Mojtaba Pour Mohaghegh et al.
Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients:
The Mediating Role of Prospective Event Thinking

Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients: The Mediating Role of Prospective Event Thinking

Mojtaba Pour Mohaghegh[1], Alireza Moradi[2*], Vida Mirabolfathi[1], Meysam Sadeghi[1]

1. Cognitive Psychology Department, Institute for Cognitive Science Studies, Tehran, Iran
2. Department of Clinical Psychology, Kharazmi University, Tehran, Iran
   * Corresponding author: Alireza Moradi, Cognitive Psychology Department, Institute for Cognitive Science Studies, Tehran, Iran. Email: Moradi@khu.ac.ir

Abstract

Introduction: With the spread of coronavirus in the world, in addition to physical problems in people who are infected and have recovered, psychological effects are also observed in these people. Research has shown that post-traumatic stress is one of these psychological consequences. The aim of this study was to study the predictive model of health belief on post-traumatic stress with a mediating role of forward thinking in people recovering from coronary heart disease.

Method: For this purpose, 383 people were selected by convenience sampling method and event questionnaire, health belief scale and prospective thinking task. Data were analyzed using Amos and SPSS software.

Results: The findings showed the significance of the predictive model of health belief on post-traumatic stress with the mediating role of futuristic thinking. Also, direct and indirect paths in this model were significant at the level of 0.05.

Discussion: These findings indicate the importance of paying attention to people's cognitive beliefs in the field of health belief and their cognitive abilities and its effect on mental states after experiencing illness.

Keywords: Health Belief Model, Post Traumatic Stress, Prospective Thinking, Coronavirus

Introduction

The prevalence of infectious diseases has existed worldwide for a long time. It has caused many social, economic, and health consequences, including famine, poverty, theft, death, and the spread of other diseases [1]. The coronavirus has infected Iran and other countries globally, and the fight against this virus is being carried out nationwide and comprehensively throughout the country [2]. Patients with coronavirus have some symptoms of psychological disorders such as anxiety, fear, depression, emotional changes, insomnia, and post-traumatic stress disorder [3,4]. In a study conducted by Wang, Penn, Wang, et al. (2020) in China on 1,210 people in 194 Chinese cities,

Mojtaba Pour Mohaghegh et al.
Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients:
The Mediating Role of Prospective Event Thinking

the results showed that stress, depression, and anxiety were more common in women when the Covid 19 outbreak occurred. Students experienced psychological effects from the higher prevalence of the disease with higher levels of stress, anxiety, and depression [5].

Due to the traumatic nature of the coronavirus outbreak, the development of post-traumatic stress disorder (PTSD) is one of the psychological disorders of this disease in patients. Symptoms of the disorder include re-experiencing the accident, avoidance, and emotional numbness and arousal [6]. Post-traumatic stress disorder (PTSD) is a disorder that occurs following a traumatic event outside the scope of everyday human experience and is characterized by a pattern of symptoms of an attack, persistence of trauma, and prevention of related stimuli [6,7]. Covid 19 led us to consider it a new type of collective trauma [8]. In addition to reactions such as numbness, apathy, disability, extreme fear, and irritability, people with varying degrees of PTSD are associated with cognitive problems such as impaired memory, attention, and executive functions [6].

One of the cognitive problems of PTSD patients is the shortening of the future and the inefficiency of futuristic thinking of events, so the model of futuristic thinking means that the individual can plan, maintain and retrieve planned goals in the future [9]. A forward-thinking model can potentially create the act of simulating a prediction, intention, or plan. However, studies of prospective thinking almost always focus on predictive simulations in practice. Futuristic thinking is used to predict the future and simulate the future [10]. Prospective event thinking can be affected by anxiety and depression [11]. Considering the relationship between prospective event thinking and depressive and anxiety disorders, it can be inferred that prospective event thinking can be affected by these disorders and change predicting the future in people with this disorder [12].

Given the above, the study of the prospective event thinking model represents a unique opportunity in the coronavirus crisis (Covid 19) to explore the future of the disease. Due to the emphasis on the importance of social distancing strategy and avoiding unnecessary travel and staying at home, health anxiety on the one hand and also the elimination of social relationships, on the other hand, the occurrence of various psychological problems such as depression, anxiety, insomnia, attention deficit Provide post-traumatic stress disorder, anger, emotional numbness, mood swings [13,14]. In particular, the health belief model has demonstrated the theory of planned behavior and the tools for predicting behavioral attitudes, risk perception, self-efficacy, and goals in predicting a wide range of health behaviors [15].

