

# An Investigation of the Causal Pattern of the Relationship Between Personality Variables and Corona-Related Health Attitudes

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## Abstract

**Objectives:** The present study aimed to investigate the causal pattern of the relationship between personality variables and coronavirus-related health attitudes mediated by the internal locus of control and the moderating role of self-esteem in students.

**Method:** The sample participants comprised 150 students of varying educational levels who completed the Health Behavior, Health Attitude, Internal Locus of Control, risk-taking, self-esteem, and conscientiousness and neuroticism questionnaires online and through messaging applications (Telegram & WhatsApp). To analyze data, structural equation modeling (SEM) was used to measure the fitness of the model and examine direct relationships. The mediator relationship was measured via Bootstrap, and the moderator relations were analyzed with hierarchical regression.

**Results:** The results showed that the model fit well with the data, and all direct relationships, except the relationship between risk-taking and health attitudes, were confirmed. The findings also confirmed the mediating role of the internal locus of control in the relationship between personality traits and health attitudes. The results further indicated the moderating role of self-esteem in the relationship between the internal locus of control and students' health attitudes. In other words, the relationship between the internal locus of control and health attitudes in students with higher self-esteem is stronger than the relationship in which students reported lower self-esteem.

**Conclusion:** The results also confirmed the moderating role of self-esteem in the relationship between neuroticism and students' health attitudes. In other words, the relationship between neuroticism and health attitudes in students with lower self-esteem is stronger than the relationship in which students reported higher self-esteem.

**Keywords:** Personality trait, attitude, coronavirus, self-esteem.

## Introduction

The COVID-19 pandemic, which is reported to have begun in Wuhan in December 2019, quickly spread around the world and has become a serious threat to people's physical health and lives. The

outbreak of this disease has also led to a widespread increase in psychological disorders, including panic and anxiety disorders as well as depression among affected people (Qiu, Shen, Zhao, Wang, Xie, & Xu, 2020) in an internet-based survey, examined the level of anxiety caused by the coronavirus outbreak among 10,754 Iranians from different provinces. His findings indicated a high degree of coronavirus-related anxiety, especially among female participants (Moghanibashi-Mansourieh, 2020).

The coronavirus outbreak is a perfect example of a widespread crisis in which events or the sequences of said events occur on a large scale with astonishing

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speeds that can ultimately lead to a high degree of uncertainty that exacerbates irregularities, feelings of lack of control and can cause or exacerbate emotional disorders in people (Shore, 2020).

Despite the warnings and extensive information from various media and medical staff across the country, many individuals ignored these warnings and refused to observe the necessary health precautions to fight the spread of COVID-19 (To, Tsang, Yip, Chan, Wu, Chan, & Yuen, 2020). Certainly, individual and social behaviors of people can be derived from various environmental factors such as family, social, economic, and psychological factors. Therefore, it can be said that the psychological dimension of this phenomenon may have played a more prominent role in this particular case, and psychological dynamics, including personality traits, can be considered a factor that has made a major difference in people's health attitudes and behaviors.

The individual personality is one of the factors affecting safety attitudes, which includes unique characteristics that are formed over time and with the occurrence of different behaviors in individuals (Judge, Heller & Mount, 2002). Personality refers to enduring traits and tendencies that affect human behavior. Personality traits form the primary level of self and are a factor of stability in how people behave, feel and think in different situations and over time (McAdams & Olson, 2010).

Thus, in the present study, the personality antecedents of individuals' health considerations at both attitudinal and behavioral levels were examined, taking into account the mediating variable of the internal locus of control.

The most widely used classification for personality today is the Big Five model, which includes five broad personality traits: Conscientiousness, Agreeableness, Extroversion, Neuroticism, and Open-mindedness or openness to experience (McAdams & Olson, 2010). People with high levels of extroversion have a strong tendency to repeatedly experience positive moods and are usually active and dominant in

social interactions. People who have a high level of agreement tend to engage in behaviors that facilitate positive and reciprocal relationships with others and are often described with traits such as being kind, empathetic, and helpful. Conscientiousness includes characteristics such as being programmed, organized, and responsible. People with high levels of neuroticism have difficulty dealing with negative emotions and are often described as pessimistic, anxious, and worried (Restart, Luyckx, Verdyck, Mijster, & Mark, 2020).

One of the basic dimensions of personality that has been investigated in this study as a precursor to health considerations is conscientiousness, or the so-called having a superego. Within psychological parameters, this trait is defined as trustworthy, responsible, hardworking, and accurate (Wimmer & Keestra, 2022). People who score high on these personality traits are more likely to succeed in protecting their health than others. Research shows that conscientiousness is inversely related to accident-proneness because individuals who are disciplined, responsible, trustworthy, and dependent are less likely to have accidents and an occurrence of unsafe behaviors (Lee, Hansen, & Lee, 2020).

