improved prediction depression*

matter if results of different correlational studies would have shown that correlation frequently. Given that the modification indexes indicated the correlation of worry and neuroticism with rumination in this study, and based on the previous studies (12, 13, 21, 7), the conceptual model was modified and retested. The path analysis of anxiety and the table representing its statistical indexes will be shown later. According to Table 4, GFIs related to the anxiety model proposed in this study did not match the standard indexes. Therefore, it could be concluded that the conceptual model was not fit for the obtained data because the $\chi 2/df$ index and RMSEA of an appropriate fitted model should be less than 3 and 0.05, respectively. The CFI (1), TLI (0.98), and AGFI (0.96) should be over 0.9 for good models; and RMR should be less than 0.05.

Table 4 *Statistical indicators of primary model of anxiety*

RMSEA	RMR	AGFI	GFI	CFI	P	$\chi 2/df$
0.471	11.13	0.06	0.402	0.33	0.001	45.17

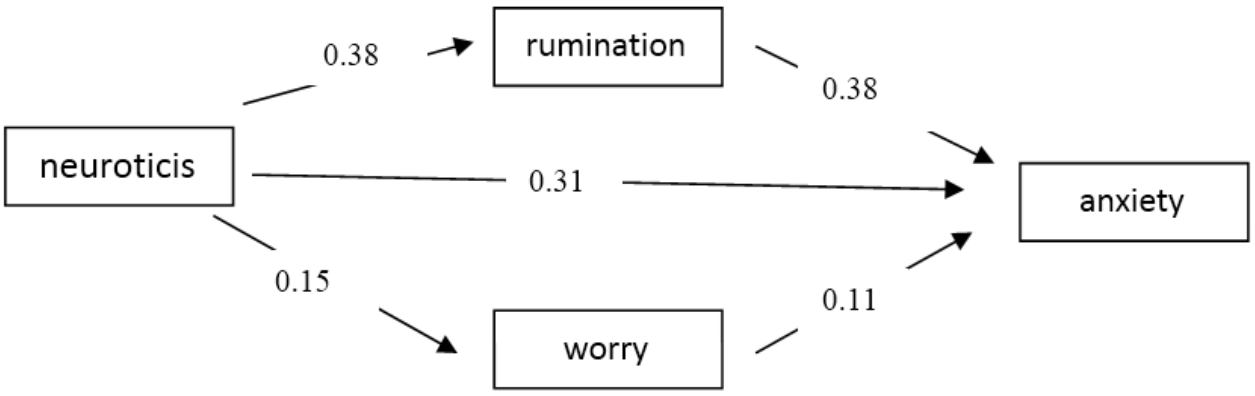

Figure 5 *Path and estimation of the parameters of the initial model predicting the anxiety in students*

Discussions

This study was conducted to determine the role of worry and rumination in the correlation between neuroticism and symptoms of depression and anxiety in university students. The first result of this study showed the correlation of worry with depression due to the mediating role of rumination. In other words, worried people had symptoms of depression due to their rumination. Many studies showed the correlation of worry and rumination with symptoms of depression [17]. The ruminative responses correlated with lower adaptability, animosity, and stress. Even, some people believe that the metacognitive beliefs about advantages of worry and rumination are effective in persistence of depression. This indicates the theory of Papageorgiou and Wells about the relationship between negative emotions and rumination that create a vicious cycle; that is, people with ruminative response styles isolate themselves

from others and think about the root of their problem without taking action to solve the problem. Such people are also worried about their rumination and mental states and tend to use the rumination in response to negative moods. The rumination itself highlights the effects of negative moods, and consequently, people's concentration and performance are disturbed. Segerstrom, Tsao, Alden, and Craske [29] reported a fundamental correlation between rumination and worry in clinical and non-clinical participants. Papageorgiou and Wells [22] believe that rumination and worry correlate with each other because worry as a chain of negative thoughts, imaginations, and emotions is heavy and uncontrollable. Worry is involved in the persistence of negative emotions and impaired cognitive skills [15]. Some psychologists take worry as a kind of emotional avoidance response that reduces distress in the short term and makes people prevent the incidence of more severe negative emotions [27]. However, unlike self-protection function of worry, it may cause depressive symptoms and underestimation of coping skills. Many people believe that when they get depressed, they should try to concentrate on their inside because they think that such an assessment and concentration help them to find a solution for their problem. Therefore, they would be involved in rumination that makes depression persistent [32]. In their studies, Ryan and Dahlen [33] and Garnovsky et al. [34] showed that most depressed people used emotion-regulatory negative strategies, such as rumination, catastrophization, and self-blame, while facing with adverse situations. Theories, including mindfulness-based cognitive therapy and self-regulatory executive function model, introduced the cessation of ruminative cycles as the goal of their techniques for reducing the relapse of depression and treating it [34].

