



# The mediating effect of resilience on the relationship between the academic burnout and psychological well-being of medical students

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**Purpose:** This study aimed to examine the mediating effect of resilience on the relationship between academic burnout and psychological well-being of medical students.

**Methods:** The participants were a group of 97 medical students. Scales measuring Maslach Burnout Inventory-Student Survey, Ryff's Psychological Well-Being, and Korean Resilience Quotient-53 were utilized. The data were analyzed by descriptive statistics, correlation analysis, t-test, and multiple regression analyses using IBM SPSS ver. 22.0 (IBM Corp., Armonk, USA).

**Results:** According to the study results, the medical students' psychological well-being was negatively correlated with their academic burnout and positively correlated with their resilience; the degree of academic burnout experienced by the first and second year preclinical students was greater than that experienced by the third and fourth year clinical students; the male students' average score for cynicism was higher than that of the female students; and the significant effects of academic burnout on the medical students' psychological well-being were mediated by resilience.

**Conclusion:** It was confirmed that medical students' academic burnout and resilience are significant factors that explain their psychological well-being; resilience is also an important variable in improving psychological well-being. This suggests that education and counseling support are needed to increase medical students' resilience in order to increase their psychological well-being.

**Key Words:** Burnout, Medical student, Resilience, Psychological well-being

## Introduction

Korean university students are considered as adult members of the Korean society when they graduate from high school; thereafter, they are subject to hardships in adapting to simultaneous physical, psychological, and social changes. Students who have not yet established their ego-identity are burdened with overwhelming

responsibility and, in contrast to high school life, university life requires them to actively handle various situations leading to higher levels of experienced confusion [1]. This phenomenon also applies to medical students [2-4]. Because medical students are accepted as professionals in society, in the sense that they are recognized as "medical physicians" who are required to sustain high levels of academic achievement to reach the desired professionalism, they consequently experience

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overwhelming academic workload.

Academic burnout includes the concepts of overwhelming emotional exhaustion, cynicism due to academic workload, and feelings of inefficacy due to excessive academic demand. Medical students are a group of individuals who experience a high probability of burnout because of their academic workload rather than the psychological burden of caring for the health of patients. A recent study revealed that 50%-60% of medical students experience academic burnout that leads to psychological stress [5]. Another similar investigation pertaining to medical students revealed that academic burnout led to distress. This study in particular noted that academic workload and overwhelming clinical clerkship schedules were related to academic burnout and that higher burnout consequently led to more frequent depression experiences and lower quality of life among medical students [6].

Although academic burnout is a negative risk factor for psychological well-being of medical students, increased scholarly attention has been given to resilience, which may play a role in the enhancement of psychological well-being in this cohort [7]. Resilience is the ability of an individual to find solutions to a problem or adopt adequate and flexible behaviors according to the demands of the situation when confronted with a negative one [8]. A prior study revealed that medical students displayed low resilience when experiencing stress with regard to interpersonal relationships, academic workload, and economic/monetary problems. These major stresses stemmed from experiencing death, disease, and sexual assault trauma [9]. In addition, it was shown that among medical students, stress related to everyday living including employment had a significantly negative impact on resilience, while stress due to problems in family relations also contributed to their low resilience.

Although the emergence of positive psychology has spurred active investigations into “happiness” in many fields, scholarly focus on medical students’ happiness is scarce. In the current study, we attempt to ascertain the relationship of medical students’ academic burnout and resilience with psychological well-being and to determine measures to enhance their psychological well-being.

To the above-mentioned ends, this study pursued the following research questions: What is the correlation among the variables of medical school students’ academic burnout, resilience, and psychological well-being? Is there a difference in these variables between genders and year levels? Is there a mediating effect of resilience on the relationship between medical school students’ academic burnout and psychological well-being?

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## Methods

### 1. Respondents

In 2017, a survey was administered to 170 students who were taking first to fourth year general medical courses in the Medical College of Ajou University in Gyeonggi-do, Korea. Out of these respondents, 73 were excluded because of their refusal to participate and careless responses to the questionnaire. This left us with a final sample of 97 students (response rate=57%).

This study was approved by the Institutional Review Board (IRB) of Ajou University Hospital (Ethics Consent no., AJIRB-SBR-SUR-17-268). The respondents signed on the informed consent form to take part in the study, as approved by the IRB.