The personality trait of neuroticism can also be an important factor in the occurrence of unsafe behaviors. Neuroticism (social maladaptation) refers to a general class of behaviors and personality traits that are related to accidents. Research also has shown that neuroticism is positively related to the occurrence of accidents (Eysenck, 2020).

The mechanism of the effect of personality traits on people's behavior and attitudes is not necessarily direct, and several mediators can be effective in this regard. Cognitive components and processes can be among the mediators in which studying their role is both valuable and can provide further insight. Cognitive traits can act as a mediator about various inputs as well as attitudinal and behavioral outputs.

In this study, the internal locus of control as a cognitive construct that is of particular importance

in explaining human behavior is considered an intermediary or a so-called mediating role between personality traits and coronavirus-related health considerations. In describing the internal locus of control, it can be said that people who attribute negative events to controllable factors have an internal locus of control (Caliendo, Cobb-Clark, Obst, Seitz, & Uhlendorff, 2022). Many studies have identified a link between the locus of control and the likelihood of involvement in work-related incidents, both in frequency and severity (Ng et al., 2006; Lefcourt, 2014). Regarding safety, people with an internal locus of control believe that accidents are under their control, and if an accident occurs, they blame themselves. Thus, the locus of control is a strong factor that affects the way a person interprets events and perceives danger as well as attitudes toward safety. Studies show that people with a higher internal locus of control scores exhibit an increased tendency to maintain safety orientation and more often refer to safety centers to gain safety experiences (Deming & Lochman, 2008; Miksza, 2006).

Self-esteem is a variable that has been examined in this study as a moderator variable. To define self-esteem, one must first determine the structure of the self-concept. Self-concept refers to a set of beliefs and knowledge of humans about their outstanding abilities and personality traits. In other words, self-concept is a cognitive schema that organizes objective and abstract perspectives regarding the self and controls and also directs information processing related to the self (Hattie, 2014). Other concepts, such as self-perception and self-image, are equivalent to the definition of self-concept. Self-esteem is the emotional and self-evaluating dimension of the self-concept and is equivalent to concepts such as self-regard, self-estimation, and self (Hart, Shaver, & Goldenberg, 2005). Self-esteem refers to an individual's overall evaluation of their positive and negative values in different roles and contexts of life. Positive self-esteem is not only

seen as an essential aspect of mental health but also, through its protective role against negative forces, provides the context for better health and positive social behavior. Healthy self-esteem functions are actively reflected in various aspects of life, including success, improvement, satisfaction, and the strength to confront diseases such as cancer and heart disease. Conversely, an unstable self-concept and poor self-esteem play a crucial role in the development of a range of mental disorders and social problems, such as depression, anorexia nervosa, bulimia, anxiety, violence, substance abuse, and risky behaviors (Mann, Hosman, Schaalma, & De Vries, 2004). Conditions resulting from poor self-esteem not only lead to individual suffering but also impose burdens on society. Experimental research over the past 15 years has shown that self-esteem is an important psychological factor for health and quality of life (Evans, 2000).

Recently, several studies have shown that health and welfare are significantly associated with self-esteem which has a significant common variance with welfare and happiness. Self-esteem is also known as the strongest and most influential predictor of happiness. Studies also show that people with high self-esteem and narcissism tend to express anger and aggression. It seems that the combination of self-esteem with narcissism is not very beneficial for human beings (Harris & Orth, 2020).

The effect of self-esteem on risky behaviors and physical health is also evident. For example, in a longitudinal study, Rouse (1998) found that adaptive adolescents had higher rates of self-esteem and were less likely to engage in risky behaviors than their maladaptive peers. Adolescents with high levels of self-esteem are less likely to use alcohol or drugs (Scheier, Botvin, Griffin, & Diaz, 2000). On the other hand, those with low self-esteem are more likely to be addicted to drugs, alcohol, and tobacco (Aydm & San, 2011).

According to internal and external research, it has been determined that personality can have a

