Research Paper

The Relationship Between Health Literacy, Perceived Stress, Anxiety Sensitivity, and Self-care for COVID-19: The Mediating Role of Health Locus of Control

Soliman Ahmadboukani[1] , Davod Fathi[1] , Sepideh Bashirgonbadi[1] , Leila Raisi[2] , Meraj Derakhshan[3] , Behnam Molaei[4*]

1. Department of Counseling, Faculty of Educational Sciences and Psychology, University of Mohaghegh Ardabili, Ardabil, Iran.
2. Department of Midwifery, School of Nursing and Midwifery, Ardabil University of Medical Sciences, Ardabil, Iran.
3. Department of Counseling, Bushehr Farhangian University, Bushehr, Iran.
4. Department of Psychiatry, Faculty of Medicine, Ardabil University of Medical Science, Ardabil, Iran.

ABSTRACT

Objectives: This study aims to determine whether health literacy, perceived stress, and anxiety sensitivity are correlated with self-care for COVID-19, focusing on the mediating role of health locus of control (HLOC) in Ardabil City, in northwestern Iran, in 2020.

Methods: This descriptive-correlational study was conducted using path analysis. The research population included households living in Ardabil city. The participants included 300 persons who were selected using the convenience sampling method. The data were collected via the health literacy instrument for Iranian adults (HELIA), perceived stress scale (PSS), anxiety sensitivity scale (ASS), self-care questionnaire, and locus of control scale (LCS). The statistical analysis of the collected data was performed with SPSS software, version 25 and AMOS software, version 24.

Results: Data analysis showed that anxiety sensitivity had a negative relationship with the internal locus of control (ILOC) and a positive and significant relationship with the external locus of control (ELOC). Furthermore, health literacy has a positive correlation with ILOC and a negative and significant correlation with ELOC. The results also demonstrated that perceived stress had a direct and negative impact on ELOC and a direct and positive impact on the chance locus of control. Moreover, ILOC had a positive and direct relationship with self-care for COVID-19, and ELOC and chance locus of control had a negative and direct relationship. The data also indicated that HLOC played a fully mediating role in the relationships between the research variables, and health literacy and anxiety sensitivity were associated with self-care for COVID-19 mediated by the ILOC and the individual HLOC. However, the relationship between perceived stress and self-care was not confirmed mediated by HLOC.

Discussion: The results revealed that health literacy and anxiety sensitivity are associated with self-care for COVID-19 and this relationship is mediated by HLOC. Accordingly, some interventions should be planned and implemented to strengthen and direct HLOC and enhance self-care behaviors in people during the COVID-19 outbreak.

* **Corresponding Author:**
Behnam Molaei, Assistant Professor.
Address: Department of Psychiatry, Faculty of Medicine, Ardabil University of Medical Science, Ardabil, Iran.
Tel: +98 (914) 3511233
E-mail: b.molaei@arums.ac.ir

Highlights

• Currently, many scientists in the world consider the COVID-19 pandemic to be the greatest public health, economic, and national policy challenge of the century for many countries.

• Following the literature, Iran, like other countries, is affected by the negative consequences of COVID-19. Thus, some measures should be taken to mitigate these consequences.

• Self-care should be taken as a crucial strategy in epidemiological studies on COVID-19 to cope with the disease and the factors affecting it to develop a model to identify and understand the COVID-19 mechanism.

• However, various factors seem to affect people's ability to care for themselves.

• Research shows that although anxiety reduces an individual's ability to take care of themselves, having a certain degree of stress makes the person take more care of themselves and thus be less at risk of developing the disease.

• To engage in adequate self-care, people are expected to have a high level of health literacy.

• Research also shows that patients with higher levels of self-reliance and independence are more likely to have less cooperation with healthcare providers, which in turn negatively affects patient self-care.

