Original Article

The mediating role of emotion regulation difficulty between health anxiety and state anxiety in Iranian adults during coronavirus pandemic

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Abstract

Introduction: The aim of the present study was to investigate the mediating role of emotion regulation difficulties between health anxiety and state anxiety during coronavirus pandemic.

Materials and Methods: The present study is a descriptive-correlation of structural equations. The statistical population of the study includes all Iranian adults who lived in Mashhad between April and May 2020 from which 370 Iranian adults were selected as the sample by the convenient sampling method. The Spielberg State-Trait Anxiety Inventory (STAI), the Difficulties in Emotion Regulation Scale (DERS) and the Health Anxiety Inventory (HAI-18) were used. Data analyzed using Pearson correlation method and structural equation analysis.

Results: The results show that the components of health anxiety, which include getting sick (P=0.02), patient outcomes (P=0.02), and general health concerns (P=0.01), have a significant effect on state anxiety through the emotion regulation difficulties with effects of 0.27, 0.30 and -0.14, respectively. Increasing (decreasing) the getting sick and the patient outcomes components of health anxiety increases (decreases) the state anxiety by increasing (decreasing) the emotion regulation difficulties. However, increasing (decreasing) general health concerns lead to a decrease (increase) in state anxiety by decreasing (increasing) emotion regulation difficulty.

Conclusion: Individual who have higher subscales of "getting sick" and "patient outcomes" in health anxiety perceive more anxiety in situations where their health is at risk. But people with higher "general health concerns" subscale have better emotion regulation and perceive less anxiety in these situations.

Keywords: Coronavirus, Emotion regulation, Health anxiety, State anxiety

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Introduction

The news of several people contracting an unusual pneumonia in China led to introduction of a new type of coronavirus at the beginning of the 2020 New Year (1,2). The rapid spread of the disease in China and then to other parts of the world has caused great concern and panic amongst the people of the world. On March 11, 2020, the World Health Organization declared the outbreak of the virus to be a worldwide epidemic (3). During the coronavirus epidemic, experiencing anxiety is predictable for people in all societies (3). This anxiety is widespread and is probably due to the unknown nature of this virus and the creation of cognitive ambiguity in the human mind. On the other hand, very little scientific information about this virus and the lack of definitive treatment for it exacerbates this anxiety (4). He Iranian people are no exception to this rule, and the existence of this anxiety in Iran has been reported. Its effects on the mental health of the people are still being studied (5).

This anxiety has historically played an important role in the spread of viruses. For example, at the time of the outbreak of Severe Acute Respiratory Syndrome (SARS), there were not only physical dangers to humans, but anxiety over the outbreak of the disease had created a new state of mental health. The people of the United States were even comparing that anxiety to the September 11th incident (6,7). Also, during the outbreak of the Middle East Respiratory Syndrome (MERS), increasing anxiety played an important role in people's mental health status (8).

During the outbreak of respiratory syndromes, whether past illnesses or coronavirus, people's experienced anxiety can be considered a kind of state anxiety (9,10). State anxiety refers to a strong emotional reaction to a particular event or situation (11). Previous research has shown that several factors affect the level of state anxiety experienced by individuals (12,13), and one of the most important of these factors can be health anxiety (13). Health anxiety is a condition similar to hypochondria associated with an over-fear of getting sick or having a medical condition. In this type of anxiety, people are constantly monitoring their health and examining their bodies. A new feature that has recently been added is that they are continuously searching the Internet for the features of the disease (14). People with high levels of health anxiety during the coronavirus epidemic are constantly concerned about their health; because the fear of loneliness, contagion of the disease, and even death has caused them to worry about contracting coronavirus at the slightest sign it (15,16). These conditions cause them to experience a high level of state anxiety (17).

Moreover, the inability to apply effective emotion regulation strategies is one of the causes of many psychiatric problems, including state anxiety (18,19). Emotion regulation refers to people's strategy to maintain, control, and enhance their experience and emotional expression (20-22). Research has shown that the spread of coronavirus can lead to the inability of people to use these strategies (23). Since being in the ambiguous state of the coronavirus outbreak leads to fear and some people take an avoidance approach along with frustration to this fear and are unable to use appropriate emotion regulation strategies, they experience high levels of state anxiety (19,24).