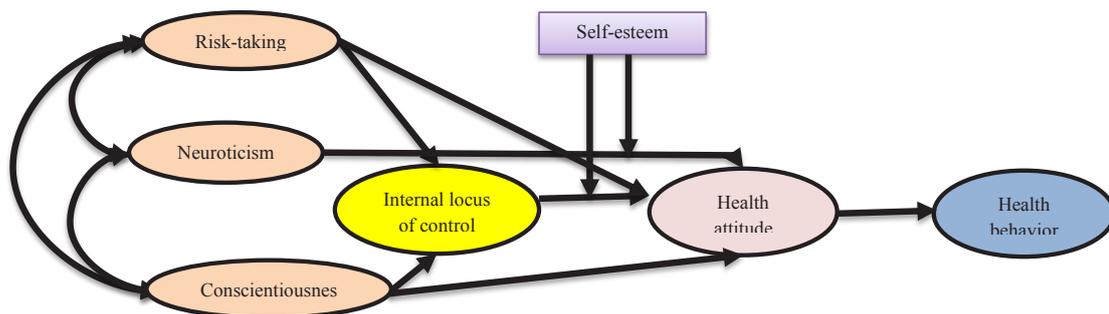
significant impact on people's attitudes toward safety observance, thus the main purpose of this study was to determine the extent of risk-taking, neuroticism, conscientiousness, and the internal locus of control in the antecedents of coronavirus-related health attitudes and to what extent this health attitude leads to a health behavior relative to the coronavirus. On the other hand, this study examined the moderating role of self-esteem and the mediating role of the internal locus of control, with consideration given to the internal locus of control as a powerful factor in the way in which events are interpreted and danger is perceived. This study also aims to examine its effects on attitudes toward safety and health; therefore, the role of a mediator can provide important information to the researcher and plays an important role in introducing and application of this structure. In this

of nature and method, it is a description of the type of correlation because, in such research, the researcher seeks to investigate the possible relationship and the effect size of the correlation between the variables mentioned in the research.

## Method

### Participants and Procedure

The sample population of the present study included students who were involved in health issues related to the coronavirus disease in April and May 2020 during quarantine and physically absent from university. From the sample population, 150 participants were selected. Due to the special conditions of the community and the restrictions of traffic and social communication, the convenience sampling method and online questionnaire were used. The method



**Figure 1:** The proposed model of the causal pattern of the relationship between personality variables and health attitude relative to the coronavirus

study, a model of the causal pattern of the relationship between the antecedents and consequences of health attitudes toward the coronavirus has been designed. Figure 1 shows the proposed model of the present study.

### Research design

The design of this study was descriptive-correlational. In this study, a model of the causal pattern of the relationship between personality variables and health attitudes has been tested. Therefore, in terms

consisted of questionnaires designed electronically online with the questionnaire link provided to the participants through social messaging networks (Telegram and WhatsApp). After collecting the data and reviewing the returned questionnaires to ensure their correct and accurate completion, they were all analyzed.

### Measures

In the present study, in order to measure the research variables, the following instruments have been used:

**Personality Traits Questionnaire:** In this study, the personality traits of conscientiousness and neuroticism are defined by the scores that individuals obtain in the NEO-FFI questionnaire, suitable for people who are 17 years or older. The responses to the questionnaire are scored on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). In the present study, the short form, namely the NEO-FFI test, and the characteristics of neuroticism and extraversion were used (Ghazanfari, Kazemnejad, Feizi, Fesharaki, Dinu, Keshteli, & Adibi, 2020). In the present study, Reliability coefficients were calculated by Cronbach's alpha and split halving method for the neuroticism questionnaire, respectively calculated as 0.77, 0.70, and conscientiousness as 0.77 and 0.73.

**Internal locus of control Questionnaire:** The locus of control questionnaire, developed by Rutter (1966), has 16 questions, 8 of which measure the internal locus of control and 8 questions measure the external locus of control (Stern & Manifold, 1977). The responses to this questionnaire are scored on a six-point Likert scale from 1 (strongly disagree) to 6 (strongly agree). The results showed that this scale was suitable for Iranian general population (Ghasemzadeh, 2011). Reliability coefficients in the present study were calculated by Cronbach's alpha and the split halving method were 0.72 and 0.70, respectively. Also, to determine the validity of this questionnaire, the method of confirmatory factor analysis was used which calculated the values of IFI (0.99), CFI (0.99), RMSEA (0.04), and relative chi-square (1.35) which is close to the fitness criteria and were verified.

**Health Attitude Questionnaire:** This questionnaire, which measures people's attitudes toward health care against the coronavirus and immunity at the time of the coronavirus epidemic, was developed by the researcher (Abedini Vellamdehi, Gheysari, & Beshlideh, 2020). This scale showed suitable psychometric properties. Reliability coefficients in the present study were calculated by Cronbach's alpha

and split halving method which was respectively 0.76 and 0.74. Also, to determine the validity of this questionnaire, the method of confirmatory factor analysis was used which calculated the values of IFI (0.97), CFI (0.97), RMSEA (0.06), and relative chi-square (1.99) which is close to the fitness criteria and were verified.

**Health Behavior Questionnaire:** This questionnaire, which measures how people behave towards health care against the coronavirus and immunity at the time of the coronavirus epidemic, was developed by the researcher (Abedini Vellamdehi et al., 2020). This questionnaire has 7 items of which the responses are scored on a four-point scale from 1 (strongly disagree) to 4 (strongly agree). Reliability coefficients in the present study were calculated by Cronbach's alpha and split halving method which was respectively 0.7 and 0.64. Also, to determine the validity of this questionnaire, the method of confirmatory factor analysis was used which calculated the values of IFI (0.97), CFI (0.97), RMSEA (0.068), and relative chi-square (1.99) which is close to the fitness criteria and were verified.

