Coping and emotional state in the acute phase of myocardial infarction

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ABSTRACT: Objective: Emotional and coping adaptation after the acute phase of a myocardial infarction (MI) is a compensatory mechanism developed for patients' adjustment to the new reality following this life threatening situation. There are however scarce data on the relationship between hospitalized MI patients' coping behavior and their emotional state. The study investigates the associations between coping strategies and the affective status in patients surviving a MI.
Methods: One-hundred male patients surviving a MI, aged 60.5 (Confidence Intervals (CI): 57.5-62.7) years, were interviewed after the acute phase of MI, at the last day of their coronary unit stay. Medical data were obtained by their medical records. Coping Orientation to Problems Experienced (COPE) and Profile of Mood States (POMS) questionnaires were used to examine coping styles and patients' mood state respectively.
Results: Active coping was positively related to anxiety and anger. Emotional support was negatively associated with these variables. Religious coping and behavioral disengagement were positively related to depression. Significant difference was found in coping styles and mood states scores between the different perceived severity beliefs.
Conclusion: Patients surviving after a MI, develop coping strategies related to their emotional state. The significance of these relations remains to be clarified in future studies.

Key Words: myocardial infarction, coping strategies, depression, anxiety, anger..

INTRODUCTION

Conceptual model

Cognitive appraisal, coping and outcome are the fundamental terms in the Stress and Coping Model. This theoretical context refers to a meaning-making process where emotions play a vital role. As far as appraisals is concerned primary and secondary appraisal are the main elements. Primary appraisal yields the evaluation of whether a stressful condition is estimated as challenge or threat. This appraisal is being related to the person's assumptions and beliefs about the world and own-self. On the other hand, secondary appraisal refers to the person's estimation about what can be done and what may be the outcome. Being diagnosed with a severe disease can be appraised as a threat. Patient may have to deal and adjust to the new situation. These mechanisms are often expressed as emotional-focused coping, targeted to the reduction of the distress and problem-focused coping aimed to problem solution or to the elimination of the threat and so forth the emotional distress.[1,2,3,4]

The study

Research in the field of cardiovascular disease reports that acute coronary heart disease is one of the main

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causes of death in developed western countries, with the number of newly diagnosed patients suffering from myocardial infarction (MI) rapidly and constantly increasing.[5,6,7] Patients surviving a life-threatening condition like MI, might face feelings of vulnerability or distress.[8,9] In addition, patients overcoming a MI may have to modify their lifestyle habits, for example by extenuating their social life, changing daily life or usual every-day activities, by following medical treatment, swift to a healthier diet, or quit smoking.[8] So in order to deal with major changes in life, patients may adopt different coping strategies (cognitive, emotional or behavioral) as readjustment mechanisms.

The aim of this study was to reveal any associations between coping and mood states (anxiety, depression, anger). We also investigated the role of perceived severity. The hypotheses were: 1) coping strategies are related to emotional states 2) coping strategies and affective states are related to perceived severity.

METHODS

Procedure and sample

This is a cross sectional study, involving consecutive male-adult patients hospitalized with the diagnosis of MI in the coronary intensive care unit of three tertiary hospitals of northern Greece. All patients were of Caucasian origin, Greek speaking men, with no previous history of MI. After informed consent, patients were interviewed at the day of their discharge from the coronary intensive care unit. Patients with serious complications in their physical condition (eg intubated patients), patients with mental disorders (schizophrenia, mental retardation etc.) or neurological diseases (dementia, medical history of stroke with consecutive mental illness or Parkinson disease) were excluded. The study was approved by the Bioethics and Deontology Committee of Medical School of Aristotle University of Thessaloniki-Greece (Ethics Committee reference number: 119/08.12.2014).

Measurements

Age, education, residence, marital and occupational status were self-reported. Medical profile (odjective disease severity, co-occurrence of other disease, type of therapy applied, specific cardiologial indicators) were obtained from medical records. Participants gave information about having specific symptoms, difficulties faced before MI (in walking, climbing a ladder, weight-lifting or driving), heredity and substance use issues.

COPE

Coping Orientation to Problems Experienced (COPE) questionnaire[3], adjusted for the Greek language (Cope Brief-Greek version measured by a 4-Likert-type scale[10,11]), was used to assess the way patients deal with the situation in the first days of their recovery in hospital. The questionnaire uses 13 subscales: self-distraction, active coping, denial, use of emotional support, use of instrumental support, behavioral disengagement, venting, positive-reframing, planning, humor, acceptance, religion and self-blame.