Also, the results of previous researches indicate that emotion regulation and its deficits have significant effects on the level of health anxiety in individuals (25). Therefore, considering the impact of health anxiety on state anxiety, the relationship and effect of emotion regulation difficulties on health anxiety and state anxiety, also the lack of studies on the interactive effect of health anxiety and emotion regulation difficulties on state anxiety, the present research, aimed to investigate these variables and the mediating role of emotion regulation difficulties between health anxiety and state anxiety in Iranian adults during coronavirus epidemic.

Materials and Methods

Since the present study seeks to investigate the mediating role of emotion regulation difficulty between health anxiety and state anxiety during the coronavirus epidemic, the outline of the present cross-sectional study is descriptive-correlation of structural equations. The statistical population of this study is estimated 370 Iranian adults through G-power software, based on the type of statistical method used and calculating 25% loss and 0.15 effect size and a test power of 0.95. The participants were selected through the convenient sampling method. Also, since this study was conducted during the coronavirus outbreak and there was a lack of face-to-face access, sampling was done through an online questionnaire.

Research instrument

A) Checklist of Demographic Characteristics: The personal information including gender, age, level of education, marital status, history of physical and psychological problems, and a way to reconnect to send research findings were obtained from people.

B) Health Anxiety Inventory (HAI-18): This inventory is used to measure health anxiety. Its long-form was first designed by Salkovskis and Warwick in 1989, based on which a cognitive model of health anxiety and hypochondriasis was developed. Its short-form was designed in 2001 by Salkovskis and Warwick. This questionnaire consists of 18 close-ended questions with a five-point Likert scale. Each item has four options, and each option includes a person's description of health and illness components as a declarative sentence that the respondent must choose the one that best describes him/her. The score for each item is from 0 to 3, and a high score is a sign of health anxiety. This questionnaire has three subscales: 1- Getting sick (Questions 5, 6, 8, 9, 11 and 12), 2- Patient outcomes (Questions 13, 15, 16, 17 and 18), and 3- General health concerns (1, 2, 3, 4, 7, 10 and 14). Salkovskis and Warwick obtained a test-retest validity equal to 0.90 for this questionnaire and reported Cronbach's alpha coefficient to be from 0.70 to 0.82. These researchers used the Illness Attitude Scale (IAS) questionnaire to assess the validity and obtained the validity of the Health Anxiety Inventory to be 0.63 (26). This questionnaire was studied in Iran by Nargesi et al. (2017). In their study, the validity of Cronbach's alpha for the whole questionnaire was 0.75. Cronbach's alpha was also 0.59 for General health concerns, 0.60 for Getting sick, and 0.70 for Patient outcomes. These results indicate acceptable reliability for this questionnaire. Confirmatory factor analysis was also used to assess the validity of this questionnaire, which showed that health anxiety is a three-dimensional structure, and the existence of getting sick, patient outcomes, and general health concerns dimensions in it are confirmed (27).

C) Difficulties in Emotion Regulation Scale (DERS): This scale was designed and validated in 2004 by Gratz and Roemer. The initial version of this questionnaire consists of 41 items developed to assess the difficulty in regulating emotions. In Gratz and Roemer's study, 1 item was removed due to its low correlation with the whole scale and four items