The Health Belief Model (HBM) is one of the practical models of health education in prevention, which is especially useful for designing programs to prevent disease and change behavior in the short term, and includes a health belief model including perceived sensitivity, perceived severity. Perceived barriers, perceived benefits, perceived self-efficacy, and guide to action [16]. Psychological models, including the health belief model, can realize the health behavior that results from patients' perceptions and beliefs about the disease they are experiencing [17]. The Health Belief Model has components that, according to previous studies, appear to be likely to endanger the physical, mental, and social health of themselves and others if people with PTSD due to Coronavirus do not have those components, will be more [18-20]. So in believing in personal

Mojtaba Pour Mohaghegh et al.
Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients:
The Mediating Role of Prospective Event Thinking

hygiene in the corona crisis, another cognitive model called futuristic event thinking is essential. Suppose this component of futuristic thinking is included in the health belief model. In that case, we can better picture the belief in personal health, its underlying factors, and the psychosocial aspects of health management. In the present study, based on a conceptual model, we will seek to answer whether we can study the predictive model of health belief in post-traumatic stress disorder of coronavirus patients with the mediating role of prospective event thinking?

Method

The method of the present study was descriptive and of correlation schemes and structural equation modeling method. The statistical population of the present study consisted of 170,000 people who recovered from the coronavirus in Iran, whose test results were positive and were discharged from the hospital after recovery. Using Power software, 383 people were selected as the research sample using the available sampling method. The method of collecting information was through advertisements in cyberspace, and the research was conducted online through a website designed by the researcher. Criteria for inclusion in the study were

- history of corona disease and hospitalization,
- having a minimum diploma level of education,

not receiving psychiatric services during the past month (the criterion was the time of receiving the questionnaire).

Exclusion criteria also included: not being hospitalized due to coronary heart disease, receiving psychotherapy services during the past month, and incomplete completion of research questionnaires. The instruments used in this study included: the Health Belief Model Scale (HBM) for Coronavirus Infection: Health Belief Model Questionnaire by Marcelo Fernandez Costa (2020) to assess individuals' beliefs about the risk of coronavirus infection. (Covid 19) was made. This scale measures five areas of the Health Belief Model of coronavirus risk: perceived sensitivity (five questions), perceived severity (five questions), perceived benefits (five questions), perceived barriers (five questions), and occupational health motivation. O (four questions). Scoring and interpretation of this questionnaire fall into this range: maximum (100 to 120), extremely strong (90 to 100), substantial (70 to 90), slightly substantial (50 to 70), balanced (35 to 50), Weak (20 to 35), very weak (10 to 20), severely weak (5 to 10), minimal (0 to 5). Validity and validity of the scale made by Costa et al. (2020) that the results of Cronbach's alpha coefficient (0.88), as well as standard alpha (0.82), confirm the optimal validity of this scale. In Iran, Alizadeh Siouki et al. (2014) confirmed the validity of this scale using Cronbach's alpha coefficient. Futuristic Event Thinking Task: This scale was created by Spunar, Addis, and Scooter (2012). This task is divided into three parts. The first part is the stage of collecting stimuli. Participants are trained to make a list of 90 acquaintances (real-life names of people they know or a list of friends on their cell phone) and 90 familiar places (specific places participants have already visited).), To produce 90 familiar objects (objects that are physically portable and can be taken with them to different places, such as bags). This part of the task takes about 60 minutes. In the second part of the task, which is

Mojtaba Pour Mohaghegh et al.
Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients:
The Mediating Role of Prospective Event Thinking

performed with a delay of three days, the experimenter makes 60 different random combinations from the generated list of people (90 familiar people, 90 familiar places, and 90 familiar objects); In other words, these people randomly put places and objects together (such as Venus East + Cultural Bookstore + Glasses). Also, out of these 60 combinations, 20 items with a positive label, 20 items with a negative label, and 20 items with a neutral label have been identified. In this part of the task, the participant's task is to do an event simulation for each combination for the next five years. The experience that can occur in the next five years involves interacting with a specific person in a specific place.