**Risk-taking questionnaire:** In the present study, the safety and risk-taking questionnaire by Westby and Lee (2003) was used to measure risk-taking, which consists of 12 items along with two subscales of safety awareness (7 items) and risk-taking (5 items). In this study, the risk-taking dimension was used (Westby, 2014). Westby & Lee (2003) confirmed the independent structure of these two factors using exploratory and confirmatory factor analysis. The responses to the questionnaire were scored on a five-point scale from 1 (strongly disagree) to 5 (strongly agree). The results showed that this scale was suitable for Iranian general population (Jalali, Jaafar, Talebi, & Halim, 2014). Reliability coefficients in the present study were calculated by Cronbach's alpha and split halving method which was 0.76 and 0.75, respectively. Also, to determine the validity of this questionnaire, the method of confirmatory factor analysis was used which calculated the values of IFI

(0.97), CFI (0.97), RMSEA (0.07), and relative chi-square (2.22), which is close to the fitness criteria and were verified.

Self-esteem questionnaire: In the present study, the Rosenberg Self-Esteem Scale (1965) was used

self-report method at a certain time interval (three weeks from April 8th to April 29th, 2020). First, the descriptive findings related to the variables were examined followed by the findings related to the hypothetical model. Data analysis began with various

**Table 1:** Mean, standard deviation and correlation coefficients between research variables

Variables	Mean	Standard deviation	1	2	3	4	5	6	7
Neuroticism	7.80	2.40	*						
Conscientiousness	15.97	2.60	-0.43**	*					
Risk-taking	9.85	2.80	0.002	-0.11	*				
Self-esteem	15.57	3.04	-0.59**	0.58**	-0.14	*			
Internal locus of control	16.86	2.26	-0.21*	0.17*	-0.22*	0.26**	*		
Health attitude	18.77	1.77	-0.02	0.31**	-0.11	0.26*	0.48**	*	
Health behavior	21.22	2.27	-0.19	0.22*	-0.33**	0.20*	0.37**	0.41**	*

to measure self-esteem. This questionnaire has 10 items that assess a general factor of personal self-worth. Five items on this scale measure the negative aspects of self-perception, so to obtain the total scale score, it is necessary to score the five negative items in the opposite direction. The questionnaire consists of a six-point Likert scale scored from 1 (strongly disagree) to 6 (strongly agree). The results showed that this scale was suitable for Iranian general population (Joshanloo & Ghaedi, 2008). Reliability coefficients in the present study were calculated by Cronbach's alpha and split halving method at 0.85 and 0.77, respectively. Also, to determine the validity of this questionnaire, the method of confirmatory factor analysis was used which calculated the values of IFI (0.99), CFI (0.99), RMSEA (0.07), and relative chi-square (2.28) which is close to the fitness criteria

preliminary analyses (i.e. mean, standard deviation, zero-order Pearson correlations, and regression to examine the multivariate relationship of antecedents) to gain basic insight into the data. More complicated analyses were then performed to evaluate the fitness of the proposed model through structural equation modeling (SEM) as well as utilizing SPSS 23 and AMOS 23 software. To test the indirect effects in the hypothetical mediation model, the Bootstrap method was used. Finally, the stepwise regression coefficient was used to investigate the role of the moderator.

## Results

In terms of demographic characteristics among the 150 participants, 46% (69) of the sample were male, 54% (81) female, 22% (33) married, and 78% (117) were single. In addition, 26% (39) had an associate

**Table 2:** Fitness indices of the research model

Model	df	/df	GFI	AGFI	IFI	TLI	CFI	NFI	RMSEA	
Proposed Model	675.624	395	1.71	0.70	0.65	0.85	0.70	0.85	0.65	0.09

and were verified.

### Sample and procedure

Research questionnaires were answered via a

degree, 42% (63) had a bachelor's degree, 22% (33) had a master's degree, and 10% (15) had a doctorate. The minimum age of participants ranged from 20 to

