Role of illness perception in explanation of severity of post-traumatic stress disorder symptoms after cardiovascular problems

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Original Article

Abstract

BACKGROUND: Given the role of post-traumatic stress disorder (PTSD) in morbidity and mortality of cardiac patients, the present study was conducted to determine the relationship between the perception of heart disease and severity of PTSD symptoms.

METHODS: Sampled using simple random sampling, 202 cardiovascular patients (50.5% women) were selected and included in this cross-sectional study. The patients admitted to a hospital from January to May 2017 in western Iran were selected and asked to complete the self-report demographic and cardiac risk factors inventory, Brief Illness Perception Questionnaire (Brief-IPQ), and National Stressful Events Survey PTSD Short Scale (NSESSS) checklist. The results were analyzed using the Pearson correlation coefficient and multiple regression analysis.

RESULTS: The mean age of patients was 53.5 ± 11.9 years. The results of the correlation coefficient showed a significant relationship between all the components of illness perception, except personal and treatment control, with PTSD (P < 0.05). The regression model could predict 22.5% of PTSD variance and the greatest role was for the emotional representation (P = 0.002) and female sex (P = 0.008).

CONCLUSION: The perception of cardiovascular patients of the cognitive and emotional components of the disease, especially in women, plays a significant role in experiencing the symptoms of PTSD. Thus, health professionals have to monitor all these components, especially the patient's perceptions and emotional reactions, and to come up with proper and timely interventions for patients at risk to control the adverse effects of PTSD after cardiovascular events.

Keywords: Cardiovascular Disease; Cognition; Perception; Post-Traumatic Stress Disorders

Introduction

As one of the anxiety disorders, post-traumatic stress disorder (PTSD) is not only one of the risk factors for developing cardiovascular diseases (CVDs), but also mortality is one of the adverse effects of these diseases.[1-6] In this disorder - characterized by a sustained non-adaptive response to one or more severely stressful factors[1,7] - the patient repeatedly experiences aggressive thoughts related to a stressful event and tries to avoid that event and the factors triggering it.[2] Previous results show that this disorder has a significant role in the morbidity and mortality of cardiovascular patients.[8,9] Furthermore, PTSD and its consequences impose great costs on the health system of communities.[4]

According to the above considerations, identification of the factors affecting PTSD experience is of importance in controlling and managing the adverse effects of the disease. Moreover, identification of these factors using suggested models available can provide appropriate information to health professionals. One of these models is the Self-Regulatory Model (SRM) by Leventhal et al.,[10] which explains the causes and outcomes of the disease. This model considers healthy behaviors as the result of the multifaceted and complex perception of the disease in which a person plays a dynamic and active role in the perception of his illness.[11] Illness perception is a

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patient's cognitive appraisal and personal understanding of a specific disease and its potential outcomes and consequences.[12] According to Leventhal et al., three parallel processes, including threat perception, countering threat, and self-regulatory assessment play an active role.[10] According to SRM, cognitive expressions of the disease parallel with emotional expression can affect the coping strategies of individuals and the emotional outcomes of the disease. Based on Leventhal et al.'s SRM of illness perceptions, patients' beliefs about their disease comprise five key domains including identity, timeline, cause, control/cure, and consequences. The domains are used to aid the understanding of illness and guide a coping response. As a result, patients will then appraise the process to determine the success or failure of the illness coping strategy.[13] As this theory mentions about the role of the parallel cognitive and emotional systems of disease,[14] studying the role of these systems in experiencing symptoms of PTSD after cardiovascular problems can be useful. Thus, the purpose of the present study was to investigate the relationship between illness perception and PTSD in cardiovascular patients.

Materials and Methods

The population of this cross-sectional study was all cardiac patients admitted to the men and women wards of Imam Ali Hospital, Kermanshah (West of Iran), during January-May 2017. All these patients admitted were diagnosed with a heart problem, including myocardial infarction (MI) or aggressive heart procedures, such as coronary artery bypass graft (CABG), surgical aortic valve replacement (SAVR), and percutaneous coronary intervention (PCI). Moreover, 202 patients were selected by simple random sampling and entered the study. That is, among the hospitalized patients, some people who met the inclusion criteria were randomly selected each day. The inclusion criteria were the age of 18 to 85 years, having at least secondary school literacy, fluent Persian language and proper comprehension, and the desire to participate in the study. To collect data in the first step, one of the members of the research team was present daily in the hospital wards and provided the patients with forms and questionnaires after presenting the necessary explanations. After confirming the informed consent form, the patients completed the papers to participate in the study. The tools used to measure the factors were the self-report demographic and cardiac risk factors inventory,[15] the Brief Illness Perception Questionnaire (Brief-IPQ),[16] and National