## 2. Measures

### 1) Academic burnout

The Maslach Burnout Inventory–Student Survey developed by Schaufeli et al. [10] and was later validated by Lee and Lee [11] was utilized. This scale is composed of 14 questions, among which five are devoted to emotional exhaustion, five revolve around inefficacy, and four center on cynicism. The respondents rated each item on a 7–point Likert scale (1=“extremely disagree,” 7=“extremely agree”). The Cronbach’s  $\alpha$  of academic burnout was 0.873. For subscales, the Cronbach’s  $\alpha$  coefficients for emotional exhaustion, inefficacy, and cynicism were 0.904, 0.853, and 0.809, respectively.

### 2) Resilience

The Korean Resilience Quotient–53 was used to measure resilience. It is the modified version of the Resilience Quotient Test, which was developed by Reivich and Shatté [12] for adults and translated and modified by Shin et al. [13] for suitability to Koreans. The scale consists of nine sub–factors to which 53 questions are devoted. Of these questions, 18 revolve around self–regulatory ability (emotional control, impulse regulation, and cause analysis), 18 are related to interpersonal abilities (communication, sympathy, and self–expansion), and 17 are associated with positive attitudes (self–optimism, life satisfaction, and appreciation). The overall Cronbach’s  $\alpha$  of resilience was 0.933, while the Cronbach’s  $\alpha$  coefficients for self–regulatory ability, interpersonal abilities, and positive attitudes were 0.825, 0.856, and 0.899, respectively.

### 3) Psychological well–being

The Psychological Well–Being Scale developed by Ryff [14] and validated by Kim et al. [15] was used to measure students’ quality of life. The six dimensions are autonomy, positive relations with others, purpose in life, personal growth, self–acceptance, and environmental

mastery. The respondents were asked to rate the items on a 5–point Likert scale (1=“strongly disagree,” 5=“strongly agree”). The Cronbach’s  $\alpha$  of psychological well–being was 0.842. For subscales, the Cronbach’s  $\alpha$  coefficients for autonomy, positive relations with others, purpose in life, personal growth, self–acceptance, and environmental mastery were 0.658, 0.708, 0.560, 0.729, 0.669, and 0.420, respectively.

## 3. Analysis

Descriptive statistics were used to examine the respondents in terms of gender and year level. Correlation analysis was carried out to determine the correlations among sub–variables, and a t–test and analysis of variance were performed to analyze differences in variables between genders and year levels. The hierarchical multiple regression analysis was carried to look into whether resilience mediated the relationship between the respondents’ academic burnout and psychological well–being. Finally, the Sobel test was performed to verify the significance of the mediating effect.

## Results

### 1. Descriptive statistics and correlation analysis

The mean, standard deviations (SDs) of continuous variables, and Pearson correlation analyses are presented in Table 1. The academic burnout variable that obtained the highest score was emotional exhaustion (mean=5.09, SD=1.39), followed by cynicism (mean=4.09, SD=1.60) and inefficiency (mean=3.82, SD=1.18). The resilience variable that was scored the highest was interpersonal competencies (mean=3.54, SD=0.57), followed by positive attitudes (mean=3.51, SD=0.69) and self–regulation (mean=3.21, SD=0.53). The psychological well–being