Furthermore, related to a particular object. The simulation must evoke specific emotions by its value (positive, negative, or neutral). Participants are trained to produce a detailed event experience for each set presented to them; That is, the best idea of what they are likely to do in the future. The tester also practices with participants to make sure participants understand the instructions well. In addition, they simulate an event as an example. This step of the task takes 90 minutes. Then the third part is the scoring stage of the next event. That the participants have to compare their simulations in 3 indicators: a) reasonableness (1 = very unreasonable 5- very reasonable) b) details (1 = low details 5- great details C) Rate arousal (1- very sedative 5- very stimulating) on a 5 Likert scale.

It should be noted that these indicators are randomly assigned to each of the 60 combinations. The validity of this scale was confirmed by Bahri et al. (2015). Revised Weiss & Marmer Event Impact Scale (IES-R): This questionnaire was developed by Weiss and Marmer (1997) to assess the dimensions of mental distress when faced with specific life events (avoidance, unwanted thoughts, and hyperactivity). Is. This scale has 22 items answered and scored by the 4-point Likert method from never (0) to strongly (4). Weiss and Marmer (1997) reported the reliability of the questionnaire using Cronbach's alpha for the whole scale of 0.87, for the subscale of unwanted thoughts at 0.84, and the subscale of arousal at 0.79. The principles of research ethics include the freedom of research participants to leave the research at any stage, and their anonymity was observed during the research process. The obtained data were analyzed using the structural equation method using Amos and SPSS software.

findings

Table 1 shows the descriptive information of research variables.

Table 1. Demographic information of the research sample

	Average	SD.	Min	Max
Age	35.54	8.15	18	52
Recovery period (months)	5.05	3.74	1	10
Level of Education	Diploma	Associate Degree	Bachelor	MA

Mojtaba Pour Mohaghegh et al.
Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients:
The Mediating Role of Prospective Event Thinking

Abundance	98	74	143	68
Frequency	26%	19%	37%	18%

A look at Table 1 shows that the average age of the study sample members was 35 years, and the average recovery time per month was five months. Also, the distribution of education was such that 98 people had diplomas, 74 people had master's degrees, 143 people had bachelor's degrees, and 68 people had master's degrees. Table 2 shows the mean and standard deviation of research variables.

Table 2. Mean and standard deviation of research variables

	Total score	Perceived sensitivity	Severely perceived
Health Belief Scale	95.55	16.44	19.23
	6.31	4.43	3.18
	Perceived advantage	Perceived obstacles	Occupational health motivation
	17.64	15.73	12.24
	4.25	5.49	5.46
The task of thinking forward-looking events	Total score		
	217/61		
	11.22		
Event Impact	Unwanted thoughts	Avoid	Over-arousal
	25.63	18.86	17.44
	6.59	5.65	5.36

In order to test the desired conceptual model, i.e., to study the predictive model of health belief on post-traumatic stress in coronary heart disease patients with the mediating role of futuristic thinking, the path analysis method was used.

To determine the adequacy of the proposed model, a combination of fitness individuals was used with the data. Table 3 shows the modeling of structural equations with model fit indices.

Table 3. Statistics and indicators of pattern fitting

	χ^2	χ^2/df	RMSEA	GFI	AGFI	CFI	NFI
Estimation	43.32	2.7	0.074	0.96	0.90	0.93	0.91

Based on the fit indices of Table 4, the first indicator is suitable for chi-square fit. The values of the Goodness Fit Index (GFI), Adaptive Fit Index (CFI), Softened Fit Index (NFI), and Adjusted Goodness Fit Index are within the desired range for model acceptance. The obtained indices showed a good fit of the model and based on this, the model's fit was confirmed. The direct and

Mojtaba Pour Mohaghegh et al.
Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients:
The Mediating Role of Prospective Event Thinking

indirect effects of health belief on post-traumatic stress with the mediating role of forward-thinking thinking are presented in Table 4.