Stressful Events Survey PTSD Short Scale (NSESSS).[17] Finally, the checklist for self-reporting of demographic factors and cardiac risk factors was matched to the information contained in patient records filed by the cardiologist. In the case of an inconsistency between these data, we directly talked to the patient's cardiologist and the correct information was entered into the research form.

This study was approved by the Ethics Committee of Kermanshah University of Medical Sciences (Ethical code: IR.KUMS.REC.1398.460).

Instruments

The Checklist for demographic features and cardiovascular risk factors: This self-report checklist includes information on gender, age, marriage status, education level, occupational status, cardiovascular risk factors such as smoking, hypertension (HTN), diabetes mellitus (DM), and hyperlipidemia (HLP), and eventually, a family history of CVD and heart attack.[15]

The Brief-IPQ: This questionnaire, which is developed by Broadbent et al.,[16] has nine questions. The scale was developed based on the revised version of the Illness Perception Questionnaire (IPQ-R) that is a theoretically derived measure comprising five domains for assessing the representation of illness. The instrument has three subscales including cognitive response (perception of illness consequences, timeline, personal control, treatment control, and symptoms identify), emotional response (concern over illness, emotions and emotional representation to illness), and the illness comprehensibility (coherence). Score range of 8 first questions is from 1 to 10. Score 1 means poor perception and 10 means the proper perception of the illness. Thus, the total score of the questionnaire ranges from 8 to 80. Item 9, which is related to the disease etiology, is an open-ended item that according to the patient includes three important causes of the disease according to its importance. This item was not analyzed in the present study due to the quality of the responses. Broadbent et al.[16] reported Cronbach's alpha of this scale as 0.80 and their test re-test reliability of six-week interval for subscales was from 0.42 to 0.75. Construct, criterion, concurrent, and divergent validities of this tool were appropriate too. Cronbach's alpha of the Persian version of this test was 0.84 and the concurrent validity of this scale with its revised version was 0.71.[18] Moreover, Bazzazian and Besharat reported their re-test reliability between 0.50 and 0.75.[19]

NSESSS: This 9-item scale based on Diagnostic

and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) has been designed to assess the severity of PTSD in adults over 18 years old. Each item is scored based on the Likert scale, from not at all (= 1) to severely (= 4). This instrument lacks any subscale and the range of scores is between 9 and 36; the higher score indicates a more severe disorder. The reliability assessed using the Cronbach's alpha for the final nine-item scale was 0.901. Besides, the validity of this tool has been verified by LeBeau et al. in 2014.[17] The Iranian version of the scale also was valid and the Cronbach's alpha for the overall scale was 0.88.[20]

Statistical analysis: Firstly, descriptive data about the socio-demographic variables were reported using percentages. The mean and standard deviation (SD) of continuous variables were reported as well. Discontinuous variables were compared using chi-square test or Fisher's exact test. The Pearson correlation coefficient was used to determine the correlation between variables. Finally, multiple regression analysis was used to examine the role of the components of illness perception in predicting PTSD. All IPQ items along with age and sex were predictive variables for PTSD severity. The main analysis was performed after examining the non-violation of statistical assumptions including normality, multicollinearity, and outliers. All tests were a two-tailed test and the significance level of 0.05 was considered as significant. All analyses were performed using the SPSS software (version 20, IBM Corporation, Armonk, NY, USA).

Results

The sample's mean age was 53.5 ± 11.9 years (53.6 ± 11.9 years for men, 53.5 ± 11.9 years for women; $P = 0.948$). In addition, the mean of PTSD score was 18.16 ± 5.94 (16.79 ± 6.01 for men, 19.51 ± 5.57 for women; $P = 0.001$). The participants' socio-demographics can be seen in table 1. According to the results of the table, there was a difference between men and women in job status ($P < 0.001$), smoking ($P < 0.001$), drug addiction ($P < 0.001$), alcohol drinking ($P < 0.001$), HTN ($P = 0.006$), DM ($P = 0.043$), HLP ($P = 0.021$), and identity dimension of the IPQ ($P = 0.046$).