POMS

Profile of Mood States (POMS) Brief-Greek version questionnaire was used to identify depressive, anxiety and anger symptoms (5 Likert-type scale) (MHS, Toronto-Canada). Higher scores indicated greater symptomatology.[12]

Perceived severity

A question was created for the evaluation of the disease severity, as perceived by the patient himself and participants were asked to grade their condition with the use of a climax extending from 1 (not severe) to 5 (very severe).

Statistical analysis

Statistical Package for the Social Sciences (SPSS, Chicago, IL; USA) for Windows (version17.0) was used. Normality was assessed by Kolmogorov-Smirnov test for $p > 0.05$. Descriptive statistics are represented as median value and confidence intervals because of the non-normal distribution of the variables. Spearman correlations were performed to reveal the associations between coping strategies and emotional states. Mann-Whitney tests were performed to reveal significant differences in coping strategies scores (dependent variable) or in emotional states scores (dependent variable) between the different patients' beliefs about perceived severity (independent variable/a 2-grouping variable in SPSS, min=1 (quite severe), max=2 (very severe)). The reason we used Mann-Whitney tests was because patients perceived their physical condition, (perceived severity/ independent variable/a 5-grouping variable in SPSS, min=1 (not severe at all), max=5 (very severe)), as very severe or quite severe and evaluated it with rate 5 (very severe/75% of the sample) or rate 4 (quite severe/25% of the sample)

respectively. Since there were no patients that perceived their cardiological disease as not severe at all (rate 1), a little bit severe (rate 2) or moderate severe (rate 3), there were only two groups in compare instead of five. Hierarchical multiple regression analyses were conducted to test the predicted value of coping strategies (independent variables) to emotional states (dependent variables) after controlling for specific socio-demographic (step 1) and medical data (step 2). Cronbach's alpha value was assessed in order to test the reliability of questionnaires' subscales. Statistical significance was considered positive for p-values <0.05.

RESULTS

Socio-demographic and medical data

Our study included 100 male patients, aged 60.5 (Confidence Intervals (CI): 57.5-62.7) years. The majority of the patients lived in an urban area and were married with children (median number of children: 2.0). Half of the patients were pensioners. Only eighteen (18%) of patients had a higher education. In terms of disease severity comprehension, seventy-five (75%) of patients perceived their cardiac condition as very severe. Medical data are summarized in Table 1.

Reliability of questionnaires

The reliability of the COPE subscales, measured in this study, was valued between 0.618 and 0.989 (Cronbach's alpha values). Cronbach's alpha values of POMS reliability for the 3 sub-scales of depression-dejection, tension-anxiety and anger-hostility, were a=0.608, a=0.736, a=0.795 respectively.

Coping and mood disturbance

Positive-reframing [median value: 4.0 (CI: 4.1-4.7)] was the most commonly used coping strategy, adopted by 83% of the patients, followed by emotional support [median value: 4.0 (CI: 3.8-4.4), 70% of the patients], active coping [median value: 4.0 (CI: 3.9-4.6), 68% of the patients], self-distraction [median value: 4.0 (CI: 3.4-3.9), 65% of the patients] and self-blame [median value: 4.0 (CI: 3.1-3.7, 56% of the patients]. Anxiety and anger, against their clinical condition, were the predominant mood states patients experienced during their stay in the intensive care unit, with 39% and 11% of the patients reporting a score >5 [median value: 4.0 (CI: 3.9-5.1) and median value: 1.0 (CI: 1.3-2.1) respectively], followed by depression, with only 5% of studying population reporting score >5, [me-

Table 1. Preliminary descriptive statistics of medical data.

	Median (CI)
N of symptoms	2.0 (2.2-2.7)
CPK	204.0 (375.4-931.4)
LVEF	45.0 (42.8-48.1)
Days in Intensive Care Unit	7.0 (6.9-7.3)
	N (%)
N of difficulties	
0 difficulties	63
1-2 difficulties	25
3-4 difficulties	12
N of comorbidities	
0 diseases	68
1-2 diseases	29
3-4 diseases	3
MI aggravating factors	
Smoking	65
Alcohol	4
HBP	38
Diabetes Mellitus	26
Hyperlipidemia	26
Obesity	14
Heredity	32
Therapy applied	
Drug therapy	49
Angioplasty	47
CABG	4

N=100 MI male patients, *Abbreviations*: CI, confidence intervals; MI, myocardial infarction; CPK, creatine phosphokinase; LVEF, left ventricular ejection fraction; HBP, high blood pressure; CABG, coronary artery bypass graft.

Table 2. Correlations between sub-scales of COPE and POMS questionnaires.