Plain Language Summary

During the COVID-19 outbreak in Iran, self-care has gained special importance in preventing the spread of infectious diseases. Although improving self-care behaviors is one of the most effective ways to control disease and its complications, only a low number of adults practice effective self-care measures. Various factors appear to influence people's ability to care for themselves. The present study was conducted to determine whether health literacy, perceived stress, and anxiety sensitivity are correlated with self-care for COVID-19 with a focus on the mediating role of Health locus of control (HLC) in Ardabil City in 2020 using a descriptive-correlational design and path analysis. The research population included people living in Ardabil City. The participants included 300 persons who were selected via the convenience sampling method. The health literacy instrument for Iranian adults (HELIA), perceived stress scale (PSS), anxiety sensitivity scale (ASS), self-care questionnaire, and locus of control scale (LCS) were used to collect data. The results showed that health literacy and anxiety sensitivity are associated with self-care for COVID-19, mediated by health locus of control (HLOC) (both internal and individual). Thus, planning effective interventions to strengthen HLOC can improve self-care behaviors in people during the COVID-19 pandemic.en that the new coronavirus is spreading rapidly worldwide and many countries are struggling with this virus, evaluating factors affecting self-care behaviors can be a vital step in managing the disease and reducing its complications.

Introduction

Despite significant developments in disease control, infectious diseases are still major concerns for epidemiologists and public health professionals [1]. Following the environmental conditions and the re-emergence of these diseases, most countries do not have the capacity required for quick identification and timely response [2]. COVID-19 is a pandemic induced by a novel beta coronavirus (severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]). It started in China in late December 2019 and affected people worldwide within almost 4 months. Accordingly, on March 11, 2020, World Health Organization (WHO) declared CO-VID-19 to be a pandemic to redirect public attention to its importance. Currently, many think tanks in the world consider the COVID-19 pandemic to be the greatest public health, economic, and national policy challenge for many countries [3]. It seems that the critical challenge created by this pandemic is the health of human lives worldwide, which has imposed many problems and costs on countries [4]. Researchers have concluded that in addition to physical and therapeutic interventions, affected people need psychological interventions to reduce the psychological harm of this disease [5].

One of the psychological solutions to control and reduce the complications and costs caused by COVID-19 is to promote self-care behaviors. Self-care behaviors by the sick person or positive and specific attitudes towards himself and his illness are formed in a conscious and controlled way. Self-care behaviors refer to a set of spontaneous activities performed by the patient to understand their conditions and factors affecting their health [6]. These activities include choosing the right food, physical activity, receiving medicines, and following a healthy lifestyle [7]. The extent to which patients engage in self-care behaviors varies in different societies, and even though improving self-care behaviors is one of the effective solutions to control the disease and its complications, only a small number of adults perform self-care methods efficiently [8]. According to previous studies, encouraging healthcare officials and family members to perform self-care behaviors and control eating habits is effective and plays an essential role in controlling the complications caused by diseases [9]. For example, Pandit et al. showed that engaging in self-care behavior is effective in the occurrence of complications and disease recovery [10]. MacPherson et al. also showed that self-care can greatly reduce pain in patients [11]. However, given the low doctor-patient ratio and the high prevalence of COVID-19, paying attention to self-care is very rational and necessary.

Nevertheless, different factors may affect people's self-care ability. For example, Siegel and Lopez showed a negative relationship between anxiety and non-adherence to treatment [12]. Harvie and Steel also showed that self-care greatly reduces the anxiety of the disease and helps the treatment process [13]. Anxiety is a part of modern human life; it is present in all people on average and is considered an adaptive response to environmental stimuli [14, 15]. An anxiety construct that has received extensive attention in anxiety disorder studies is anxiety sensitivity. Anxiety sensitivity is one of the critical mediating variables between stress and disease. Anxiety sensitivity refers to a stable tendency and desire to consider the physical, psychological, and social consequences of anxiety to be annoying and dangerous [16]. Anxiety sensitivity leads to bias in retrieving and processing information related to anxiety-inducing stimuli, paving the way for a person to suffer from mental disorders, including anxiety and panic [17]. Furthermore, studies on the relationship between stress and self-care in patients have reported conflicting results. They have shown that although anxiety reduces a person's ability to take care of himself, having a certain degree of stress makes the person take more care of themselves and thus be less at risk of developing the disease [18].