Table 1. Descriptive Statistics and Correlations

	1	1-1	1-2	1-3	2	2-1	2-2	2-3	3	3-1	3-2	3-3	3-4	3-5	3-6
1. Academic burnout	1														
1-1. Emotional exhaustion	0.81**	1													
1-2. Inefficiency	0.77**	0.43**	1												
1-3. Cynicism	0.87**	0.56**	0.53**	1											
2. Resilience	-0.55**	-0.34**	-0.55**	-0.48**	1										
2-1. Self-regulation	-0.40**	-0.31**	-0.43**	-0.28**	0.83**	1									
2-2. Interpersonal competencies	-0.36**	-0.15	-0.41**	-0.33**	0.86**	0.60**	1								
2-3. Positive attitudes	-0.63**	-0.42**	-0.59**	-0.55**	0.88**	0.59**	0.62**	1							
3. Psychological well-being	-0.59**	-0.34**	-0.62**	-0.51**	0.84**	0.64**	0.71**	0.81**	1						
3-1. Autonomy	-0.21*	-0.09	-0.36**	-0.13	0.40**	0.42**	0.28**	0.40**	0.57**	1					
3-2. Positive relations with other	-0.32**	-0.17	-0.29**	-0.31**	0.65**	0.39**	0.73**	0.51**	0.63**	0.11	1				
3-3. Purpose in life	-0.45**	-0.27**	-0.37**	-0.46**	0.58**	0.44**	0.45**	0.55**	0.77**	0.32**	0.28**	1			
3-4. Personal growth	-0.34**	-0.14	-0.41**	-0.29**	0.57**	0.42**	0.49**	0.49**	0.78**	0.42**	0.40**	0.57**	1		
3-5. Self-acceptance	-0.56**	-0.30**	-0.62**	-0.48**	0.75**	0.55**	0.62**	0.78**	0.80**	0.36**	0.48**	0.53**	0.45**	1	
3-6. Environmental mastery	-0.65**	-0.50**	-0.57**	-0.55**	0.70**	0.56**	0.52**	0.71**	0.79**	0.31**	0.45**	0.56**	0.51**	0.60**	1
Mean ± standard deviation	4.34 ± 1.15	5.09 ± 1.39	3.82 ± 1.18	4.09 ± 1.60	3.41 ± 0.51	3.21 ± 0.53	3.54 ± 0.57	3.51 ± 0.69	3.52 ± 0.59	3.19 ± 0.72	3.68 ± 0.78	3.43 ± 0.87	3.92 ± 0.81	3.53 ± 0.87	3.34 ± 0.76

\*p<0.05. \*\*p<0.01.

variable that was scored the highest was personal growth (mean=3.92, SD=0.81), followed by positive relations with others (mean=3.68, SD=0.78), self-acceptance (mean=3.53, SD=0.87), purpose in life (mean=3.43, SD=0.87), environmental mastery (mean=3.34, SD=0.76), and autonomy (mean=3.19, SD=0.72).

The findings of the correlation analysis indicated that the variables of academic burnout, resilience, and psychological well-being were correlated at a significance level of 0.01. Academic burnout exhibited a significant negative correlation with psychological well-being (r=-0.59, p<0.01) and resilience (r=-0.55, p<0.01). Resilience and psychological well-being had a significant positive correlation (r=0.84, p<0.01).

## 2. Analysis of differences in variables according to gender and year level

The differences in variables according to gender and year level are shown in Table 2 and Table 3. No significant difference between genders was found in terms of the variables of academic burnout and resilience, but the female students obtained a significantly higher score than did their male counterparts with respect to positive relations with others. Academic burnout significantly differed according to year level (F=3.65, p<0.05). Scheffe's test showed that the first year students experienced more severe academic burnout than did the fourth year students, with these respondents significantly differing in regard to emotional exhaustion and cynicism. No significant difference in resilience and psychological well-being was found between year levels.

## 3. Mediating effect of resilience on the relationship between academic burnout and psychological well-being

The hierarchical multiple analysis for exploring the mediating effect of resilience on the relationship

Table 2. Differences in Academic Burnout, Resilience, and Psychological Well-Being by Gender

Variable	Category	Male (n=61)	Female (n=36)	t-value
Academic burnout	Emotional exhaustion	5.09 ± 1.45	5.10 ± 1.31	-0.04
	Inefficiency	3.79 ± 1.33	3.86 ± 0.88	-0.27
	Cynicism	4.30 ± 1.62	3.74 ± 1.52	1.70
	Total	4.40 ± 1.24	4.23 ± 0.98	0.69
Resilience	Self-regulation	3.25 ± 0.56	3.15 ± 0.48	0.87
	Interpersonal competencies	3.45 ± 0.62	3.69 ± 0.47	-1.97
	Positive attitudes	3.54 ± 0.72	3.46 ± 0.66	0.49
	Total	3.39 ± 0.55	3.44 ± 0.44	-0.45
Psychological well-being	Autonomy	3.25 ± 0.70	3.07 ± 0.76	1.17
	Positive relations with others	3.54 ± 0.79	3.93 ± 0.70	-2.41*
	Purpose in life	3.33 ± 0.93	3.60 ± 0.74	-1.48
	Personal growth	3.88 ± 0.81	3.99 ± 0.80	-0.63
	Self-acceptance	3.48 ± 0.88	3.60 ± 0.86	-0.66
	Environmental mastery	3.33 ± 0.78	3.36 ± 0.75	-0.17
	Total	3.47 ± 0.62	3.60 ± 0.53	-1.03

Data are presented as mean ± standard deviation.

\*p<0.05.