Concerning the main analysis, the correlation between IPQ subscales, age, and sex with PTSD can be seen in table 2. As can be seen, there was a significant relationship between PTSD with all components ($P < 0.05$), except personal, treatment control and age ($P > 0.05$). Of course, in the crude multiple regression model (model A) related to

PTSD, the P-value was significant simply for emotional response subscale including concern ($P = 0.049$) and emotional representation ($P = 0.003$). In the model adjusted for age and sex (model B), only emotional representation ($P = 0.002$) and sex ($P = 0.008$) were able to explain PTSD significantly. Therefore, these components were the strongest predictor for PTSD. Generally, the model A was able to significantly explain the 18.4% variance of PTSD ($F = 5.438$, $P < 0.0005$). However, model B was able to provide a more accurate explanation (22.5%) of PTSD variance ($F = 5.556$, $P < 0.0005$).

Discussion

The present study was conducted to investigate the relationship between perception of heart disease and PTSD in cardiovascular patients. The results showed a significant relationship between all the components of illness perception, except for personal and treatment control, with PTSD. This finding is consistent with the results of previous studies.[21-23] Oflaz et al. found that illness perception might increase the risk of PTSD symptoms.[22] The acute medical traumas such as cardiovascular events are mainly unexpected and as life-threatening and fear-inducing experiences may result in the PTSD symptoms. However, the severity and symptoms of PTSD are not the same and epidemic. This may be related to patients' different perceptions of their illness. The findings of present study can be explained by the derived concepts from the theory of SRM that illness perceptions may account for variations in emotional reactions to acute medical trauma or symptoms of acute physical diseases such as cardiovascular events and treatment procedures.[21]

In the cognitive aspect of illness perception, it is stated that the patient's attitudes and beliefs about that cardiac disease are accompanied by serious and problematic consequences, strongly associated with the inability to perform daily tasks and disturbance in social interactions.[24] Moreover, the cognitive manifestations and representation of the disease are both effective in the emergence and continuation of PTSD symptoms.[25] In the emotional dimension, perceptions of the disease may contribute to emotional fluctuations in symptoms associated with a cardiac event.[21] However, proper cognitive control of PTSD symptoms can lead to increasing use of adaptive emotion regulation strategies.[26] Thus, cognitive and emotional perceptions of physical illness seem to work in parallel, and each, in turn, is associated with PTSD.