The concept of perceived stress is derived from Lazarus' and Folkman's theory about the role of evaluation in the stress process, whereby interpreting an event as a stressful event imposes pressure on a person. Perceived stress is a person's overall perception and interpretation of susceptibility to stress [19, 20]. Different people perceive and interpret the same stressor in different ways, and different factors can affect the formation of perceived stress and a person's interpretation of the stress severity [21]. However, some researchers believe that due to their inherent concern, stressed people often tend to engage in self-care behaviors due to the fear of the consequences of inadequate self-care and may even avoid high-risk behaviors or engage in daily self-care without having any specific illness [18].

It is also expected that people need to have more advanced levels of health literacy to have adequate self-care [22]. Health literacy instrument for Iranian adults (HELIA) refers to cognitive and social skills that affect the motivation and ability of people to acquire, understand, and use information to improve and maintain their health. HELIA has two individual and social aspects, the individual aspect involves personal information, capacities, and potentials, and the social aspect involves culture, ethnicity, family-social influences, and economic status that can affect people's health behaviors [23]. Although it is not yet known exactly how much health literacy affects health outcomes, a huge bulk of evidence indicates that many unfavorable health-related outcomes are the result of insufficient health literacy [24]. As a case in point, the effect of self-care on diseases spread by viruses was investigated and showed that self-care and compliance with the instructions given to people by healthcare workers can greatly contribute to prevent the spread of viral and contagious diseases [25]. Studies have demonstrated that self-care is associated with health literacy, and health literacy leads to higher levels of self-care in patients [26].

However, researchers assume that patients with higher levels of self-reliance and independence are likely to have weaker cooperation with healthcare providers and thus less motivation to engage in self-care behaviors [27]. This issue can be addressed through the concept of health locus of control (HLOC) because the perception of individual effectiveness and personal responsibility for well-being, in principle, is a moderating variable to increase the effectiveness of coping and adopting healthy behavioral styles [28]. HLOC is the extent to which people believe that they, significant others, or chance affect their health or illness [29]. The construct of HLOC was developed based on the social learning theory pro-

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posed by Rotter. This theory suggests that based on the history of their reinforcements, people learn to develop their general and specific expectations, and through the learning process, come to believe that certain consequences are the outcome of their actions (internal) or the outcome of other factors independent of themselves (external). Those who believe that they control their health or life events have an internal locus of control (ILOC), and conversely, those who feel that others or chance are responsible for what happens to their health have an external locus of control (ELOC). A review of the literature shows that individuals with an ILOC often tend to perform health-promoting behaviors compared to people who believe that chance or social factors are responsible for their health [30] and are also less prone to learned helplessness [31]. Researchers have shown that HLOC is associated with health-promoting behaviors. Thus, to promote health behaviors, one should focus more on people's perceptions of the impact of internal factors and their abilities, as well as the influence of important people on the control of external factors and chance [32, 33].

Accordingly, since the new coronavirus is spreading rapidly worldwide and many countries in the world have been affected by this virus, paying attention to the factors affecting self-care behaviors can be an effective step in managing this disease and reducing its complications. In the epidemiology of COVID-19, medical equipment and staff are not proportionate to the number of patients, and most of the treatment and prevention services are demoted to self-care behaviors. Thus, paying attention to self-care is essential as a crucial strategy to cope with COVID-19 and its risk factors to develop a model to identify and understand the mechanism of dealing with COVID-19. Therefore, the present study was conducted to specify whether HELIA, perceived stress scale (PSS), and anxiety sensitivity scale (ASS) are correlated with self-care for COVID-19, emphasizing the mediating role of HLOC components. Figure 1 shows the conceptual model of the study:
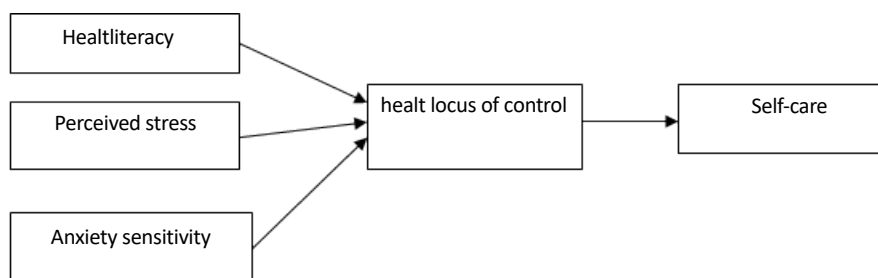
Materials and Methods