Table 3. Differences in Academic Burnout, Resilience, and Psychological Well-Being by Year Level

Variable	Category	M1 (n=30)	M2 (n=15)	M3 (n=18)	M4 (n=34)	F	Bonferroni
Academic burnout	Emotional exhaustion	5.71 ± 1.23	5.43 ± 0.72	4.94 ± 1.00	4.48 ± 1.66	5.18**	M1>M4
	Inefficiency	3.98 ± 1.46	3.64 ± 0.94	3.92 ± 1.13	3.70 ± 1.03	0.46	
	Cynicism	4.72 ± 1.72	4.27 ± 1.25	4.00 ± 1.51	3.49 ± 1.51	3.38*	M1>M4
	Total	4.80 ± 1.16	4.44 ± 0.74	4.29 ± 1.00	3.89 ± 1.23	3.65*	M1>M4
Resilience	Self-regulation	3.14 ± 0.51	3.16 ± 0.52	3.18 ± 0.67	3.32 ± 0.47	0.65	
	Interpersonal competencies	3.52 ± 0.63	3.62 ± 0.49	3.49 ± 0.67	3.55 ± 0.52	0.14	
	Positive attitudes	3.39 ± 0.72	3.50 ± 0.74	3.47 ± 0.71	3.64 ± 0.65	0.67	
	Total	3.34 ± 0.53	3.43 ± 0.54	3.40 ± 0.63	3.48 ± 0.42	0.34	
Psychological well-being	Autonomy	3.18 ± 0.74	3.42 ± 0.65	2.90 ± 0.77	3.24 ± 0.70	1.50	
	Positive relations with others	3.70 ± 0.83	3.64 ± 0.68	3.61 ± 0.86	3.73 ± 0.76	0.10	
	Purpose in life	3.18 ± 0.84	3.67 ± 0.81	3.33 ± 0.97	3.58 ± 0.86	1.56	
	Personal growth	3.94 ± 0.77	4.11 ± 0.67	3.78 ± 1.06	3.90 ± 0.76	0.48	
	Self-acceptance	3.41 ± 0.96	3.73 ± 0.74	3.39 ± 0.97	3.61 ± 0.81	0.70	
	Environmental mastery	3.21 ± 0.75	3.24 ± 0.57	3.11 ± 0.91	3.63 ± 0.71	2.65	
	Total	3.44 ± 0.58	3.64 ± 0.49	3.38 ± 0.79	3.61 ± 0.51	0.97	

Data are presented as mean ± standard deviation.

\*p<0.05. \*\*p<0.01.

Table 4. Hierarchical Multiple Analysis of the Mediating Effect of Resilience

Dependent variable	Independent variable	Unstandardized coefficients		Standardized coefficients	t-value	R <sup>2</sup> (adjusted R <sup>2</sup> )	F
		β	Standard error	β			
Resilience	Academic burnout	-0.26	0.04	-0.55	-6.12***	0.31 (0.30)	37.47***
Psychological well-being	Academic burnout	-0.31	0.05	-0.59	-6.59***	0.35 (0.34)	43.36***
	Resilience	-0.09	0.04	-0.17	-2.41*	0.73 (0.72)	106.97***
		0.85	0.08	0.75	10.58***		

\*p<0.05. \*\*\*p<0.001.

between academic burnout and psychological well-being are demonstrated in Table 4. In the first step of verification, academic burnout significantly predicted resilience ( $\beta=-0.55$ ,  $p<0.001$ ). In the second step of verification, academic burnout significantly predicted psychological well-being ( $\beta=-0.59$ ,  $p<0.001$ ) at an explanatory power of 35%. In the third step of verification, when academic burnout and resilience were simultaneously incorporated into the validation, the effect of academic burnout on psychological well-being remained significant, although such influence decreased ( $\beta=-0.17$ ,  $p<0.05$ ). These results showed that resilience partially mediated the relationship between the academic burnout and psychological well-being of the respondents. When the variables of resilience were added to the verification, the overall explanatory power increased by 38% from the level achieved when only the variables of academic burnout were incorporated.

The Sobel test was conducted to verify the statistical significance of the mediating effect. The mediating effect of resilience on the relationship between academic burnout and psychological well-being was statistically significant ( $Z=-7.74$ ,  $p<0.001$ ).