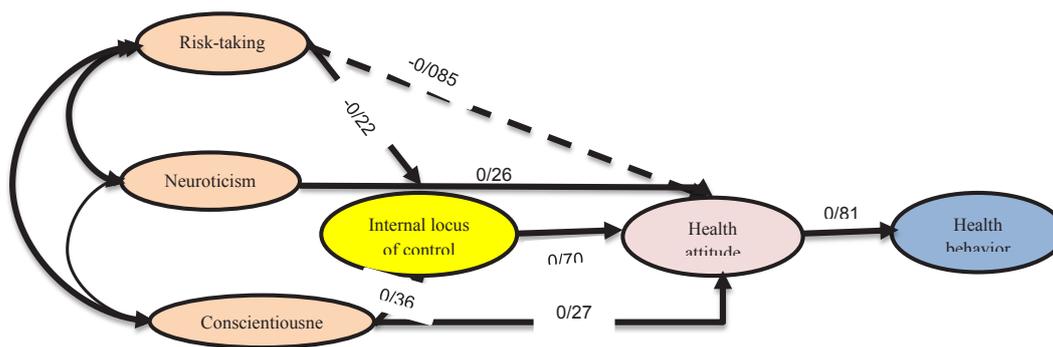


Figure 2: The final model of the causal pattern of the relationship between personality variables and health attitudes

the maximum age at 36 years old. Table 1 shows the statistical indicators of mean, standard deviation, and correlation coefficient between research variables. As seen in Table 1, the correlation coefficient between the variables of health attitude with the variables of conscientious personality (0.31), self-esteem (0.26), the locus of control (0.48), and the variable

were less than 3 and 10, respectively, which indicates the normality of data distribution. Also, the tolerance and variance enhancement statistics for any variable were not less than 0.1 and greater than 10, respectively. Therefore, no multiple alignments were found between the predictor variables of this study. The fit of the proposed model was used based

Table 4: Structural model of direct paths and their standard coefficients in the final model of the present study

path	Estimate	S.E.	C.R.	P
neuroticism → health attitude	0/20	0/067	2/482	0/005
conscientiousness → health attitude	0/33	0/076	2/802	0/001
conscientiousness → internal locus of control	0/30	0/098	3/006	0/0001
risk-taking → health attitude	0/004	0/208	-1/136	0/98
risk-taking → internal locus of control	-0/36	0/106	-2/171	0/001
internal locus of control → health attitude	0/57	0/119	5/953	0/0001
health attitude → health behavior	0/45	0/132	4/807	0/0001

of health behavior (0.41) at level  $P \leq 0.01$  and  $P \leq 0.05$  is significant. There was no simple relationship between neuroticism and risk-taking with health attitudes. To evaluate the proposed model, structural equation modeling (SEM) was used. Before analyzing the data related to the hypotheses, they were examined to ensure that the data of this study estimate the underlying assumptions of the structural equation model. In this study, two assumptions, including the normality of data distribution and the absence of multiple alignments, were examined. The skewness and Kurtosis coefficients of the variables

on a combination of fit criteria to determine the sufficiency of the proposed model to fit the data. If the Chi-Square ( $\chi^2$ ) is not statistically significant, it indicates the appropriate fit of the model. The relative to the chi-square ( $\chi^2/df$ ), the closer it is to zero, and the smaller it is, the better. The acceptable value is less than or equal to 3. The acceptable value of GFI (Goodness-Of-Fit), AGFI (Adjusted Goodness-Of-Fit), CFI (Comparative Fit Index), IFI (Incremental Fit Index), and TLI (Tucker Lewis Index) is greater than or equal to 0.90. In the Root-Mean-Square Error of Approximation (RMSEA), the value of 0.08 to

0.10 reflects the model with an average fit, whereas the value of 0.01 to 0.06 indicates the model with an acceptable fit. A value between 0.01 and 0.06

also be said that the relationship between health attitudes and health behavior (0.45) is significant at the level of  $p \leq 0.01$ . According to the results of

**Table5:** Structural model of indirect paths and their standard coefficients in the final model of the present study

path	Data	Boot	Bias	S.E.	Lower	Upper
conscientiousness → internal locus of control → health attitude	0/0964	0/0958	-0/0006	0/0295	0/0512	0/1736
risk-taking → internal locus of control → health attitude	-0/0502	0/0511	-0/0009	0/0239	-0/1130	-0/0149
conscientiousness → health attitude → health behavior	0/1536	0/1535	-0/0002	0/0337	0/0942	0/2263
neuroticism → health attitude → health behavior	0/0115	0/0116	0/0001	0/0320	-0/0375	0/1019

indicates a very good fit of the model, and a value of 0.00 (zero) indicates a model with an excellent fit (Jenni & Nessi, 2004). The fit of the proposed model with the data based on fit indices is reported as an absolute fit index in Table 2.

As can be seen in Table 2, the proposed model with indices such as RMSEA (0.09), IFI (0.85), and the relative chi-square (1.71) indicates the optimal fit of the model. Structural equation modeling (SEM) tests performed at two levels of relationships between latent variables and measurement models show that the research model fits well with the data. In other words, the observed model is statistically reproducible in society. Also, these results show that the scales involved in this study have construct validity. Therefore, the direct and indirect effects of variables can be investigated. However, the direct relationship between risk-taking and health attitude was not significant and was removed from the model. Figure 2 shows the final research model.