The present study was an applied study in terms of its objectives and was conducted using a correlational and path analysis method. The research population included households living in Ardabil City. The participants included 300 persons who were selected via the convenience sampling method. According to Kline, the number of participants in structural equation modeling studies should be equal to or >200 [33].

Before administering the instruments to the respondents, some instructions were provided to them about the objectives of the study and the importance of COVID-19. After obtaining informed consent from the respondents, the link of the questionnaires was provided to them and they were asked to complete them online.

Instruments

HELIA

Montazeri et al. [34] constructed a health literacy HELIA to measure health literacy among Iranian urban adults aged 18 to 65 years. The instrument has some features, such as a small number of items, ease of administration, coverage of all health literacy aspects (access to information, reading skills, understanding, appraisal, and decision-making), and generality. Thus, this tool has not been developed for a specific class, occupation, education, or age group and can be administered to different demographic groups [34]. Panahi et al [35] assessed the construct validity and reliability of the instrument by administering it to a sample of students. The confirmatory factor analysis showed that the instrument has an acceptable goodness of fit [35].

PSS

Cohen et al. designed the perceived stress scale PSS and it has 14 five-point Likert items. The scale has two subscales. Cohen et al. calculated its correlation coefficient with semiotic measures from 0.52 to 0.76 to assess

Figure 1. The conceptual model of the study

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the criterion validity of the scale [35]. In Iran, Moham-madi-Yeganeh et al. confirmed the reliability of the tool using internal consistency and reported its Cronbach's α as 0.74 [36].

ASS

Taylor and Cox [37]. developed the ASS to assess the degree of fear of anxiety symptoms and consequences. This 36-item self-report scale assesses 6 specific features of anxiety sensitivity, including fears of publicly observable anxiety reactions (8 items), cardiovascular (6 items), respiratory (7 items), gastrointestinal (4 items) dissociative/neurological (6 items), and cognitive dyscontrol symptoms (5 items). The items are rated on a five-point Likert scale. Taylor and Cox have reported alpha coefficients from 0.83 to 0.94, confirming the internal consistency of the scale [37]. In Iran, the coefficients measured for the scale and its subscales varied from 0.82 to 0.93, confirming the internal consistency of the scale [38].

Self-care questionnaire

The self-care questionnaire contains 17 items rated on a five-point scale (1=never to 5=always). The items were developed through qualitative interviews and a review of the literature. The face and structure validity of the tool has been confirmed, and the assessment of its content validity showed that the content of the tool is fully consistent with the research objectives. The results of the factor analysis confirmed the validity of the tool. The tool's reliability was evaluated by Cronbach's α, with the corresponding values of 0.71 and 0.83 for personal care and social responsibility factors, respectively.

Multidimensional health locus of control (MHLC) scale

Wallston et al. [39]. developed a MHLC. It has three scales (A, B, C). Forms A and B measure HLOC. Each of these two equivalent forms includes three subscales each with 6 items, internal and external, significant others, and external, chance. In the past 25 years, forms A and B have been used in many studies. Form C was developed for use in disease conditions and can be used instead of form A or B when people with a disease are being studied. Like forms A and B, form C also contains 18 items, but the subscale of significant others has been replaced by two subscales of doctors and significant others, each with 3 items [39]. The construct validity of the instrument in Iran was confirmed through confirmatory factor analysis and its internal consistency was established with Cronbach's α of 0.70 [32]. The α value for this scale was 0.83.