due to low factor loading. Thus, the final version of this questionnaire includes 36 close-ended questions with a five-point Likert scale. Each item has five options, and the respondent must choose one of the sentences that best describes him/her. This questionnaire has six components: 1- Non-acceptance of emotion responses (questions 11, 12, 21, 23, 25, and 29), 2- Difficulty engaging in goal-directed behavior (questions 13, 18, 20, 26, and 33), 3- Impulse control difficulties (questions 3, 14, 19, 24, 27, and 33), 4- Lack of emotion awareness (questions 2, 6, 8, 10, 17, and 34), 5- Limited access to emotion regulation strategies (questions 15, 16, 22, 28, 30, 31, 35, and 36), and 6- Lack of emotion clarity (questions 1, 4, 5, 7, and 9). Factor analysis showed the existence of 6 factors: non-acceptance of emotional responses, difficulty engaging in goal-directed behavior, impulse control difficulties, lack of emotion awareness, limited access to emotion regulation strategies, and lack of emotional clarity. The results show that this scale has a high internal consistency of 0.93, and all its six subscales have an above 0.80 Cronbach's alpha (28). Also, this questionnaire has a significant correlation with the Acceptance and Action Questionnaire (28,29). Based on the research of Azizi, Mirzaei, and Shams, the Cronbach's alpha level of this questionnaire in our country was 0.92 (30). Also, in the study of Besharat and Bazzazian, the psychometric properties of the Persian version of this test were examined and confirmed in clinical and non-clinical samples. In this study, Cronbach's alpha coefficients were obtained, which ranged from 0.73 to 0.88 for questions of non-acceptance of emotional responses, 0.72 to 0.89 for difficulty engaging in goal-directed behavior, 0.75 to 0.90 for impulse control difficulties, 0.76 to 0.85 for limited access to emotion regulation strategies, 0.70 to 0.90 for Lack of emotion clarity, and 0.79 to 0.92 for the overall scale score. These coefficients confirm the internal consistency of this questionnaire. Also, the test-retest reliability of this questionnaire was obtained, which ranged from 0.70 to 0.83 for questions of non-acceptance of emotional responses, 0.70 to 0.85 for difficulty engaging in goal-directed behavior, 0.72 to 0.86 for impulse control difficulties, 0.69 to 0.78 for limited access to emotion regulation strategies, 0.68 to 0.80 for lack of emotional awareness, 0.73 to 0.85 for lack of emotional clarity, and from 0.71 to 0.87 for the whole scale (31).

D) State and Trait Anxiety Inventory (STAI): This inventory was developed in 1970 as a self-assessment tool in two separate forms. This questionnaire has 40 items. Questions 1 to 20 measure state anxiety, and questions 21 to 40 measure trait anxiety. The questions are scored on a four-point Likert scale. The minimum score is 20 (no anxiety), the maximum is 80 (highest anxiety), and scores 21 to 39 show mild anxiety; scores 40 to 59 are moderate anxiety, and scores from 60 to 80 mean severe anxiety (32,33). Spielberger et al. reported a 0.92 Cronbach's alpha coefficient for the state anxiety subscale and 0.90 for the trait anxiety subscale. Also, the test-retest coefficient was 0.62 for the state anxiety subscale and 0.68 for the trait anxiety subscale (33). In the study by Taghavi et al. on 219 patients with generalized anxiety disorder, major depression, and ordinary individuals, Cronbach's alpha coefficient was 0.92 on the state anxiety scale and 0.90 on the trait anxiety scale (34).

Research data were collected from those interested and volunteered to participate in the research through an online questionnaire (Google form between April and May 2020). Inclusion criteria included living in Mashhad city, not having acute medical and psychiatric problems (based on self-report in the checklist of demographic characteristics), willingness to participate in the study. The exclusion criteria included dissatisfaction and unwillingness to cooperate and also incompleteness of the questionnaires. Therefore, the necessary explanations were given through an announcement regarding the objectives of the research. Then, the research link was sent to the people who expressed their desire and had the necessary criteria to participate in the study to complete the questionnaire whenever they had the opportunity. The questionnaire took an average of 15 to 20 minutes to be answered by participants. The collected information was then entered into statistical software to analyze the research data, descriptive statistical methods including mean, frequency, standard deviation, lowest and highest score, and Pearson correlation and analyze the hypotheses expressing the role of the mediator, and Structural equation analysis was used. Data were analyzed using SPSS software version 25 and AMOS software version 24. To maintain the principle of confidentiality, the information obtained from the questionnaires was collected without the names and addresses of the subjects to preserve their identities and was only at the disposal of those involved in this research. Also, gaining the trust and assurance of the subjects to participate in the study and being free to answer the questionnaires were among the other considerations that were tried to be observed in this study.

Results

In term of demographic characteristics, 178 (48.1%) men, and 192 (51.9%) women participated in the present study. All of them are from Iran. They aged 18 to 69 years (29.78 ± 10.89 years). Among them, one person (0.03%) has a middle school degree, 51 cases (8.13%) have a diploma, 12 cases (3.2%) have an associate degree, 180 cases (48.6%) have a bachelor's degree, 98 cases (26.5%) have a master's degree, and 28 cases (7.6%) have a Ph.D degree or higher. Also, 256 participants (69.2%) are single, and 114 of them (30.8%) are married.

