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Original Article

A Structural Model for Predicting Physical Health Based on Attachment Styles: The Mediating Role of Psychological Well-Being

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Abstract

Background and Aim: Attachment styles directly and through other psychological factors play an essential role in physical health and illness. Therefore, the current research was conducted to fit the model of attachment styles on physical health with the mediating of psychological well-being.

Materials and Methods: In cross-sectional descriptive research, of all medical students in Gilan and Qazvin provinces from May 2022 to February 2023 who completed their internship during the Corona epidemic and subsequent strains, 550 students were selected by convenience sampling. The participants completed the Adult Attachment Questionnaire, Psychological Well-Being, and Physical Health Scales. Means, standard deviations, and correlations were used in descriptive analysis, taking into account statistical test assumptions using SPSS software. Liesrel software was employed with a significance level of $P<0.05$ for hypothesis testing with structural equation modeling.

Results: The findings showed that attachment styles have a direct and significant relationship with physical health, and psychological well-being mediates the relationship between attachment styles and physical health ($P<0.001$). The model has a good fit ($P<0.05$).

Conclusion: Attachment styles predict physical health and psychological well-being and mediate the relationship between attachment styles and physical health. These results contain practical themes in formulating appropriate interventions to promote physical health and prevent diseases based on attachment styles and psychological well-being.

Keywords: Attachment styles, Psychological well-being, Physical health, Covid-19

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Introduction

The health of the medical staff has been highly affected in recent years (1). In this context, examining health indicators and the psychosocial factors related to it are essential for medical students who have completed their internship during the sensitive period of Corona (2). Physical health includes medical symptoms and related issues such as sleep problems, shortness of breath, heartburn, pain, fatigue, perceived health, medical visits, and the number of hospital days due to illness (3).

Attachment as an indicator of a person's initial experiences with parents or the type of initial emotional relationship with parents during childhood is one of the factors affecting physical health (4). Responsiveness of the mother, the relationship between the mother and the child in the first years of life, the level of access to the mother and the mother's support when she feels threatened, and helping the child to discover the environment are the determinants of the attachment style in early childhood (5). The three adult attachment styles derived from childhood are secure, avoidant, and anxious, and the last two attachment styles are called insecure (5,6). People with secure attachment have a positive self-image and positive expectations of others. People with an anxious style are both interested in social interaction and fear rejection. These people have a negative image of themselves and a positive image of others.

People with an avoidant attachment style struggle to maintain their positive perception by denying any need for attachment if they feel rejected. These people also have negative perceptions and expectations from others (6,7). Understanding the relationship between attachment and different body systems, including the autonomic nervous system, neuroendocrine processes, the immune system, and ultimate physical health, has been the focus of recent research (8,9). Attachment affects health through behavioral, neurological, endocrine, and immune pathways and affects the occurrence of diseases by affecting cognitive processes and appraisal of stress (8,10). In addition, the attachment system affects cognitive evaluations and pain-related behaviors and acts as a vulnerability factor for experiencing physical symptoms (11,12).

Psychological well-being, as another important factor in health, indicates a person's positive thoughts and feelings towards life and being healthy (13). The comprehensive definition of psychological well-being expressed by Ryff has autonomy components such as a sense of competence and the ability to manage one's surrounding environment, personal growth, positive relationships with others, purposefulness in life, self-acceptance and positive attitude towards oneself, and mastery over the environment or the ability to choose and create a healthy environment (14). According to research evidence, there is a positive relationship between psychological well-being and physical health, and high psychological well-being reduces the risk of chronic conditions, including cardiovascular diseases, as well as mortality (15, 16). Psychological well-being mediates the relationship between attachment styles and health and illness (17).

Secure attachment style leads to improved health by increasing psychological well-being, and insecure attachment styles contribute to the occurrence of diseases and health conditions by decreasing psychological well-being (18, 19). Secure attachment promotes positive psychological states and provides the ability to form long-term close relationships for protection and support at all ages, relieves anxiety and tension, and directly affects well-being and health (20)

Several studies have investigated the mental health of medical students during the coronavirus epidemic and the period after it (21). Due to academic pressure, night work, and lack of sleep, medical students are at risk of diseases. Although much research has been conducted on the relationship between attachment styles, psychological well-being, and physical health, no independent research has been done to examine these variables simultaneously through an integrated model. Therefore, the present study investigated the role of attachment styles on physical health with the mediating role of psychological well-being in medical students during the coronavirus epidemic and its subsequent mutations in the form of structural equation modeling. The main research question is whether psychological well-being mediates the relationship between attachment styles and physical health. Figure 1 demonstrates the assumed model.