### Results related to simple relationships

Table 4 shows the direct paths and their standard coefficients for the final research model. As can be seen in Table 4, all path coefficients in the proposed model of the present study are significant except for a relationship at high levels.

According to Table 3, it can be said that the relationship between neuroticism (0.20), conscientiousness (0.33), the internal locus of control (0.57), and health attitudes at level  $p \leq 0.01$  is significant. It should

this study, except for the relationship between risk-taking and health attitudes, the other results are not only straightforward and unambiguous but also statistically significant at the level of  $p \leq 0.01$ .

### Results on mediator relationships

The bootstrap method in the AMOS 23 program was used to analyze the mediator hypotheses. Table 5 shows the indirect paths and their standard coefficients in the final research model. As can be observed in Table 5, all indirect path coefficients in the proposed model of the present study are significant. Accordingly, all indirect hypotheses were confirmed.

The confidence interval for the paths listed in Table 5 indicates no zero in this interval, indicating the significance of these indirect paths except for one indirect path. The confidence level for this interval is 95, and the replication number of Bootstrap sampling is 5000. According to Table 5, the variable of internal locus of control has been able to explain the mediating role in the relationship between personality traits (conscientiousness and risk-taking) and health attitude because zero is not in this interval, and the indirect path is significant. Also, the health attitude has played a mediating role in the relationship between conscientiousness and health behavior because zero is not in this interval.

### Results on moderator

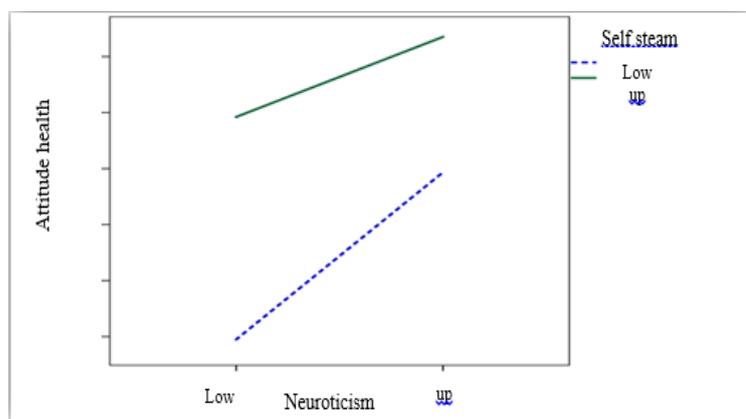
To investigate the modulatory effects of self-esteem in the relationship between neuroticism and health

attitudes, the simultaneous-entry regression analysis method has been used. The results of self-esteem moderating effects using simultaneous regression analysis are presented in Table 5.

According to the results of Table 5, the beta coefficient is related to the product of neuroticism and self-esteem  $\beta = -0.894$ , while the critical ratio obtained (t) is -3.456, which is at the level of  $P < 0.001$  and is statistically significant. Thus, self-esteem can moderate the relationship between neuroticism and

Also, the interaction of neuroticism and self-esteem defines 9% of the variance of health attitudes, thus the mentioned interaction is significant. The moderating role of self-esteem in the relationship between neuroticism and health attitudes is shown in Figure 3.

To investigate the modulating effects of self-esteem on the relationship between the internal locus of control and health attitudes, the simultaneous-entry regression analysis method was used. The results



**Figure 3.** The role of self-esteem moderator in the relationship between neuroticism and health attitudes

health attitudes. Based on the results of this table, the neuroticism variable entered the analysis in the first step, which has a positive and significant relationship with health attitudes ( $\beta = 1.170$ ,  $P < 0.0001$ ). In the second step, self-esteem was entered in the analysis, which had a positive and significant relationship with health attitudes ( $\beta = 0.939$ ,  $P < 0.0001$ ). In the third step, the interaction of neuroticism (independent) and self-esteem (moderator) was significant in predicting health attitudes ( $\beta = -0.894$ ,  $P < 0.001$ ).

of the modulating effects of self-esteem using simultaneous regression analysis are presented in Table 6.