## Discussion

This study examined the effects of medical school students' academic burnout on their psychological well-being to explore the measures that can reinforce these individuals' mental health. To this end, the research looked into the relationship among academic burnout, psychological well-being, and resilience and into the mediating effect of resilience on the relationship between academic burnout and psychological well-being. The core findings are discussed as follows.

First, the medical school students' psychological well-

being was negatively correlated with their academic burnout and positively correlated with their resilience. The negative correlation between academic burnout and psychological well-being indicated that the more severe the academic burnout, the more difficult it was for the students to positively perceive their current conditions. These results are consistent with those of multiple studies that verified the relationship between college students' study-related stress and psychological well-being [16]. Shi et al. [17], for example, found a significant positive correlation between Chinese medical students' well-being and resilience. The authors also reported that stress negatively affected the students' satisfaction with their life, causing them to develop depression. In other words, the high correlation between resilience and psychological well-being is an important psychological variable with which to overcome psychological problems, such as burnout, anxiety, and depression that may result from stressful situations.

Second, the degree of academic burnout experienced by first and second year preclinical students was greater than that experienced by third and fourth year clinical students. The curriculum for preclinical students showed that integrated education is provided on a weekly basis and that team teaching of a course is implemented by several professors. Ordinary college students take exams once to twice per semester, whereas medical school students take an exam each time or after a major subject is taught. Thus, the study load of the latter and the pressure that they encounter from frequent exams trigger academic burnout. These results are consistent with those of research that analyzed the relationship between medical school students' academic burnout and relevant variables [18,19]. Among the sub-variables of academic burnout, the most severe was emotional exhaustion, indicating that the psychological fatigue and tension felt by the medical school students was relatively high.

Third, the male students' average score for cynicism was higher than that of the female students, and the females scored statistically significantly higher on positive relations with others than did their male counterparts. Such results mean that when male students experience severe academic burnout, they are more likely than female students to distance themselves from their study and are therefore likely to give up on their academics at an earlier time. Considering that psychological well-being is a variable that reflects how well an individual is functioning as a member of society, not only a means of subjectively assessing one's life, the issue of gender should not be neglected in medical college education [14].

Finally, the significant effects of academic burnout on the medical students' psychological well-being were mediated by resilience; that is, severe academic burnout led to low levels of resilience, covering self-regulation, interpersonal competencies, and positive attitudes, and consequently negatively influenced psychological well-being. These results are consistent with those of previous studies that verified the mediating effect of resilience on the relationship between college students' life stress and psychological well-being [20,21]. The findings are also similar to those derived in studies that validated the mediating effect of resilience on the relationship between college students' life stress and quality of life and studies that examined the mediating role of resilience in the relationship between depression and anxiety. Put differently, medical school students' academic burnout negatively influences their psychological well-being even when resilience is added as a mediating variable; nevertheless, resilience may positively affect psychological well-being. Therefore, measures for reducing medical students' academic burnout and improving their psychological well-being should be sought, and efforts to sustain a strong psychological well-being

should be made in collegiate institutions [22–24].

The findings of this work presents a number of implications. First, the medical students' academic burnout diminished their psychological well-being, thereby raising the need to identify measures for reducing the incidence of this condition. The variables of resilience exhibited a high explanatory power for psychological well-being. A necessary requirement, then, is to formulate strategies that increase medical students' psychological well-being through improvements to their resilience, their willpower to overcome and successfully resolve difficult situations, and their ability to adapt. Second, the variables of psychological well-being were analyzed to examine students' happiness and emotional health conditions. Psychological well-being is an important variable that affects study and school life as a whole. Students should be able to understand their psychological conditions, and professors should exert efforts to comprehend their students' psychological circumstances.

The limitations of this study and recommendations for follow-up research are as follows. This study administered a survey using only a structured self-report questionnaire. Measurement methods should be diversified to determine specific content and level of psychological and emotional variables; in-depth interviews and focus group discussions should be conducted. This study also recruited students from a single medical college, thus constraining the generalizability of the results. Researchers should include students from a variety of medical schools in their sample to consider variables such as region and size. This work analyzed only resilience variables with respect to the relationship between academic burnout and psychological well-being. It is essential to conduct analyses of other mediating resilience-related variables that can decrease academic burnout and heighten psychological well-being. Finally,

the application of various analytical methods and control variables will lead to more abundant suggestions.