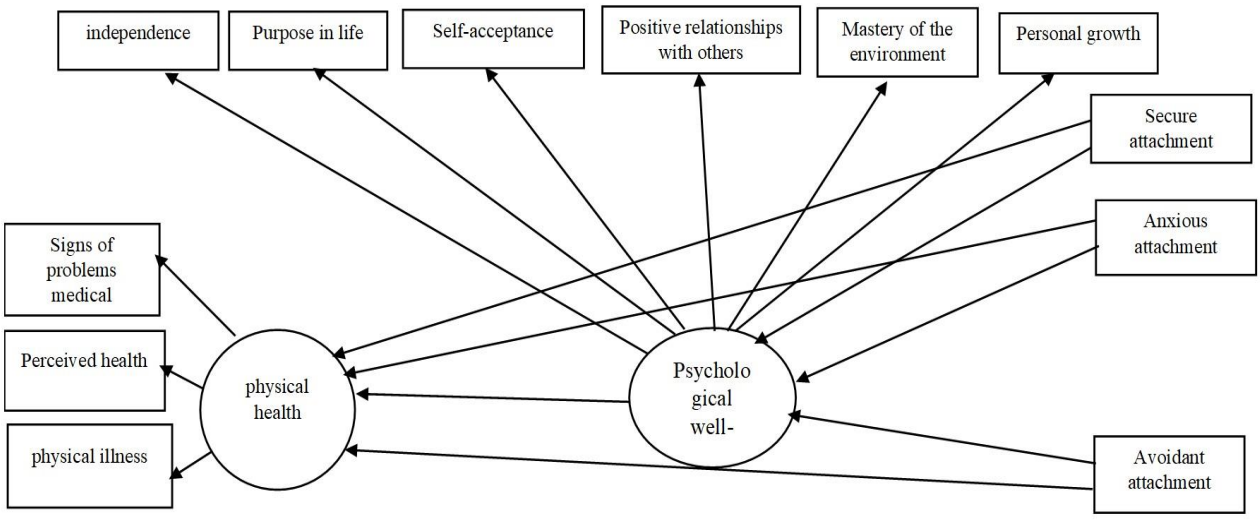

Figure 1. The hypothesized model of structural relationship between physical health and attachment styles through psychological well-being

Methods

It was a cross-sectional descriptive study during which structural relationships between variables were investigated using structural equation modeling. The statistical population of the study included all medical students in Gilan and Qazvin provinces who completed their internship during the Corona epidemic and its subsequent mutations. To determine the sample size with the structural equation modeling method, according to Kline (22), the sample size should be between 5 and 15 observations per item. Therefore, by calculating 91 items multiplied by 5.5, the sample size was 500.5 participants. According to the possibility of removing outlier data and observing precautionary measures to ensure the adequacy of the sample size, 550 participants were selected and investigated from May 2022 to February 2023 by the convenience sampling method. The entry criteria included completing written informed consent to participate in the research, completing an internship during the Corona epidemic, and being engaged in education during the study. Exclusion criteria included the lack of accurate and complete completion of the research instruments and the psychiatric illness or substance use that caused the use of drugs during the research. The assessment of inclusion and exclusion criteria was based on self-declaration and examination of medical records.

Materials

Adult Attachment Questionnaire (AAQ)

Adult Attachment Questionnaire (AAQ) is a Likert-type questionnaire created by Hazan and Shaver (23) as a self-report. This questionnaire is a self-assessment questionnaire based on a 7-point Likert-type scale. The subjects determine their status regarding the degree of agreement with each description that represents an attachment style. The internal consistency of the subscales shows that each subscale examines a different issue than the other subscale. This questionnaire contains 18 items and three subscales: avoidant, anxious, and secure. The scoring of the questionnaire based on the Likert scale includes completely agree "7", agree "6", slightly agree "5", not sure "4", slightly disagree "3", disagree "2" and strongly disagree "1". The minimum possible score will be 3, and the maximum will be 21. A score between 3 and 6 indicates low attachment, a score between 6 and 12 indicates moderate attachment and a score above 12 indicates high attachment. Hazan and Shaver (23) found the total test-retest reliability of this questionnaire to be 0.81, and its internal consistency with Cronbach's alpha was 0.87. In the Iranian sample, the homogeneity of the factor subscales of the adult attachment questionnaire with an average inter-item correlation between 0.20 and 0.40 was in the optimal range, the instrument had sufficient internal consistency, and the test-retest