Table 4. Direct and Indirect Effects of Health Belief on Post-Traumatic Stress with the Mediating Role of Futuristic Thinking

Routes	Direct impact	Indirect effect	Total effect
Perceived sensitivity to post-traumatic stress	-0.434	-0.283	-0.717
Perceived severity of post-traumatic stress	-0.385	-0.247	-0.633
Perceived benefit to post-traumatic stress	-0.432	-0.266	-0.698
Perceived barriers to post-traumatic stress	-0.355	-0.227	-0.582
Motivation of occupational health to post-traumatic stress	-0.411	-0.24	-0.687
Perceived sensitivity to futuristic thinking	0.288	-	0.288
Perceived intensity to futuristic thinking	0.265	-	0.265
Perceived advantage to forward thinking	0.273	-	0.273
Perceived barriers to forward thinking	0.275	-	0.275
Motivate occupational health to forward thinking	0.264	-	0.264
Prospective thinking to post-traumatic stress	-0.387	-	-0.387

As shown in Table 4, the direct and indirect effects of health belief subscales (perceived sensitivity, perceived severity, perceived benefits, perceived barriers, and occupational health motivation) on post-traumatic stress in this case model. The study is significant at the level of 0.05. It is also observed that the direct effect of subscales of health belief on forwarding thinking is significant at

Mojtaba Pour Mohaghegh et al.
Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients:
The Mediating Role of Prospective Event Thinking

the level of 0.05, and the direct effect of forwarding thinking on post-traumatic stress is significant at the level of 0.05.
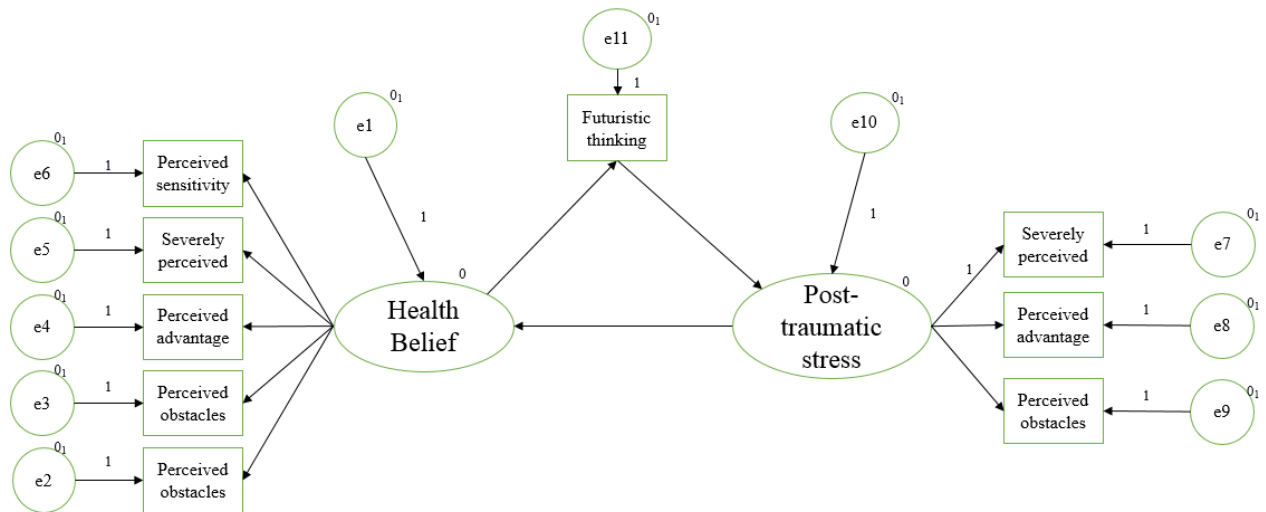

Figure 1. The final model

Discussion

The present study aimed to study a predictive model of health belief in post-traumatic stress disorder of coronavirus patients with a mediating role of prospective event thinking. By analyzing the data through structural equations, it was found that this model is statistically significant. This finding is consistent with the results obtained by Liu et al. (2020), Tang Ho et al. (2020), Bog and Milad (2020), and Stevens and Juanick (2018) [2,3,15].

To explain this finding, we must first point out the role of the health belief model in post-traumatic stress. It should be noted that according to previous research, PTSD activating symptoms are influenced by factors such as anxiety, phobia, and social anxiety [21,22]. On the other hand, what is clear is that, in fact, according to the model of health belief model, to adopt preventive behaviors, one should first feel threatened by the disease. In the next step, the severity of the disease should be understood by the person. By receiving symptoms Positive about the environment and the belief that prevention is enforceable, taking action is more beneficial than not doing it. Thus, because the components of the health belief model confirm that people with PTSD due to the coronavirus endanger their physical, mental, and social health [18], It can be said that people with PTSD perform poorly in performing tasks related to recognizing and responding to emotions [23]. At the same time, adults with PTSD develop some form of emotional anesthesia. Experience harms interpersonal performance [24].