Table 1. Descriptive indicators of health anxiety, anxiety state, and emotion regulation difficulty

Variable		Mean	Standard deviation	Skewness	Kurtosis
Health anxiety	Getting sick	4.25	3.01	1.34	2.52
	Patient outcomes	3.55	2.32	0.80	0.85
	General health concerns	8.04	3.54	0.88	0.78
Emotion regulation difficulty	Non-acceptance of emotion responses	12.4	5.47	1.11	0.76
	Difficulty engaging in goal-directed behavior	14.01	4.79	0.23	-0.81
	Impulse control difficulties	14.19	5.25	0.70	-0.10
	Lack of emotion awareness	15.01	4.18	0.52	0.41
	Limited access to emotion regulation strategies	17.46	6.82	0.81	-0.001
	Lack of emotion clarity	10.19	3.58	1.09	1.19
Anxiety	State	44.39	11.58	0.42	-0.23

Table 1 presents descriptive indices for the research variables. The skewness and kurtosis indices are often in the range of +1 to -1 or close to these values, indicating their distribution's approximate normality. In the following, Table 2 presents the correlation matrix of the relationship between research variables using the Pearson correlation test.

Table 2. Results of Pearson correlation test to examine the relationship between research variables

Variable		1	2	3	4	5	6	7	8	9	10
Health anxiety	1- Getting sick	1									
	2-Patient outcomes	0.65**	1								
	3-General health concerns	0.64**	0.53**	1							
Emotion regulation difficulty	4-Nonacceptance of emotion responses	0.39**	0.40**	0.22**	1						
	5-Difficulty engaging in goal-directed behavior	0.35**	0.47**	0.19**	0.52**	1					
	6-Impulse control difficulties	0.43**	0.48**	0.23**	0.57**	0.78**	1				
	7-Lack of emotion awareness	0.04	0.05	-0.10	0.14**	0.06	0.02	1			
	8-Limited access to emotion regulation strategies	0.45**	0.47**	0.22**	0.64**	0.68**	0.74**	0.07	1		
	9-Lack of emotion clarity	0.27**	0.26**	0.02	0.43**	0.34**	0.36**	0.51**	0.45**	1	
10-State anxiety		0.46**	0.48**	0.27**	0.48**	0.54**	0.55**	0.15**	0.66**	0.42**	1

$P< 0.05^{*}$, $P<0.01^{**}$

The results obtained in Table 2 show that the state anxiety has a positive and significant relationship with all the components of health anxiety and emotion regulation difficulty ($P< 0.01$). Structural equation analysis was used to examine whether emotion regulation difficulty mediates the relationship between health anxiety and state anxiety.

The modified model (direct pathways from health anxiety to state anxiety were not significant and were excluded from the model) is shown in Figure 1.
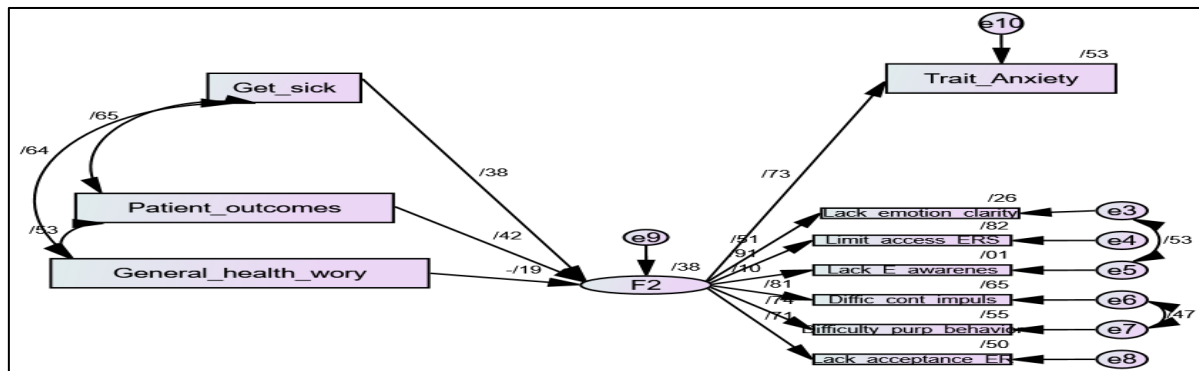

Figure 1. Modified research model

Figure 1 presents the research modified model. In the modified model, in addition to removing direct paths from the components of health anxiety due to lack of significance, according to the proposed software modification, the error values e3-e5 and e6-e7 were connected due to a high correlation with the two-way arrow to improve the model fit. The results of this modified model are presented in Table 3.