reliability was also good (24). The test-retest reliability for the secure attachment was 0.82, the avoidant attachment was 0.78, and the anxious attachment was 0.75, which was satisfactory (24). Cronbach's alpha reliability of this tool in the research of Rahimian Boger et al. (25) for the whole scale, anxious style, avoidant style, and secure style was obtained as 0.75, 0.83, 0.81, 0.77, respectively, which has a favorable reliability.

Psychological Well-Being Scale (PWS)

The short version of the Psychological Well-Being Scale (PWS) is a self-measurement tool and includes 18 items designed by Ryff and revised in 2002 (14,15)**.** This version consists of 6 factors. Items 9, 12, and 18 are the independence factor; items 1, 4, and 6 are the environmental mastery factor; items 7, 15, and 17 are the personal growth factor; items 3, 11, and 13 are the positive relationship with other factors; and items 2, 8 and 10 measure the self-acceptance factor. The total scores of 6 factors are calculated as the overall score of scale. Of all items, 10 are scored directly, and eight are scored inversely. The range of scores is between 18-108, with a higher score indicating more psychological well-being (26). In Iran, Khanjani et al. (27) reported the internal consistency of this scale using Cronbach's alpha in 6 factors of self-acceptance, environmental mastery, positive relationship with others, having a purpose in life, personal growth, and independence equal to 0.51, 0.76, 0.75, 0/52, 0.73 and 0.72, and 0.71, respectively. The total score of this scale is an appropriate tool to measure psychological well-being in the Iranian sample. In the research of Akbari et al. (28), its reliability was 0.88 with Cronbach's alpha.

Physical Health Scale

This scale is adapted from Macmillan (29) with 24 self-report items that measure three indicators related to physical health, including symptoms of medical problems, perceived health, and physical illness. The number of symptoms is determined from 21 items related to sleep problems, shortness of breath, heartburn, pain, suffering, fatigue, and the impact of these problems on daily functioning. Perceived health is measured in a way that the individual determines his overall physical health compared to his peers on a four-point Likert scale from 1 (poor) to 4 (excellent). Physical illness is measured by two questions: the number of visits to the doctor and the number of days of hospitalization due to illness in the last two years. These two questions are scored on a seven-point Likert scale from 1 (for no visit and hospitalization) to 7 (for more than 15 visits or hospitalization). Before calculating the scores related to symptoms and physical illness, the numerical values of the items of these two scales are reversed. The minimum and maximum score of a person in this index according to the five-point Likert scale from 1 (never) to 5 (always) is from 21 to 105, respectively, and a higher score is a sign of better health (29). Cronbach's alpha coefficient for items related to symptoms in a sample of 492 participants from the general population was reported to be 0.87 (29). Cronbach's alpha coefficient was calculated as 0.85 in the research by Besharat (30).

Precedure

For this study, the necessary arrangements were first made with the universities of medical sciences in Gilan and Qazvin. Considering the completion of the theory courses and the absence of the interns in university classes, the researcher went to the hospitals and selected the interns through the convenience sampling method and obtained written informed consent to take samples and complete the questionnaires. Due to the inaccessibility of the sample in one province achieving the sample size and the similarity of demographic characteristics of medical students in Gilan and Qazvin provinces, these two provinces were chosen for sampling. To control for ceiling and floor effects, the research instruments were implemented using the counterbalancing method. The research was conducted individually over six months, and the average time to complete the instruments was about half an hour. In this research, mean, standard deviation and default check tests were used with SPSS-25 software, and structural equation modeling was used with LISREL 7.8 software to check the research hypotheses. The significance level of the data was considered $P<0.05$. The study was conducted with written informed consent and research ethics code IR.SEMUMS.REC.1401.205 from the National Committee of Ethics in Bio-Medical Research of Semnan University of Medical Sciences. Other ethical aspects of the research, including confidentiality, the protection of participants' rights, and the possibility of voluntary withdrawal, were also observed.