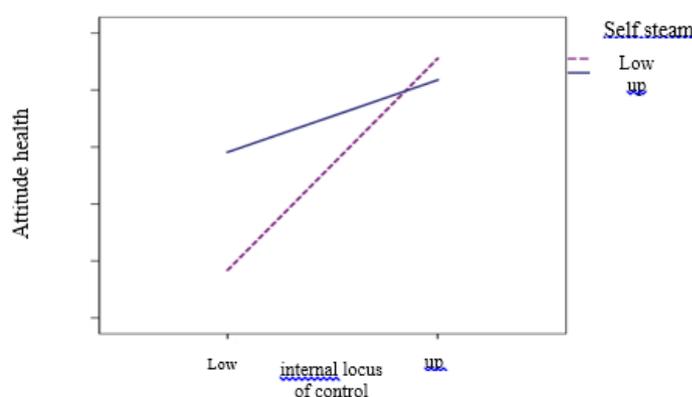
According to the results of Table 6, the beta coefficient is related to the product of the internal locus of control and self-esteem ( $\beta = -1.664$ ), and the critical ratio obtained (t) is -2.865, which is at the level of  $P < 0.005$ , and it is statistically significant. Thus, self-esteem can moderate the relationship between the internal locus of control and health attitudes. Based

**Table 6.** Results of regression analysis of internal locus of control and self-esteem (moderator) with health attitude

Predictor variables		B	S.E.	$\beta$	T	P
Criterion variable: health attitude						
Step one	internal locus of control	0.753	0.195	1.170	3.868	0.0001
Step two	Self-esteem	0.520	0.118	0.939	4.404	0.0001
Step three	internal locus of control *Self-esteem	-0.041	0.012	-0.894	-3.456	0.001
$P < 0.001$		R -0.312	R -0.097	F -7.565		

on the results of this table, the internal locus of the control variable entered the analysis in the first step, which has a positive and significant relationship with health attitudes ( $\beta = 1.377$ ,  $P < 0.0001$ ). In the second step, self-esteem was entered in the analysis, which had a positive and significant relationship with health attitudes ( $\beta = 1.324$ ,  $P < 0.003$ ). In the third step, the interaction of the internal locus of control (independent) and self-esteem (moderator) was significant in predicting health attitudes ( $\beta = -1.664$ ,  $P < 0.005$ ). Also, the interaction of the internal locus of control and self-esteem defines 31% of the variance

Numerous studies have shown that conscientiousness is inversely correlated to occupational accidents and unsafe behaviors (Cellar, Nelson, Yorke, & Bauer, 2001). As Clarke (2006) explains this issue states, "Conscientious personality traits lead to greater safety observance and control of occupational accidents through precisely following safety regulations". In other words, it can be said that more conscientious people pay more attention to health instructions than other people who are less conscientious and take them more seriously, which leads to the formation of a stronger health attitude



**Figure 4.** The role of self-esteem moderator in the relationship between internal locus of control and health attitudes

of health attitudes, thus the mentioned interaction is significant. The moderating role of self-esteem in the relationship between internal locus of control and health attitudes is shown in Figure 4.

### Discussion and conclusion

The results of this study showed a significant relationship between neuroticism and conscientiousness with health attitudes. In other words, the direct relationship between neuroticism and conscientiousness with health attitudes has been confirmed. In explaining the positive relationship between neuroticism and health attitudes, we can mention the component of worriedness and anxiety. Worriedness and anxiety caused by neuroticism may make people more sensitive to the dangerous coronavirus and make them more prone to develop serious health attitudes.

in these individuals (Wallace & Vodanovich, 2003). In this study, the simple relationship between risk-taking and health attitudes was not confirmed. This means that risk-taking alone cannot be negatively related to health attitudes. Whereas the risk-seeking person seeks tension, risk-taking, and adventure, and this adventuring and risk-taking mainly occur in the social context. In the specific case of the COVID-19 pandemic, the social context was certainly not associated with this risk, and as a result, risk-taking itself had nothing to do with health attitudes in this case. In addition, it can be said that a risk-taking personality goes into danger in a situation where there is a kind of adventuring and ambiguity and uncertainty hidden (Clarke, 2006; Bu, Hanspal, Liao, & Liu, 2020). However, in the specific case of the coronavirus, no vague consequences can

be imagined for dangerous and unsafe behavior. Everything in this regard has been made public through various social media, and individuals themselves have reached this insight in their daily experiences. Therefore, the lack of a relationship between risk-taking and health attitudes seems significant. However, an interesting point shown in this study demonstrated that the locus of control construct has played a complete mediating role in risk-taking with health attitude, and risk-taking is related to health attitude through its relationship with the internal locus of control (Bajema, Oster, McGovern, Lindstrom, Stenger, Anderson, & Yousaf, 2020). According to related research, Risky behaviors are the cause of indifference to diseases, and risk-taking people do not believe that they will get sick and consider themselves excluded from society, and this carelessness causes infectious viruses to enter the body, and as a result, these people become the cause of virus transmission to the members of society.