Table 3. Fit indicators of the modified research model

Indicator	$X^2/_{df}$	RMSEA	NFI	IFI	CFI	GFI	AGFI
Fitting criteria	3≥*	0.10≥*	0.90≤*	0.90≤*	0.90≤*	0.90≤*	0.90≤*
Statistics of the present study	2.33	0.06	0.96	0.98	0.98	0.96	0.94

The results of Table 3 show that the research model has a good fit and improves over the original model. In general, the closer the AGFI, GFI, CFI, IFI, and NFI indices are to one and the RMSEA and x2/df to zero, the better the model fits. In the following, Table 4 presents the results of standardized indirect effects for the modified research model.

Table 4. Results of the mediating role of emotion regulation in the modified research model on the relationship between health anxiety and state anxiety

Path	Standard effect size	Lower limit	Upper limit	P
Getting sick → Emotion regulation → State anxiety	0.27	0.17	0.36	0.02
Patient outcomes → Emotion regulation → State anxiety	0.30	0.22	0.38	0.02
General health concerns → Emotion regulation → State anxiety	-0.14	-0.20	-0.06	0.01

The results obtained from Table 4 show that the components of health anxiety, which include getting sick ($P= 0.02$), patient outcomes ($P= 0.02$), and general health concern ($P= 0.01$), have a significant effect on state anxiety due to the emotion regulation difficulty with the effect size of 0.27, 0.30 and -0.14, respectively. In other words, the results show that increasing Based on studies in the history of epidemics related to the prevalence of acute respiratory syndromes, it seems that the prevalence of these diseases is highly correlated with the experience of anxiety. In this regard, state anxiety indicates a strong emotional reaction to a specific event or situation, such as the coronavirus epidemic. Therefore, the present study investigated the mediating role of emotion regulation difficulties between health anxiety and state anxiety in Iranian adults during the coronavirus epidemic.

Discussion

The results showed that the components of health anxiety, including getting sick, patient outcomes, and general health concerns, significantly affect state anxiety through the emotion regulating difficulty. Although a similar model has not been studied in previous studies, the results of the studies of Wong, Hung, Alias and Lee (10), Schimmenti, Billieux and Starcevic (16), Eftekhari, Zoellner and Vigil (24), and Garcia Batista et al. (23), which show the relationship between health anxiety and emotion regulation and anxiety with emotion regulation, are in line with the present study.

In the study of Wong, Hung, Alias, and Lee, which dealt with anxiety symptoms and preventive measures during the outbreak of COVID-19 in Taiwan, the research method was cross-sectional. The sample was 3555 Taiwanese residents aged 20 to 70 years. The data was collected through the 6-item State-Trait Anxiety Inventory (STAI-6) and questions related to preventive measures. In line with the present study, the results of this study showed that anxiety scores and preventive measures were high and increased

(decreasing) the getting sick and patient outcomes components of health anxiety lead to an increased (decreased) state anxiety by increasing (decreasing) the emotion regulation difficulty. But an increase (decrease) in general health concerns leads to a decrease (increase) in state anxiety due to a decrease (increase) in the emotion regulation difficulty.

with the prevalence rate of the disease. Higher anxiety was associated with increased use of preventive measures against COVID-19 (10). In the study by Schimmenti, Billieux, and Starcevic, who examined the four horsemen of fear: An integrated model of understanding fear experiences during the COVID-19 pandemic; the research method was reviewed, and its results, in line with the present study, showed that the experiences of fear during COVID-19 epidemic disease are organized at a psychological level in about four interconnected dialectical domains including physical characteristics, interpersonal, cognitive and behavioral, respectively (16). In Eftekhari, Zoellner, and Vigil's research that examined the patterns of emotion regulation and psychological pathology, this descriptive-correlational research was conducted on 301 female undergraduate students. The data was collected through the emotion regulation questionnaire, posttraumatic stress diagnostic scale, state-trait anxiety inventory, Beck depression inventory, anxiety sensitivity index, and ruminative response subscale of the response styles questionnaire. The results showed that emotion regulation strategies such as higher expressive suppression and lower cognitive reappraisal might be associated with increased psychological pathology (24).