Results

Of medical students from Gilan and Qazvin provinces, 550 participated in this research during the Corona epidemic and the subsequent surge. The mean age and standard deviation of the participants in the study were 25.02 and 2.3 years, respectively. Among the participants, 305 (55.45%) were female, 245 (44.55%) were male, 432 (78.55%) were single, and 118 (21.45%) were married. Also, 218 (39.6%) were from Qazvin province and 332 people from Gilan province (60.3%). Other ethical aspects of the research, including confidentiality, the protection of participants' rights, and the possibility of voluntary withdrawal, were also observed. As can be seen in Table 1, the significance level of the Kolmogorov-Smirnov test for the research variables was higher than 0.05. According to most sources, the skewness of the score distribution was also in the range of (-2 and 2). Therefore, the data distribution can be assumed normal. Also, the basic assumptions of structural equation modeling analysis, such as the adequacy of the sample size, absence of outlier data, multiple non-collinearities, and the adequacy of the sphericity test, were established. The Kaiser−Meyer−Olkin (KMO) test was equal to 0.1912, indicating the adequacy of the sample size (the coefficient of 0.6 is the minimum value necessary for analysis). The results of Bartlett's sphericity test ($\varkappa$^2 = 3785.124 and P < 0.001) also indicate the establishment of the assumption that the correlation matrix between the cases is not the same. There are no multiple collinearities between predictor variables because the correlation coefficients between variables are less than 0.7. Multiple co-collinearities between research variables were also investigated using the tolerance index and variance inflation factor. The tolerance index was higher than 0.10, and the variance inflation factor was less than 10. The Mahalanobis value was not higher than the critical value for any data. Therefore, there was no outlier data. The mean, standard deviation, and distribution of research variables are shown in Table 1.

The correlation matrix of research variables through Pearson correlation coefficients is presented in Table 2, which shows a significant relationship between physical health, psychological well-being, and attachment styles (P<0.05). Considering the confirmation of the significant relationship between the research variables, it is possible to investigate the mediating role of psychological well-being in the relationship between attachment styles and physical health with the structural equation modeling (Table 3). The implementation of structural equations with the maximum likelihood method to determine the mediating role of psychological well-being in the relationship between attachment styles and physical health is shown in Figure 2 with the standard coefficients of each path. In addition, standard and non-standard path coefficients between research variables are presented in Table 3.

Table 1. Mean and standard deviation and distribution of research variables

Variables	Mean	Standard deviation	Kolmogorov Smirnov	Sig.	Skewness	kurtosis
Secure attachment	20.66	3.63	0.31	0.095	0.17	0.94
Anxious attachment	18.40	5.64	0.82	0.052	0.42	0.07
Avoidant attachment	19.57	4.52	0.75	0.054	0.19	0.34
Independent	16.56	3.17	0.62	0.066	0.88	0.92
Mastery of the environment	14.23	3.52	0.51	0.073	0.14	0.47
Personal growth	11.35	2.98	0.48	0.077	0.19	0.03
Positive communication with others	16.09	3.35	0.64	0.065	0.71	0.33
Purpose in life	14.59	4.17	0.31	0.092	0.29	0.57
Self-acceptance	14.72	3.87	0.38	0.088	0.44	0.38
Signs of problems medical	79.83	10.569	0.89	0.055	0.532	0.067
Perceived health	2.69	0.984	0.92	0.052	0.197	0.643
Physical illness	12.02	1.848	0.47	0.077	1.449	1.613

Table 2. Correlation matrix of research variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Secure attachment	1											
2. Anxious attachment	-0.82	1										
3. Avoidant attachment	-0.503**	0.194**	1									
4.Independent	0.120**	-0.391**	-0.236**	1								
5. Mastery of environment	-0.376**	-0.353**	-0.395**	0.409**	1							
6. Personal growth	-.082	-0.299**	-0.039	0.330**	0.211**	1						
7. Positive communication with others	0.214**	-0.266**	-0.257**	0.628**	0.478**	0.167**	1					
8. Purpose in life	0.322**	-0.279**	-0.352**	0.377**	0.632**	0.109*	0.538**	1				
9. Self-acceptance	0.159**	-0.319**	-0.263**	0.454**	0.498**	0.169**	0.531**	0.523**	1			
10. Signs of problems Medical	0.306**	-0.441**	-0.371**	0.312**	0.367**	0.128**	0.281**	0.360**	0.367**	1		
11. Perceived health	0.072	-0.129**	-0.038	0.382**	0.348**	0.097*	0.387**	0.334**	0.370**	0.410**	1	
12. Physical illness	0.084*	-0.096*	-0.103*	0.070	0.110**	0.030	0.055	0.147**	0.087**	0.383**	0.203**	1