In describing the locus of control, we said that individuals who attribute negative events to controllable factors have an internal locus of control. According to research, a person who has an internal locus of control feels that accidents are preventable and that the person's actions are directly involved in the likelihood of accidents occurring. But a person with an external locus of control feels that accidents depend on chance and are often unpredictable. It seems that a risk-taking individual is exactly one who does not believe in personal control over events and attributes most of the events to external factors, such as chance, that can always exist. As such, this is probably why these individuals easily put themselves in danger and adventuring. Therefore, as the results of this study showed, the trait of risk-taking has a negative and significant relationship with the internal locus of control, and thus it can be said that risk-taking itself is not related to health attitudes and correlates with health attitudes only through the internal locus of control (Wimmer & Keestra, 2020;

Sigurvinsdottir, Thorisdottir, & Gylfason, 2020; Chen & Silverthorne, 2008).

In this study, the important construct of the internal locus of control has also acted as a mediator of conscientiousness. Here, in addition to the direct relationship between conscientiousness and the health attitude described earlier, conscientiousness is also connected to the health attitude through the mediator mechanism of the internal locus of control. Dutiful and conscientious people are very careful about the consequences of their actions and their effects on others and therefore try to have more control over possible events. Therefore, their attributive attitude towards negative events is more internal because they are willing to take responsibility for their actions. Furthermore, responsibility arising from conscientiousness activates the internal locus of control in individuals and thereby affects their health attitudes and, consequently, their health behavior. This means that conscientious people feel more responsible and more in control of not getting infected by coronavirus disease. Therefore, their attitude is that people can be immune from disease by following the health recommendations, and, in other words, they should follow health tips and protocols. Ultimately, this attitude leads to responsible behavior and the performance of hygienic practices (Sturman, 2020; Carvalho, Pianowski, & Gonçalves, 2020). The final finding of this study is that self-esteem moderates the relationship between neuroticism and the internal locus of control with health attitudes. This means that neurotic people with higher self-esteem have higher health attitudes than neurotic people with lower self-esteem. Also, the health attitudes of individuals who have an internal locus of control and have high self-esteem are much higher than the healthy attitude of people who also have an internal locus of control but have less self-esteem. Here, we see the important role of the self-esteem variable and how it is positively effective (Alipour, Ghadami, Alipour, & Abdollahzadeh, 2020).

As indicated in the research literature review

regarding some empirical evidence on self-esteem, this construct plays an important role in social adjustment and emotional health, psychological and even physical health of individuals. A person with higher self-esteem, even if neurotic -according to the results of this study- has a higher health attitude and therefore behaves more responsibly. Thus, the present study acknowledges that in line with previous research, i.e. the self-esteem trait when facing the COVID-19 disease still helps people's health. People with higher self-esteem have better health attitudes and perform better, so they are less likely to be infected by the coronavirus disease. The more important point to note is to what extent the personal trait of self-esteem can affect the general health of society. The COVID-19 pandemic consists of a chain in which each individual in society plays a key role in expanding or limiting this chain (Moghanibashi-Mansourieh, 2020; Wimmer & Keestra, 2020; Carvalho et al., 2020; Abdelrahman, 2020).

The general conclusion that can be drawn from the findings of this study is to what extent individual and psychological traits of people can be effective in endangering the general health of a society and even beyond the global community in a short period. The widespread negative effects that the outbreak of this disease has on the physical and psychological health of individuals all over the world, as well as the normal functioning of society and the economy of the countries, are not hidden from anyone. What we observe, and the research illustrates, is that the personality and psychological traits of individuals have greatly affected the spread of this great crisis. Perhaps before the outbreak of the coronavirus pandemic, one could not claim that the individual traits of citizens could be so effective in accelerating the global crisis that disrupts most systems of societies. Thus, traits such as the internal locus of control, conscientiousness, and self-esteem are assets for individuals and society that help us not only in daily life and personal crises

but also in widespread social crises to get through this crisis safely. However, without individual capabilities and preparations, larger forces such as governments alone will not be able to control the situation in such sensitive situations. Since most of these traits can be cultivated, they should be considered in introducing schemas and public education. How to effectively educate and promote positive psychological traits and even design short-term interventions in this regard can be considered research topics for future researchers.

As mentioned, this research was conducted in the form of an internet survey and the target population was students. Students' attitudes and behaviors are certainly different from other strata of society, and the research community is limited to a group of students is one of the limitations of the research. Also, the participants in this study were probably healthy people, and this study did not cover patients with coronavirus disease who were infected at the time of the survey; while certainly, the information obtained from the attitudes and studying the personality of this group of people could also have remarkable and significant results. Therefore, this has also been one of the limitations of the present study.

### **Ethical statement**

All procedures used in collecting survey data on which this article relies are by the ethical standards of the Helsinki Declaration of 1964 and subsequent amendments or ethical standards. All data were collected anonymously, and no association could be established between the questionnaires and the responders.

**Informed Consent:** All participants were informed of the aim of the research both verbally. All data about the confidentiality and anonymity of their responses were introduced.

**Human and Animal Rights:** Current research does not contain any interventions or studies with animals executed by any of the authors.

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