Statistical analysis

The Mean±SD was utilized in the present study to verify the descriptive characteristics of the variables. In addition, path analysis was used to evaluate the mediating roles of the variables. SPSS software, version 25 and AMOS software, version 24 were used to analyze the collected data.

Results

The results showed that 115 participants (38.3%) were men and 185 participants (61.7%) were women. Of these, 152 persons (50.7%) were married and 148 persons (49.3%) were single. In addition, 31% of participants had postgraduate education. The household income of 67.3% of the participants was at the average level. Furthermore, the participants' average age was 33.37±9.09 years. The data also showed that the average score of health literacy among the participants was 73.76 out of 100. Thus, 73% of the participants had adequate health literacy and only 26% of them had a low level of health literacy (Table 1).

To check the simple relationships between the research variables, the correlations between the variables were calculated. The results showed that the correlations between the variables were significant in most cases. Thus, it was possible to assess the model. Table 2 presents the correlation matrix for the research variables.

As presented in Table 2, ILOC and self-care have the highest correlation coefficient. To test the proposed model, after examining the assumptions of path modeling, i.e. the normality of the variables and the linearity of the relationship between the variables, the model was assessed. Table 2 presents the fit indices of the model.

Since the proposed model does not fit the data, the model should be modified by correlating the errors, adding paths, or removing non-significant paths for the optimal fit of the model. The data in Table 3 show that root means square error of approximation (RMSEA), comparative fit index (CFI), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), and normalized fit index (NFI) was equal to 0.050, 0.997, 0.990, 0.983, and 0.995, indicating the optimal fit of the conceptual model. Table 3 also presents the standard coefficients of direct paths:

As illustrated in Table 4, the greatest coefficient of a direct effect on self-care is related to the ILOC and the lowest coefficient of the direct effect on the ILOC is

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Table 1. The participants' demographic data

Variables		No. (%)
Gender	Male	115(38.3)
	Female	185(67.7)
Profession	Employed	161(53.7)
	Unemployed	25(8.3)
	Housewife	103(34.3)
	Retired	7(2.3)
	Student	4(1.3)
Status of education	High school	2(0.7)
	Diploma	53(17.7)
	Associate	25(8.3)
	Bachelor	77(25.7)
	Master	98(31.7)
	Doctorate	48(16.0)
Job loss	Yes	159(53.0)
	No	107(35.7)
	Moderate	202(67.3)
	Good	67(22.3)
	Great	5(1.7)
Disease background	I have	19(6.3)
	I don't have	275(91.7)
	I have recovered	6(2.0)
Health literacy	Insufficient	18(6.0)
	Not so sufficient	50(16.7)
	Sufficient	178(59.3)
	Great	54(18.0)

related to anxiety sensitivity. Figure 2 shows the final model and its standardized coefficients:

The mediation paths were investigated using the bootstrap method, as shown in Table 5.

As shown in the Table 5, the upper and lower boundaries of the ILOC and the individual HLOC in the re-lationship between anxiety sensitivity and self-care do not include zero. Thus, these variables are mediators between anxiety sensitivity and self-care. Besides, the upper and lower boundaries of the ILOC and the individual HLOC in the relationship between health literacy and self-care do not include zero, indicating that the ILOC and the individual HLOC act as the mediating variables in the relationship between the two variables. In addi-

Table 2. The correlation matrix for the research variables

	Variables	1	2	3	4	5	6	7	Mean±SD
1	ASS	1							48.38±26.13
2	HELIA	-0.25**	1						73.76±12.57
3	PSS	-0.36**	-0.27**	1					23.12±8.18
4	ILOC	-0.19**	0.19**	-0.06	1				27.19±4.23
5	Individuals' HLC	0.16**	-0.17**	-0.29**	0.38**	1			22.80±5.05
6	Chance health locus	0.14**	0.07	0.27**	-0.02	0.14*	1		16.60±4.46
7	Self-care	-0.13**	0.12**	-0.09	0.74**	-0.66**	-0.44**	1	39.98±6.07