*P<0.05, **P<0.01

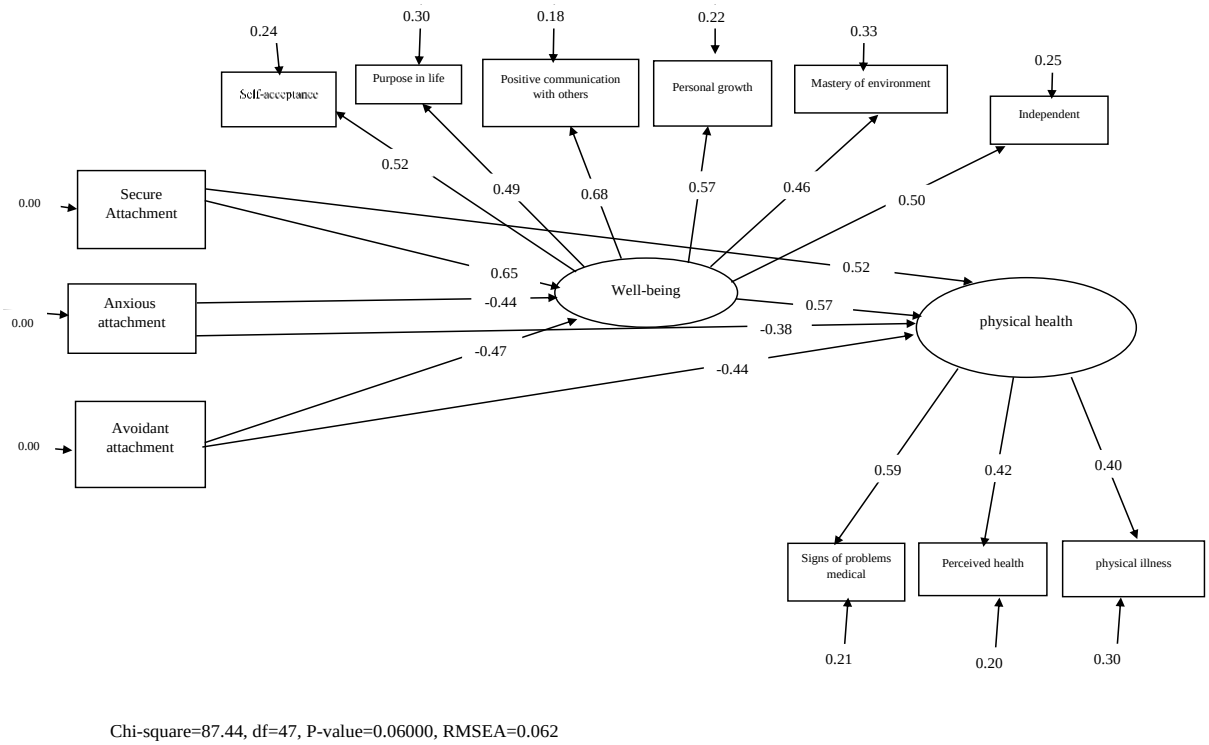

Figure 2. The exmined model of structural relationship between physical health and attachment styles through psychological well-being