Another result of the present study showed the significance of the analyzed path of neuroticism with symptoms of depression. The result conformed to that of previous studies that showed a correlation between neuroticism and negative moods [35]. Chiukuta and Steel [36] reported a significant positive correlation between neuroticism and depression. Results obtained from genetic analyses and longitudinal studies indicated that neuroticism strongly predisposes depression [32]. To explain the result, it can be argued that neuroticism is the negative pole of emotional stability, and the emotional instability plays an important role in development and stability of negative moods. Neuroticism is a vulnerability factor for depression cycles. It is predicted that people with high levels of neuroticism are subject to negative emotions, instability, and arousal and can grow the symptoms of depression, including disappointment, distress, interpersonal problems, low self-esteem, and so forth in themselves. Moreover, most specialists showed that disappointed people are recognized with regard to their high level of neuroticism, and this result can explain the correlation between neuroticism and negative emotions [37]. Various studies showed that people with high level of neuroticism assessed the insignificant negative stimuli similar to severe negative pressures [38]. High neuroticism causes insecurity and pessimism in social relations, anger, and aggressiveness in people, as those people who cannot control their emotions while facing with conflicts feel distressed and down [39].

On the significant correlation of neuroticism with worry and rumination in this study, which conformed to that in previous studies [8,40], it seems that neuroticism is the common characteristic of the cognitive factors, worry and rumination. Furthermore, some people believe that ruminative response styles can be considered as a cognitive manifestation of neuroticism. This result may conform to that in Segerstrom et al's study in which rumination and worry can be considered as psychopathology associated with unproductive and iterative thoughts. Rumination and worry in people with high levels of neuroticism are raised when facing with high levels of stress or threat. People with high levels of neuroticism have more illogical emotions, less ability to inhibit impulsive

behavior, weakness in dealing with problems, animosity, depression, shyness, and vulnerability [29]. Neuroticism may cause depressive symptoms through negative orientations toward attention and memory and ruminative cognitive and behavioral styles [13].

The result on the correlation of neuroticism, worry, and rumination with anxiety in this study was not significant, which disagreed to the result in studies conducted by Muris et al. [12]; Roelofs, Huibers, Peeters, Arntz, and Van Os [13], probably due to the different statistical population and measurement instruments of these studies. The role of cultural differences should not be ignored in this regard. Moreover, unlike other studies, the population of the present study was non-clinical, not people with anxiety disorders; and the different nature and severity of these components could be influential.

Some limitations of this study were as follows: firstly, the studied population were university students with symptoms of depression and anxiety, and thus, the generalization of the results over other populations is limited. In this regard, it is recommended to perform similar studies on other groups, including clinical populations. Secondly, the sex-related differences could not be compared due to the large number of females. Therefore, future studies are recommended to take into account the sex-related differences. Thirdly, the data collected from the self-assessment instruments were another limitation of the study. In this respect, other researchers are recommended to use the data obtained from clinical specialists' assessment besides the self-assessment data in order to prevent the biases arising from nature of the data. It is recommended to use the full version of NEO personality inventory due to its more favorable validity and reliability than the brief form. Such recommendations may reveal new models of correlations, which can develop this study's theories effectively.

Conclusion

In general, the results indicated the correlation of cognitive and personality factors with depression in the students. Regarding the role of university students in future development of the society and the effect of depression on students' self-concept, environmental conditions, compatibility, and reactions against environmental changes, the results of this study can be applied clinically and be effective in treatment of depression relying on specific strategies for reducing ruminations and worries. Therefore, future studies can examine the change or reduction of negative cognitive components during different treatments, especially cognitive therapy.

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Contribution

Study design: FMM
Data collection and analysis: SA
Manuscript preparation: FMM, SA

Conflict of Interest

"The authors declare that they have no competing interests."

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