Table 1. Demographics and clinical data of the sample

Variables	Total	Men	Women	P
Sex [n (%)][a]	202 (100)	100 (49.5)	102 (50.5)	0.957
Age (year) (mean ± SD)[c]	53.50 ± 11.90	53.59 ± 11.98	53.48 ± 11.96	0.948
Marital status [n (%)][b]				0.446
Single	6 (3.0)	2 (2.0)	4 (3.9)	
Married	194 (96.0)	98 (98.0)	96 (94.1)	
Divorced	2 (1.0)	0 (0)	2 (2.0)	
Education [n (%)][a]				0.080
Under diploma	150 (74.3)	69 (69.0)	81 (79.4)	
Diploma	36 (17.8)	19 (19.0)	17 (16.7)	
University degree	16 (7.9)	12 (12.0)	4 (3.9)	
Job [n (%)][a]				0.001
Employee	12 (5.9)	10 (10.0)	2 (2.0)	
Self-employed	68 (33.7)	66 (66.0)	2 (2.0)	
Housekeeper	96 (47.5)	4 (4.0)	92 (90.2)	
Retired	13 (6.4)	11 (11.0)	2 (2.0)	
Unemployed	13 (6.4)	9 (9.0)	4 (3.9)	
Smoking [n (%)][b]				0.001
Never	163 (80.7)	66 (66.0)	97 (95.1)	
Cessation	35 (17.3)	31 (31.0)	4 (3.9)	
Active	4 (2.0)	3 (3.0)	1 (1.0)	
Substance abuse [n (%)][b]				0.001
Never	182 (90.1)	82 (82.0)	100 (98.0)	
Cessation	16 (7.9)	15 (15.0)	1 (1.0)	
Active	4 (2.0)	3 (3.0)	1 (1.0)	
Alcohol drinking [n (%)][b]				0.001
Never	192 (95.0)	91 (91.0)	1 (1.0)	
Cessation	9 (4.5)	9 (9.0)	0 (0)	
Active	1 (0.5)	0 (0)	1 (1.0)	
HTN [n (%)][a]	80 (39.6)	30 (30.0)	50 (49.0)	0.006
DM [n (%)][a]	51 (25.2)	19 (19.0)	32 (31.4)	0.043
HLP [n (%)][a]	53 (26.2)	19 (19.0)	34 (33.3)	0.021
MI history [n (%)][a]	55 (27.2)	29 (29.0)	26 (25.5)	0.534
Family history of cardiac disease [n (%)][a]	95 (47.0)	44 (44.0)	51 (50.0)	0.439
Event or cardiovascular procedure [n (%)][a]				0.154
CABG	118 (58.4)	64 (64.0)	54 (52.9)	
SAVR	26 (12.9)	8 (8.0)	18 (17.6)	
Other	58 (28.7)	28 (28.0)	30 (29.5)	
Brief-IPQ				
Cognitive response (mean ± SD)[c]				
Consequences	7.65 ± 3.44	7.67 ± 3.41	7.64 ± 3.48	0.946
Timeline	6.03 ± 2.74	5.77 ± 2.69	6.29 ± 2.78	0.175
Personal control	6.38 ± 2.78	6.52 ± 2.91	6.23 ± 2.65	0.468
Treatment control	7.92 ± 3.90	7.87 ± 2.33	7.97 ± 5.00	0.855
Identity	5.60 ± 2.99	5.18 ± 2.98	6.02 ± 2.95	0.046
Emotional response (mean ± SD)[c]				
Concern	6.18 ± 3.79	5.84 ± 3.80	6.52 ± 3.76	0.203
Emotional representation	5.37 ± 3.85	4.97 ± 3.66	5.76 ± 4.01	0.143
Illness comprehensibility (mean ± SD)[c]				
Coherence	6.41 ± 2.52	6.28 ± 2.60	6.53 ± 2.44	0.483

[a]Chi-square test; [b]Fisher's exact test; [c]T-test for independent groups

HTN: Hypertension; DM: Diabetes mellitus; HLP: Hyperlipidemia; MI: Myocardial infarction; CABG: Coronary artery bypass graft; SAVR: Surgical aortic valve replacement; IPQ: Illness Perception Questionnaire; SD: Standard deviation

Consistent with the findings from previous studies,[21,22] another finding suggested that the emotional representation component of the emotional response subscale had the greatest role in explanation of PTSD. Experienced PTSD may result from the patient's emotional reactions to acute trauma. Understanding the patients from their emotional reactions and ensuring the negative impact of this condition on life and future medical treatment can facilitate the onset of PTSD symptoms.[21,27]

Table 2. The correlations and multiple regression model for correlates of post-traumatic stress disorder (PTSD)

Brief-IPQ	PTSD		Model B (adjustment for age and sex)			
	r	P*	A (95% CI)	P	B (95% CI)	P
Cognitive response						
Consequences	0.2110	0.0010	0.053 (-0.209, 0.315)	0.6900	0.091 (-0.168, 0.349)	0.4900
Timeline	0.1200	0.0440	0.143 (-0.166, 0.452)	0.3630	0.058 (-0.249, 0.366)	0.7080
Personal control	-0.0980	0.0820	-0.217 (-0.540, 0.105)	0.1840	-0.184 (-0.501, 0.132)	0.2520
Treatment control	-0.0620	0.1900	-0.026 (-0.227, 0.175)	0.7970	-0.053 (-0.250, 0.145)	0.6020
Identity	0.1240	0.0400	0.112 (-0.160, 0.383)	0.4180	0.060 (-0.208, 0.328)	0.6590
Emotional response						
Concern	0.3340	0.0005	0.247 (0.001, 0.494)	0.0490	0.220 (-0.022, 0.463)	0.0740
Emotional representation	0.3570	0.0005	0.363 (0.127, 0.599)	0.0030	0.378 (0.143, 0.614)	0.0020
Illness comprehensibility						
Coherence	0.1420	0.0220	0.248 (-0.120, 0.615)	0.1850	0.262 (-0.010, 0.624)	0.1550
Age	0.0530	0.2260			0.057 (-0.008, 0.123)	0.0850
Sex	-0.2290	0.0010			-2.085 (-3.612, -0.558)	0.0080