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## References

1. Laurence B, Williams C, Eiland D. Depressive symptoms, stress, and social support among dental students at a historically black college and university. *J Am Coll Health*. 2009;58(1):56-63.
2. Bjorksten O, Sutherland S, Miller C, Stewart T. Identification of medical student problems and comparison with those of other students. *J Med Educ*. 1983;58(10):759-767.
3. Dunn LB, Iglewicz A, Moutier C. A conceptual model of medical student well-being: promoting resilience and preventing burnout. *Acad Psychiatry*. 2008;32(1):44-53.
4. Walkiewicz M, Tartas M, Majkowicz M, Budzinski W. Academic achievement, depression and anxiety during medical education predict the styles of success in a medical career: a 10-year longitudinal study. *Med Teach*. 2012;34(9):e611-e619.
5. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Acad Med*. 2006;81(4):354-373.
6. Dyrbye LN, Thomas MR, Power DV, et al. Burnout and serious thoughts of dropping out of medical school: a multi-institutional study. *Acad Med*. 2010;85(1):94-102.
7. Bajaj B, Pande N. Mediating role of resilience in the impact of mindfulness on life satisfaction and affect as indices of subjective well-being. *Pers Individ Dif*. 2016;93:63-67.
8. Russo SJ, Murrough JW, Han MH, Charney DS, Nestler EJ. Neurobiology of resilience. *Nat Neurosci*. 2012;15(11):1475-1484.
9. Ferguson E, James D, Madeley L. Factors associated with success in medical school: systematic review of the literature. *BMJ*. 2002;324(7343):952-957.
10. Schaufeli WB, Salanova M, González-Romá V, Bakker AB. The measurement of engagement and burnout: a two sample confirmatory factor analytic approach. *J Happiness Stud*. 2002;3(1):71-92.
11. Lee SH, Lee DY. Validation of the MBI-SS scales-based on medical school students. *Asian J Educ*. 2013;14(2):165-187.
12. Reivich K, Shatté A. *The resilience factor: 7 essential skills for overcoming life's inevitable obstacles*. New York, USA: Broadway Books; 2002.
13. Shin WY, Kim MG, Kim JH. Developing measures of resilience for Korean adolescents and testing cross, convergent, and discriminant validity. *Stud Korean Youth*. 2009;20(4):105-131.
14. Ryff CD. Happiness is everything, or is it?: explorations on the meaning of psychological well-being. *J Pers Soc Psychol*. 1989;57(6):1069-1081.
15. Kim MS, Kim HW, Cha KH. Analyses on the construct of psychological well-being (PWB) of Korean male and female adults. *Korean J Soc Pers Psychol*. 2001;15(2):19-39.



16. Zhao F, Guo Y, Suhonen R, Leino-Kilpi H. Subjective well-being and its association with peer caring and resilience among nursing vs medical students: a questionnaire study. *Nurse Educ Today*. 2016;37:108-113.
17. Shi M, Wang X, Bian Y, Wang L. The mediating role of resilience in the relationship between stress and life satisfaction among Chinese medical students: a cross-sectional study. *BMC Med Educ*. 2015;15:16.
18. Chae SJ, Jeong SM, Chung YS. The mediating effect of calling on the relationship between medical school students' academic burnout and empathy. *Korean J Med Educ*. 2017;29(3):165-173.
19. Dyrbye LN, Power DV, Massie FS, et al. Factors associated with resilience to and recovery from burnout: a prospective, multi-institutional study of US medical students. *Med Educ*. 2010;44(10):1016-1026.
20. Gardner DH, Parkinson TJ. Optimism, self-esteem, and social support as mediators of the relationships among workload, stress, and well-being in veterinary students. *J Vet Med Educ*. 2011;38(1):60-66.
21. Anyan F, Hjemdal O. Adolescent stress and symptoms of anxiety and depression: resilience explains and differentiates the relationships. *J Affect Disord*. 2016;203:213-220.
22. Dahlin ME, Runeson B. Burnout and psychiatric morbidity among medical students entering clinical training: a three year prospective questionnaire and interview-based study. *BMC Med Educ*. 2007;7:6.
23. Thomas SE, Haney MK, Pelic CM, Shaw D, Wong JG. Developing a program to promote stress resilience and self-care in first-year medical students. *Can Med Educ J*. 2011;2(1):e32-e36.
24. Zamirinejad S, Hojjat SK, Golzari M, Borjali A, Akaberi A. Effectiveness of resilience training versus cognitive therapy on reduction of depression in female Iranian college students. *Issues Ment Health Nurs*. 2014;35(6):480-488.