Table 3. Standard and non-standard path coefficients between research variables

Path	Non-standard coefficients	Standard error	Critical value (t)	Standard coefficients	P value	Coefficient of determination
Secure attachment > physical health	0.53	0. 27	4.63	0.42	0.001	0. 204
Anxious attachment > physical health	-0.42	0. 21	-3.22	-0.38	0.008	0.178
Avoid atattachment > physical health	-0.48	0. 19	-4.89	-0.44	0.001	0. 231
Secure attachment > psychological well-being	0.71	0. 11	7.87	0.65	0.001	0. 352
Anxious attachment > psychological well-being	-0.39	0. 17	-3.11	-0.42	0.001	0. 201
Avoidant attachment > psychological well-being	-0.51	0. 15	-4.94	-0.47	0.001	0. 245
Psychological well-being > physical health	0.59	0. 13	7.04	0.57	0.001	0. 312
Secure attachment > physical health through psychological well-being	0.41	0. 18	3.26	0.37	0.001	0. 165
Anxious attachment > physical health through psychological well-being	-0.31	0. 22	-2.79	-0.24	0.044	0.137
Avoidant attachment > physical health through psychological well-being	-0.32	0. 19	-2.88	-0.27	0.019	0. 142

Table 3 shows that the relationship of secure attachment with physical health (β=0.42) and with psychological well-being (β=0.65) was positively significant (P<0/05). The relationship between anxious attachment to physical health (β=-0.38) and psychological well-being (β=-0.42) was negative and significant (P<0/05). The relationship between avoidant attachment to physical health (β=-0.38) and psychological well-being (β=-0.47) was negatively significant (P<0/05). The relationship between psychological well-being and physical health (β=0.57) was positively significant (P<0/05). The relationship of secure attachment with physical health is mediated by psychological well-being (β=0.37) in a positive and significant way (P<0/05). The relationship of anxious attachment with physical health is mediated by psychological well-being (β=-0.24) in a negative and significant way (P<0/05). The relationship of avoidant attachment with physical health was mediated by psychological well-being (β=0.27) in an indirect and significant way (P<0/05). To fit the research model with the observed data, the chi-square ratio with the degree of freedom less than or equal to 3, the comparative fit index (CIF), the goodness of fit index (GFI) and the adjusted goodness of fit index (AGFI) greater than or equal to 0.90, root mean square error of approximation (RMSEA) less than 0.08 and adaptive fit index (Normed Fit Index: NFI) and non-adaptive fit index (Non Normed Fit Index: NNFI) greater than 0.90 are considered to be good fit indices for model evaluation. According to the shows obtained in the examined model in Table 4 (1.86=$\varkappa 2/$df, CFI=0.96, GFI=0.94, AGFI=0.91, RMSEA=0.062, NNFI=0.97, NFI=0.97), the model has a good fit (P<0.05).

In addition, to determine the mediating role of psychological well-being in the relationship between attachment styles and physical health, the results of the Bootstrap test have been presented in Table 5. According to the results of Table 5 and considering that zero is not placed in the upper and lower range of scores, the mediating role of psychological well-being in the relationship between attachment styles and physical health is confirmed (P<0.05). The results of the Sobel test were also obtained to investigate the mediating role of psychological well-being in the relationship between attachment styles and physical health, which were 2.15 to 3.14, respectively, and confirmed the results of the bootstrap test.

Table 4. Fitness indices of the proposed model in the research

Indices	χ2/df	GFI	AGFI	IFI	TLI	CFI	NFI	RMSEA
Values	1.86	0.96	0.91	0.95	0.96	0.96	0.97	0.062
Desired level	<3	>0.90	>0.90	>0.90	>0.90	>0.90	>0.90	<0.08

Table 5. Bootstrap test results for the mediating role of psychological well-being in the relationship between attachment styles and physical health

Predictive variable	Mediator	Criterion variable	Upper line	Low limit	Confidence distance	Indirect effects
Secure attachment	well-being	physical health	0.125	0.158	0.95	0.41
Anxious attachment	well-being	physical health	-0.159	-0.108	0.95	-0.28
Avoidant attachment	well-being	physical health	-0.162	-0.117	0.95	-0.36