*Pearson correlation coefficient was used

PTSD: Post-traumatic stress disorder; IPQ: Illness Perception Questionnaire; CI: Confidence interval

Bennett and Brooke stated that the degree of fear experienced by the patient during the event and heart trauma could greatly predict the probability of PTSD incidence.[27] In the present study, the scores of patients in all aspects are above average. In other words, cardiac disease and its symptoms have harmed their lives, worried them, and emotionally disturbed them. These experiences and perceptions related to it can also justify symptoms of PTSD. Finally, one can say that emotional responses and perceptions like worry and concern about heart trauma lead to exacerbation of anxiety that is the source of anxiety disorders, such as PTSD.[28]

Moreover, the findings of the present study showed that women were more likely than men to experience more severe symptoms of PTSD. The lifetime prevalence of PTSD is about 10%–12% in women, while 5%-6% of men develop PTSD symptoms in a lifetime.[29] This condition may be caused by the prevalence of comorbid disorders such as major depression and anxiety disorders among women. During the sudden experience of fatal events such as CVDs, women report generally more severe symptoms than men on acute subjective responses, e.g., threat perception, peritraumatic dissociation, and known predictors of PTSD. Women handle stressful situations differently due to more use of emotion-focused, defensive, and palliative coping instead of problem-focused coping.[29] Thus, it is not unexpected to experience more severe symptoms of PTSD in women.

We examined only the role of predicting illness perception along with age and sex in our study, and our model could only explain 22.5% of the variance of PTSD. As attitudes and perceptions of patients can be influenced by the actual and perceived risk factors of CVDs, it is recommended that future studies address the role of these factors. Moreover, most of the participants in the study were CABG and VRS patients. Selecting more MI and PCI patients in future studies can facilitate the generalization of results to other groups.

Conclusion

The perception of cardiovascular patients of the cognitive and emotional components of the illness along with female sex has a significant role in experiencing PTSD symptoms. Thus, health professionals should monitor these components, especially the patient's emotional perceptions and reactions, and provide appropriate and timely interventions for patients at risk to control the adverse effects of PTSD after cardiovascular events.

Acknowledgments

Conflict of Interests

Authors have no conflict of interests.

Authors' Contribution

All authors participated in the design of the study, drafted the manuscript, and read and approved the final manuscript.

References

1. Vaccarino V, Goldberg J, Rooks C, Shah AJ, Veledar E, Faber TL, et al. Post-traumatic stress

disorder and incidence of coronary heart disease: A twin study. J Am Coll Cardiol 2013; 62(11): 970-8.

2. Edmondson D, Cohen BE. Posttraumatic stress disorder and cardiovascular disease. Prog Cardiovasc Dis 2013; 55(6): 548-56.

3. Dedert EA, Calhoun PS, Watkins LL, Sherwood A, Beckham JC. Posttraumatic stress disorder, cardiovascular, and metabolic disease: A review of the evidence. Ann Behav Med 2010; 39(1): 61-78.

4. Levine AB, Levine LM, Levine TB. Posttraumatic stress disorder and cardiometabolic disease. Cardiology 2014; 127(1): 1-19.

5. Coughlin SS. Post-traumatic stress disorder and cardiovascular disease. Open Cardiovasc Med J 2011; 5: 164-70.

6. Edmondson D, von Kanel R. Post-traumatic stress disorder and cardiovascular disease. Lancet Psychiatry 2017; 4(4): 320-9.

7. Sidney S. Post-traumatic stress disorder and coronary heart disease. J Am Coll Cardiol 2013; 62(11): 979-80.

8. Ahmadi N, Hajsadeghi F, Mirshkarlo HB, Budoff M, Yehuda R, Ebrahimi R. Post-traumatic stress disorder, coronary atherosclerosis, and mortality. Am J Cardiol 2011; 108(1): 29-33.

9. Edmondson D, Rieckmann N, Shaffer JA, Schwartz JE, Burg MM, Davidson KW, et al. Posttraumatic stress due to an acute coronary syndrome increases risk of 42-month major adverse cardiac events and all-cause mortality. J Psychiatr Res 2011; 45(12): 1621-6.

10. Leventhal H, Meyer D, Nerenz D. The common sense representation of illness danger. In: Rachman S, editor. Contributions to medical psychology. New York, NY: Pergamon Press. 1980. p.7-30.