On the other hand, confirming the mediating role of futuristic thinking in this model shows the fact that health anxiety, on the one hand, and also the elimination of social relationships, on the other hand, cause various psychological problems such as depression, anxiety, insomnia, attention deficit, post-stress disorder. Provide mood swings from injury, anger, and emotional numbness [13,14]. In other words, through its adaptive value, forward-thinking helps people become more

Mojtaba Pour Mohaghegh et al.
Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients:
The Mediating Role of Prospective Event Thinking

flexible in their behavior while accepting the possible consequences of their actions before taking any action [25,26].

One of the limitations of the present study is that this study was performed only on patients with a history of coronary heart disease and cannot be generalized to other patients. On the other hand, the research sample was not controlled regarding marital status and the possibility of marital problems or economic problems in psychological states. It is suggested that researchers interested in this field also study the emotional factors involved in the health belief model on post-traumatic stress in patients with coronary artery disease. The results of this study can help develop protocols for supportive psychotherapy interventions for people recovering from coronary heart disease.

Ethical code

This research has been registered with the code (IR.UT.IRICSS.REC.1399.012) in the national research ethics system.

References

[1]   Mirsalehian, Akbar; Dalund, Misib. (1397). History of bacterial infectious diseases in Iran, Iranian Journal of Medical Microbiology, 12, 4. 230-238.

[2]   Liu X, Na RS, Bi ZQ. (2020) [Challenges to prevent and control the outbreak of Novel Coronavirus Pneumonia (COVID-19)]. *Zhonghua liu xing bing xue za zhi = Zhonghua liuxingbingxue zazhi*.41(0):E029.

[3]   Tang, W., Hu, T., Hu, B., Jin, C., Wang, G., Xie, C., . . . Xu, J. (2020). Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students. *J Affect Disord*, 274, 1-7.

[4]   Liu S, Yang L, Zhang C, Xiang Y-T, Liu Z, Hu S, et al.(2020)Online mental health services in China during the COVID-19 outbreak. *The Lancet Psychiatry*.;7(4):e17-e8.

[5]   Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. *Int J Environ Res Public Health*, 17(5).

[6]   Regier, D. A., et al. *(2013). "The DSM-5: Classification and criteria changes." World psychiatry 12(2): 92-98.*

[7]   Liu, Nianqi, Zhang, Fan, Wei, Cun, Jia, Yanpu, Shang, Zhilei, Sun, Luna, . . . Liu, Weizhi. (2020). Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: Gender differences matter. *Psychiatry Research*, 287. doi:10.1016/j.psychres.2020.112921

[8]   Horesh, D., & Brown, A. D. (2020). Traumatic stress in the age of COVID-19: A call to close critical gaps and adapt to new realities. *Psychol Trauma*, 12(4), 331-335. doi:10.1037/tra0000592

[9]   Meier, B., et al. (2014). "From episodic to habitual prospective memory: *ERP-evidence for a linear transition." Frontiers in human neuroscience 8: 489.*

Mojtaba Pour Mohaghegh et al.
Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients:
The Mediating Role of Prospective Event Thinking

[10]   Schacter, D. L., Benoit, R. G., & Szpunar, K. K. (2017). Episodic Future Thinking: Mechanisms and Functions. *Curr Opin Behav Sci*, 17, 41-50. doi:10.1016/j.cobeha.2017.06.002

[11]   Miloyan, B., et al. (2014). "The future is here: A review of foresight systems in anxiety and depression." Cognition & emotion 28(5): 795-810.

[12]   Szpunar, K. K. and G. A. Radvansky (2016). "Cognitive approaches to the study of episodic future thinking." Quarterly Journal of Experimental Psychology 69(2): 209-216.

[13]   Webster, R. K., et al. (2020). "How to improve adherence with quarantine: rapid review of the evidence." Public health 182: 163-169.

[14]   Rubin, G. J. and S. Wessely (2020). "The psychological effects of quarantining a city." Bmj 368.

[15]   Bogg, T. and E. Milad (2020). "Demographic, personality, and social cognition correlates of coronavirus guideline adherence in a US sample." Health Psychology 39(12): 1026.