Discussion

In line with the first hypothesis that attachment styles have a direct relationship with physical health, the results showed that secure attachment has a positive and significant relationship with physical health, consistent with the previous results (4,9,31). In explaining this result, it can be said that attachment is effective on the body's defense system because safe communication increases immunity and protection against diseases and maintains health, resistance to inflammation, lowering blood pressure, and reducing cardiometabolic risk in the body (9,32,33). The results show that avoidant and anxious attachment styles have a negative and significant relationship with physical health, which is in line with the previous results (10,33,34). In explaining the findings, Pietromonaco and Beck (9) argue that insecure anxious and avoidant attachments are associated with dysregulated physiological responses to stress, risky health behaviors, susceptibility to physical illness, and poorer disease outcomes. Also, people with avoidant attachment have negative perceptions and expectations from others, so they have little quality in their social interactions (32,35). In fact, as Dodd et al. (36) state that parameters of social relationships, including social isolation and loneliness, social support, and interpersonal conflict, affect immune system measures, including markers of inflammation and cellular immunity, as well as brain-behavior relationships that have negative consequences for subsequent health. In addition, people with insecure attachment do not seek medical services due to loneliness and feelings of isolation, lack of cooperation, and mistrust of others, do not have much trust in the treatment system, and as a result, they may experience more medical problems (37).

The results showed that secure attachment has a positive and significant relationship with psychological well-being, consistent with the recent results (17,38,39).

In explaining this result, according to the positive attitude towards oneself and others in secure attachment, psychological well-being is a positive mental approach showing a person's positive thoughts and feelings towards life and being healthy (40-42). Therefore, people with secure attachments strengthen each component of psychological well-being and vice versa. Also, the results showed that avoidant and anxious attachment separately have a negative and significant relationship with psychological well-being (43).

In explaining this result, like Spence et al. (38), it can be said that secure attachment by strengthening a positive attitude towards oneself and others is the basis for positive thoughts and feelings towards life and increasing psychological well-being. Therefore, people with secure attachments have higher psychological well-being than people with insecure attachments. Trucharte et al. (40) argued that people with anxious and avoidant attachment have a negative attitude towards themselves and others, are stressed in interpersonal relationships, and due to emotional ataxia, have low positive emotions and vitality, they cannot

make positive appraisals of the situation. and have low psychological well-being due to ineffective emotional strategies. Therefore, people with insecure attachment experience lower levels of well-being and higher psychological distress due to the lack of a secure internal base (41). Hernandez et al. (42) found that psychological well-being has a positive and significant relationship with physical health. Kubzansky et al. (43) show that a high level of psychological well-being is a protective factor against cardiovascular disease and increases the quality of life and physical health. In explaining this result, it can be argued that positive emotions and attitudes have a protective effect against disease indicators and reduce disease and mortality. According to the results of the present study, psychological well-being mediates the relationship between secure attachment and insecure attachment with physical health, consistent with previous research (7,28,38).

The secure attachment style facilitates lifestyle movement and becomes the basis for improving physical health by promoting psychological well-being. On the other hand, insecure attachment undermines a person's health by reducing psychological well-being, increasing exposure to high-risk behaviors, and laying the foundation for chronic disease. Based on the arguments of experts in previous research (7,40), anxious and avoidant attachment styles increase psychological distress and decrease psychological well-being, which reduces health-related behaviors and adherence to health promotion programs, and ultimately medical diseases emerge.

Le et al. (10) pointed out that the avoidant attachment style reduces well-being and physical health due to a negative attitude towards others and fear of communication. Finally, the results showed that the model examined in this study has an acceptable fit for the data collected. This result is consistent with the findings of previous studies (9,11,17,37).

Attachment styles, directly and indirectly, affect physical health through the tension mechanism and positive or negative psychological indicators. Therefore, attachment styles are not only direct determinants of physical health but also affect physical health by altering psychological well-being.

The present study has several limitations. Due to the inclusion and exclusion criteria and the convenience sampling method, caution should be exercised in generalizing the results to other medical students. The inability to use a mixed research design (quantitative-qualitative) is one of the limitations of the current research. The different conditions and cultural contexts of the sample studied may have influenced the results beyond the control of the researcher.

Conclusion

Based on the confirmation of the hypothesized model, it can be stated that attachment styles play a decisive role in physical health. In addition, psychological well-being plays a mediating role in the relationship between attachment styles and physical health. These results contain practical themes in formulating appropriate interventions to promote physical health and prevent diseases based on attachment styles and psychological well-being.

It is suggested that future research should focus on mixed research projects, different genders, different economic conditions, and the marriage or celibacy of student interns. In addition, other important psychological factors should be added to the proposed model in theoretical foundations. To maintain and improve the physical health of medical students, it is necessary to take measures based on strengthening secure attachment and promoting psychological well-being.

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Conflict of Interest

The authors declare no conflict of interest.

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