*$P<0.05$, **$P<0.01$

Abbreviations: ASS: Anxiety sensitivity scale; HELIA: Health literacy instrument for Iranian adults; PSS: Perceived stress scale; ILOC: Internal locus of control; HLC: Health locus of control.

tion, the lower and upper boundaries of the health locus of chance and the ILOC in the relationship between perceived stress and self-care include zero, indicating that the health locus of chance and the ILOC do not play a mediating role in the relationship between perceived stress and self-care.

Discussion

The present study was conducted to discover whether health literacy, perceived stress, and anxiety sensitivity are correlated with self-care for COVID-19, focusing on the mediating role of HLOC in families of Ardabil City. The results showed that anxiety sensitivity has a negative relationship with ILOC and a positive and significant relationship with ELOC. Similarly, Cvengros et al. found that people with a high ILOC have less anxiety, while people with an ELOC experience more anxiety and are more likely to develop mental illness and psychological distress [40]. Anxiety is associated with the fundamental belief about the locus of control. Thus, the anxious person feels that they have no control over life situations, including health. Besides, ELOC is associated with the belief that situations are beyond the individual's

control, while low anxiety sensitivity is related to the belief in the ability to control situations. Accordingly, it can be argued that anxiety sensitivity adversely affects the center of internal health control and belief in one's role in disease control and has a positive and direct effect on the ELOC.

The data analysis also revealed that health literacy has a positive correlation with ILOC and has a negative and significant relationship with ELOC. Zeidner [41] showed that individuals who have scored higher on ILOC have a greater tendency to engage in preventive and health-promoting behaviors, and are more likely to engage in preventive behaviors, such as following healthy eating habits and performing medical examinations, compared to people with an ELOC. Higher levels of literacy and awareness are correlated with individual sensitivity to preventing harm and finding individual solutions. People with a high level of health literacy are aware of the mechanism of diseases and health-promoting strategies. Relying on individual control, they take preventive measures to promote health and encourage others to accept personal responsibility for maintaining health. However, low literacy and unawareness of personal control strate-

Table 3. The model fit indices

Variable Fitting Indexes	Chi-squared	df	CMIN/df	GFI	AGFI	RMSEA	NFI	CFI	P
Proposed pattern	7.90	2	3.95	0.92	0.77	0.099	0.77	0.90	0.019
Modified pattern	15.636	9	1.737	0.99	0.98	0.050	0.99	0.99	0.068

Abbreviations: CMIN/df: Minimum discrepancy function by degrees of freedom divided; GFI: Goodness of fit index; AGFI: Adjusted goodness of fit index; RMSEA: Root mean square error of approximation; NFI: Normed fit index; CFI: Comparative fit index.

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Table 4. The paths and standardized and non-standardized coefficients of the self-care model

Direct effect						
Variables		**B**	**β**	**SE**	**T (C.R)**	**P**
PSS	Chance health locus	0.145	0.26	0.030	4.76	0.001
HELIA	ILOC	0.047	0.14	0.019	2.45	0.014
ASS	Individuals' HLC	0.027	0.14	0.011	2.34	0.019
PSS	Individuals HLC	0.156	0.31	0.031	5.06	0.001
ASS	ILOC	-0.021	-0.13	0.010	-2.22	0.027
HELIA	Individuals' HLC	-0.056	-0.140	0.024	-2.38	0.017
ILOC	Self-care	0.869	0.69	0.030	29.43	0.001
Individuals' HLC	Self-care	-0.463	-0.44	0.025	-18.79	0.001
Chance health locus	Self-care	-0.539	-0.45	0.028	-19.280	0.001

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Abbreviations: ASS: Anxiety sensitivity scale; HELIA: Health literacy HELIA; PSS: Perceived stress scale; ILOC: Internal locus of control; HLC: HLOhealth locus of control.

gies are associated with less self-efficacy and sensitivity toward self-care behaviors. Accordingly, it can be argued that the ILOC is associated with improving health literacy, and health literacy has an inverse relationship with attention to external control.