11. Bazzazian S, Besharat MA, Bahrami Ehsan H, Rajab A. The moderating role of coping strategies in relationship between illness perception, quality of life and Hba1c in patients with type i diabetes. Iran J Endocrinol Metab 2010; 12(3): 213-21. [In Persian].

12. Broadbent E, Wilkes C, Koschwanez H, Weinman J, Norton S, Petrie KJ. A systematic review and meta-analysis of the Brief Illness Perception Questionnaire. Psychol Health 2015; 30(11): 1361-85.

13. Cordingley L, Prajapati R, Plant D, Maskell D, Morgan C, Ali FR, et al. Impact of psychological factors on subjective disease activity assessments in patients with severe rheumatoid arthritis. Arthritis Care Res (Hoboken) 2014; 66(6): 861-8.

14. Komasi S, Saeidi M. Presentation of new classification of perceived risk factors and etiologies of cardiovascular diseases. ARYA Atheroscler 2016; 12(6): 295-6.

15. Soroush A, Heydarpour B, Saeidi M, Ezzati P, Komasi S. Waiting time for start of outpatient cardiac rehabilitation: correlations of non compliance to systematic referral after coronary artery bypass surgery. Jundishapur J Chronic Dis Care 2016; 6(2): e43402.

16. Broadbent E, Petrie KJ, Main J, Weinman J. The brief illness perception questionnaire. J Psychosom Res 2006; 60(6): 631-7.

17. LeBeau R, Mischel E, Resnick H, Kilpatrick D, Friedman M, Craske M. Dimensional assessment of posttraumatic stress disorder in DSM-5. Psychiatry Res 2014; 218(1-2): 143-7.

18. Afshar H, Bagherian R, Foroozandeh N, Khorramian N, Daghaghzadeh H, Maracy M, et al. The relationship between illness perception and symptom severity in pa-tients with irritable bowel syndrome. J Isfahan Med Sch 2011; 29(137): 526-36. [In Persian].

19. Bazzazian S, Besharat MA. Reliability and validity of a Farsi version of the brief illness perception questionnaire. Procedia Soc Behav Sci 2010; 5: 962-5.

20. Rafiey H, Alipour F, LeBeau R, Salimi Y, Sayad M. Evaluating the Persian translation of the National Stressful Events Survey PTSD Short Scale in a sample of Iranian earthquake survivors. J Loss Trauma 2017; 22(8): 660-8.

21. Sheldrick R, Tarrier N, Berry E, Kincey J. Post-traumatic stress disorder and illness perceptions over time following myocardial infarction and subarachnoid haemorrhage. Br J Health Psychol 2006; 11(Pt 3): 387-400.

22. Oflaz S, Yuksel S, Sen F, Ozdemiroglu F, Kurt R, Oflaz H, et al. Does illness perception predict posttraumatic stress disorder in patients with myocardial infarction? Noro Psikiyatr Ars 2014; 51(2): 103-9.

23. Princip M, Koemeda M, Meister RE, Barth J, Schnyder U, Znoj H, et al. A picture paints a thousand words: Heart drawings reflect acute distress and illness perception and predict posttraumatic stress symptoms after acute myocardial infarction. Health Psychol Open 2015; 2(1): 2055102915592091.

24. Petrie KJ, Weinman J, Sharpe N, Buckley J. Role of patients' view of their illness in predicting return to work and functioning after myocardial infarction: longitudinal study. BMJ 1996; 312(7040): 1191-4.

25. Hughes JH. Psychology and cognitive processing in post-traumatic disorders. psyCHiatry 2006; 5(7): 228-30.

26. Schweizer S, Samimi Z, Hasani J, Moradi A, Mirdoraghi F, Khaleghi M. Improving cognitive control in adolescents with post-traumatic stress disorder (PTSD). Behav Res Ther 2017; 93: 88-94.

27. Bennett P, Brooke S. Intrusive memories, post-traumatic stress disorder and myocardial infarction. Br J Clin Psychol 1999; 38(4): 411-6.

28. Gana K, Martin B, Canouet MD. Worry and anxiety: Is there a causal relationship? Psychopathology 2001; 34(5): 221-9.

29. Olff M. Sex and gender differences in post-traumatic stress disorder: an update. Eur J Psychotraumatol 2017; 8(Sup 4): 1351204.