[16]   Ekhtiari YS, Majlessi F, Foroushani AR, Shakibazadeh E (2014). Effect of a self-care educational program based on the health belief model on reducing low birth weight among pregnant iranian women. *Int J Prev Med* .5(1):76-82.

[17]   Sari, G., Amin, M., & Hidayati, L. (2020). Acceptance and Commitment Therapy on Depression of Pulmonary Tuberculosis Patient: An Intervention Based on the Health Belief Model. *INDONESIAN NURSING JOURNAL OF EDUCATION AND CLINIC*,5,107.

[18]   Sesagiri Raamkumar, A., Tan, S. G., & Wee, H. L. (2020). Use of Health Belief Model-Based Deep Learning Classifiers for COVID-19 Social Media Content to Examine Public Perceptions of Physical Distancing: Model Development and Case Study. *JMIR Public Health Surveill*, 6(3), e20493

[19]   Nasir, Elwalid Fadul, Almahdi, Hatim Almahdi, & alhag, Ahmed Khalid. (2020). *Study of the Sudanese perceptions of COVID-19: Applying the Health Belief Model.* medRxiv

[20]   Jose, R., et al. (2020). "Perceptions towards COVID 19 and Reflections on Aarogya Setu Mobile Application Use among Keralites." Kerala Medical Journal 13(2): 57-61.

[21]   Stewart, S. H. (2014). "Olthuis, JV, Watt. MC, & Stewart, SH (2011). Therapist-delivered distance cognitive behavioural therapy for anxiety disorders in adults. Cochrane Database of Systematic Reviews, Issue 3. Art. No.: CD009028. DOI."

[22]   Panayiotou, G., et al. (2014). "Direct and indirect predictors of social anxiety: The role of anxiety sensitivity, behavioral inhibition, experiential avoidance and self-consciousness." Comprehensive Psychiatry 55(8): 1875-1882.

[23]   Nazarov, A., et al. (2014). "Theory of mind performance in women with posttraumatic stress disorder related to childhood abuse." Acta Psychiatrica Scandinavica 129(3): 193-201.

[24]   Cook, J. M., et al. (2004). "Posttraumatic stress disorder and current relationship functioning among World War II ex-prisoners of war." Journal of Family Psychology 18(1): 36.

[25]   Raby, C. R., et al. (2007). "Planning for the future by western scrub-jays." Nature 445(7130): 919-921.

[26]   Suddendorf, T. and M. C. Corballis (2007). "The evolution of foresight: What is mental time travel, and is it unique to humans?" Behavioral and brain sciences 30(3): 299-313.

Mojtaba Pour Mohaghegh et al.
Predictive Model of Health Belief in Post-Traumatic Stress Disorder in Coronavirus Patients:
The Mediating Role of Prospective Event Thinking

[27]   Bahri, Maryam; And Bahri, Maeda; And Gharamaleki weaver, Hassan. (1397). Comparison of prospective event thinking in people with symptoms of depression, anxiety and normal people. Cognitive Psychology and Psychiatry, 5 (2), 1-14.

[28]   Alizadeh Siouki, Hadi; Jadgal, Khair Mohammad; Shamaian Razavi, Nazanin; Attackers, Iraj; Heshmati, Hashem; Butler, Venus. (1393). The effect of education based on health belief model on nutritional behaviors of primary school students in Torbat-e Heydarieh in 2012, Journal of Health. 5 (4). 289-299

[29]   Costa, M. F. (2020). *Health belief model for coronavirus infection risk determinants.* Rev Saude Publica, 54, 47. doi:10.11606/s1518-8787.2020054002494

[30]   Liu, W., Zhang, Q., Chen, J., Xiang, R., Song, H., Shu, S., ... & Wu, P. (2020). Detection of Covid-19 in children in early January 2020 in Wuhan, China. *New England Journal of Medicine*, 382(14), 1370-1371.

[31]   Szpunar, K. K. (2010). Episodic Future Thought: An Emerging Concept. *Perspect Psychol Sci*, 5(2), 142-162.

[32]   Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive therapy and research*, 27(3), 247-259.

[33]   Weiss, D., & Marmar, C. *(1997). The Impact of Event Scale Revised. In J. Wilson & T. Keane (Eds(, Assessing psychological trauma and PTSD.* New York: Guildford.