The study's results showed that perceived stress has a positive and direct impact on ELOC and the chance locus of control, implying that since perceived stress is a person's overall perception and interpretation of being susceptible to stress [19], people who experience higher levels of stress imagine themselves exposed to events that only the help of others can protect them from harm. Moreover, perceived stress refers to a psychological state in which an individual perceives their physical and psychological well-being as threatened. This perceived threat is induced by COVID-19, and the high level of stress has a positive and significant relationship with attributing the disease to chance and others. Indeed, developing stress depends on individual impressions and perceptions of events and situations. A situation may be
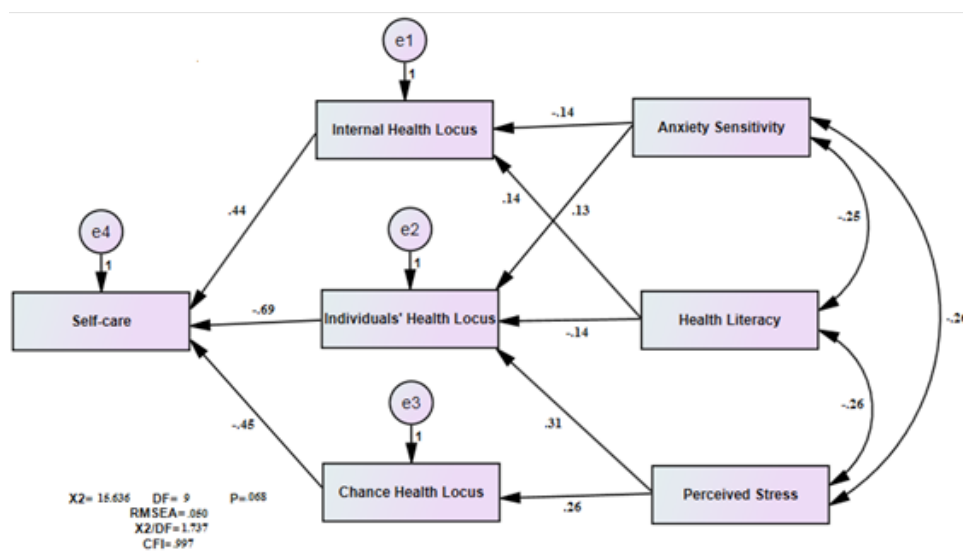

Figure 2. The standardized values of the self-care

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Table 5. Bootstrap indicators to measure the indirect relationships in self-care

Variables				B	β	Limit		P
						Lower	Upper	
ASS	LOC	Individuals' HLC	Self-care	0.031	0.153	0.026	0.242	0.031
PSS	Chance health locus	ILOC	Self-care	0.060	0.093	0.024	0.172	0.173
HELIA	ILOC	Individuals HLC	Self-care	0.067	0.159	0.059	0.283	0.020

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Abbreviations: ASS: Anxiety sensitivity scale; HELIA: Health literacy instrument for Iranian adults; PSS: Perceived stress scale; ILOC: Internal locus of control; HLC: Health locus of control.

perceived as safe for one individual and as a threat to another individual [42]. Thus, people who are stressed cannot regain their responsibility and control [43] and attribute the locus of control over their health related to illness to others and chance.