Garcia Batista et al. assessed 155 Dominican physicians through psychological tests. The results showed that contact with COVID-19 patients predicts an increase in the use of emotion suppression strategies. However, it is not associated with the help of cognitive reappraisal. These findings lead to an even greater increase of stress in health care providers (23). The results of other studies show that health anxiety increases with the

incidence of acute illness and the prevalence of COVID-19 (23,35).

In such situations, emotion as an information system related to human development and survival responds to environmental conditions and stimuli. In other words, health anxiety leads to arousal of the emotional system as a stimulus (36). The present study results showed that the getting sick and patient outcomes components of health anxiety increase the severity of emotion regulation difficulty. Given that health anxiety during the coronavirus epidemic is a warning to the organism, it can lead to fear and an avoidance approach along with distress. In anxiety, the freezing system, as a brain-behavioral system, is more active than other systems, such as the behavioral activation system and the fight-flight system; thus, it can be said that a set of emotional responses and brain activities occur that make emotion regulation difficulties in individuals (37). Emotion regulation acts in response to environmental and internal stimuli and affects a person's emotional experience. When a person has difficulty regulating their emotions, the result is often impulsive behavior with frustration, leading to increased behaviors and disturbing emotions (38).

In other words, emotional regulation difficulty leads to a defect in emotional awareness and accurate knowledge of the situation and a lack of active adaptive emotional action (39). Therefore, it can increase state anxiety, which is a disruptive emotional response to a particular situation.

Overall, it can be explained that the two dimensions of getting sick and patient outcomes in coronavirus epidemics can make emotion regulation, which is an ability to cope with challenging situations, difficult and result in an emotional response which increases state anxiety due to the activation of brain systems such as freezing and emotions such as fear and avoidance that have evolved in humans due to their evolutionary nature. Another finding of the present study is that the component of general health concerns indirectly reduces state anxiety by decreasing the emotion regulation difficulty.

However, further studies showed that this finding could also be explained. Since concern, as a cognitive component of anxiety, involves subjective anticipation and preparing for potentially adverse outcomes in the future. In other words, it includes both the negative things that can happen and the problem-solving or mental efforts to deal with these adverse outcomes.

Negative issues are considered probable, and subsequently, problem-solving or mental efforts to deal with them are anticipated. Thus, worry can be thought of as mental planning and preparation for the future that considers complex scenarios to predict what will happen and how to deal with the situation (40). In this regard, the results of the present study showed that general health concerns are negatively related to emotion loss. However, the relationship was not significant but can indicate that it increases emotion awareness, at least to some extent. One study also showed that worry plays a lesser and somewhat insignificant role in emotion dysfunction than in other areas such as emotion acceptance and alexithymia (41).

Another point about the present study is that in the correlation test, the relationship between some components of emotion regulation difficulty (impulse control difficulties, difficulty engaging in goal-directed behavior, and limited access to emotion regulation strategies) was positive and significant. Still, it took a negative form in model testing of these relationships. In the collinearity model, the common variance of the predictor variables with the two-way arrow that connects them is somewhat controlled.

As a result, it can be said that the other two components of health anxiety have a stronger dimension to explain this collinearity and common variance. In addition, worrying about one's survival value (through evolution) leads to more prudent and safer action. In this regard, the results of one of the most recent studies show that worry will lead to a faster and more accurate response to their neutral conditions and higher awareness (42).

Therefore, during the coronavirus epidemic, where a person's survival is at risk, worry leads to a reduction in state anxiety which is an emotional response to the situation that has occurred through increased emotional awareness and purposeful planning and prediction. Because the present study was at the time of the outbreak of coronavirus, so the generalizability of the results is limited to the period of outbreak of the virus and can't be generalized to other conditions. Also, considering the adult cases, these results can't be generalized to other age groups.

The impossibility of random sampling and lack of direct access to the participants are other limitations. However, according to the obtained results, it can be said that the preparation and application of interventions based on emotion regulation can be an effective intervention to reduce state anxiety during the coronavirus epidemic.

Conclusion

It seems that the components of "getting sick" and "patient outcomes" of health anxiety lead to a higher perception of state anxiety through emotion regulation difficulty in situations such as the coronavirus epidemic where people's health is at risk. But on the other hand, the "general health concerns" component will lead to better emotion regulation due to cognitive worry and problem-solving. As a result, state anxiety will be less perceived.

Acknowledgments

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