The current study indicated that ILOC has a positive and direct relationship with self-care for COVID-19, and ELOC and chance have a negative and direct relationship with self-care for COVID-19. Although no study has addressed the relationship between these variables in the case of COVID-19, previous studies have supported the relationship between ILOC and self-care [28, 31, 32]. This is to argue that HLOC refers to people's perceptions of how to control the environment. The locus of control is a system of beliefs that evaluates their successes and failures according to their abilities and weaknesses [30]. Those with ELOC believe that the outcomes of their lives are controlled by external forces, such as doctors, luck, and fate. In contrast, people with an ILOC believe that certain outcomes in life are the result of their behaviors and actions, and their health is directly affected by their actions and behaviors [30]. Consequently, people with ILOC take more care of themselves.

The data in this study indicated that HLOC plays a mediating role in the relationships between the research variables. Accordingly, health literacy and anxiety sensitivity are related to self-care for COVID-19 through the mediating role of the ILOC and individual locus of control. Since anxiety sensitivity means expecting an outcome and reflects personal differences in the tendency to experience fear [16], when a person believes that their behaviors and beliefs can affect COVID-19, they are more likely to engage in self-care behaviors. Hence, ILOC causes anxiety sensitivity to be directed in the right direction leading to self-care behaviors. On the other hand, ELOC means that the people around the person, the health-treatment system, and even the government are responsible for maintaining health. This belief has a

significant impact on the relationship between anxiety sensitivity and self-care because believing in the importance and priority of the role of others in controlling COVID-19 diminishes the sense of internal responsibility for caring for COVID-19. Anxiety sensitivity about the locus of control and the locus of control as an intermediary belief is related to self-care. Therefore, it seems logical that HLOC plays a mediating role in the relationship between anxiety sensitivity and caring for COVID-19.

Health literacy refers to cognitive and social skills that motivate and enable people to acquire, understand, and use information to improve and maintain their health in both individual and social domains [25]. Thus, it can be argued that ILOC, or a person's belief that they or others are effective in promoting health and that this matter is not dependent on chance and fortune, can improve their cognitive skills in health promotion and self-care behaviors. The stronger the people's ILOC and their self-belief about their influence on their health, the more they are likely to engage in self-care behaviors. Moreover, the tendency towards ELOC decreases self-care behaviors because individuals with an ILOC have more control over their health, hygiene, and quality and tend to perform behaviors that help them diagnose and control diseases. These people also experience fewer psychological problems, including anxiety [40].

The results of this study showed that HLOC does not play a mediating role in the relationship between perceived stress and self-care. Previous studies have reported inconsistent results in this regard. Some researchers believe that stress causes people to act more actively to protect their health and perform self-care behaviors, regardless of factors such as internal or ELOC, and they are even more aware of avoiding risky behaviors [17]. Sometimes stress causes a decline in a person's efficiency and reduces their self-care ability since different people perceive the same stressful factor in different ways

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[18]. Thus, it cannot be expected that HLOC can mediate between perceived stress and caring for COVID-19.

Conclusion

The present study showed that health literacy, anxiety sensitivity, and perceived stress are related to self-care for COVID-19, mediated by (internal and individual) HLOC. These results are significant because infectious diseases, such as COVID-19 require special attention due to their spread, and every person with self-care skills can prevent the risk of developing these diseases and in the case of infection, such skills will help them regain their health. Identifying the factors affecting self-care in COVID-19 can contribute to developing interventions to improve self-care and thus prevent the spread of the disease. In addition, the results of this study can have some implications for other infectious diseases as well. However, this research project was conducted with some limitations. Since this study was conducted on households in Ardabil City, caution should be taken in generalizing its results to other populations and groups. Furthermore, the data in this study were collected through self-report instruments. Thus, the participants may have difficulty expressing their emotions and thoughts. Accordingly, other data collection instruments, such as qualitative designs or interviews should be used in similar studies to obtain more reliable results. Nevertheless, following the results of the present study, interventional training programs can be implemented to improve the ILOC in people during the outbreak of COVID-19 to reduce anxiety and increase self-care in people. Moreover, this study can be replicated on other chronic diseases, including diabetes and multiple sclerosis (MS), to clarify the role of HLOC.

Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Ethics Committee of Ardabil University of Medical Sciences (Code: IR.ARUMS.REC.1399.045).

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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