	Anxiety r	Depression r	Anger r
Self-distraction		0.25*	
Active coping	0.24*		0.32*
Emotional support	-0.24*		-0.41**
Instrumental support	0.35**		
Behavioral disengagement		0.27**	-0.21*
Venting of emotions	0.06**		0.64**
Planning			0.22*
Humor	0.24*		
Religious coping	-0.32**	0.2*	-0.44**

N=100 MI male patients, *Abbreviations*: COPE, Coping Orientation to Problems Experienced; POMS, Profile of Mood States; CI, confidence intervals; ***p<0.05, **p<0.01** statistical method: Spearman.

Table 3a. Predicted value of venting of emotions to anxiety.

Model	ΔR^2	F	df_1	df_2	p (Sig. of F change)	β	CI
Step 1: socio-demographic variables (age, vocational status, N of children aged 14-24, N of children aged 25<)	0.140	3.87	4	95	0.006		
Step 2: medical variables (chest pain, stomach ache, transpiration, therapy treatment, perceived severity)	0.221	6.22	5	90	0.0001		
Step 3: venting of emotions	0.123	21.19	1	89	0.0001	0.375	0.351-0.884

N=100 MI male patients, Independent variable: venting of emotions; Dependent variable: anxiety; *Abbreviations*: COPE, Coping Orientation to Problems Experienced; POMS, Profile of Mood States; F, f value change; df_1/df_2, degrees of freedom; ΔR^2, R square change; β, beta value; CI, confidence intervals; ***p<0.05, **p<0.01*** statistical method: Hierarchical multiple regression.

Table 3b. Predicted value of humor to anxiety.

Model	ΔR^2	F	df_1	df_2	p (Sig. of F change)	β	CI
Step 1: socio-demographic variables (age, vocational status, N of children aged 14-24, N of children aged 25<)	0.140	3.87	4	95	0.006		
Step 2: medical variables (chest pain, stomach ache, transpiration, therapy treatment, perceived severity)	0.221	6.22	5	90	0.0001		
Step 3: humor	0.057	8.7	1	89	0.004	0.282	0.251-1.286

N=100 MI male patients, Independent variable: humor; Dependent variable: anxiety; *Abbreviations*: COPE, Coping Orientation to Problems Experienced; POMS, Profile of Mood States; F, f value change; df_1/df_2, degrees of freedom; ΔR^2, R square change; β, beta value; CI, confidence intervals; ***p<0.05, **p<0.01*** statistical method: Hierarchical multiple regression.

Table 3c. Predicted value of venting of emotions to anger.

Model	ΔR^2	F	df_1	df_2	p (Sig. of F change)	β	CI
Step 1: socio-demographic variables (age, vocational status, N of children aged 14-24, N of children aged 25<)	0.138	3.8	4	95	0.006		
Step 2: medical variables (chest pain, fatigue, formicary, diabetes, smoking, perceived severity)	0.109	2.16	6	89	0.055		
Step 3: venting of emotions	0.357	79.31	1	88	0.0001	0.647	0.633-0.997

N=100 MI male patients, Independent variable: venting of emotions; Dependent variable: anger; *Abbreviations*: COPE, Coping Orientation to Problems Experienced; POMS, Profile of Mood States; F, f value change; df_1/df_2, degrees of freedom; ΔR^2, R square change; β, beta value; CI, confidence intervals; ***p<0.05, **p<0.01*** statistical method: Hierarchical multiple regression.

dian value: 1.0 (CI: 0.8-1.5)].

After controlling (using Spearman correlation, Mann-Whitney and Kruskal-Wallis tests) for parameters affecting both COPE and POMS sub-scales, such as socio-demographic (age, sex, education, occupational and marital status) and medical variables (MI symptoms, difficulties faced a month time-period before MI, aggravating factors for MI), the following associations were observed:

Depression as mood state was positively associated with coping strategies such as behavioral disengagement, religious coping and self-distraction.

Both anxiety and anger were found to have positive associations with coping strategies such as active coping, venting of emotions and negative correlations with emotional support and religious coping (Table 2).

On the other hand, anxiety alone was positively associated with instrumental support and humor used by patients, while it was predicted by coping strategies like venting of emotions ($F_{(1,89)}=21.19$, $\Delta R^2= 0.123$, $\beta=0.375$, $p=0.0001$) and the use of humor ($F_{(1,89)}=8.7$, $\Delta R^2= 0.057$, $\beta=0.282, p=0.004$). Statistical data for hierarchical multiple regressions is summarized in Table 3a and Table 3b respectively.

Additionally, anger, as mood state, was positively related with planning and negatively associated with behavioral disengagement and was predicted by venting of emotions ($F_{(1,88)}=79.31$, $\Delta R^2= 0.357$, $\beta=0.647$, $p=0.0001$) (Table 2 and Table 3c).

Coping style, mood and perceived severity

Finally, there was a significant difference in active coping, instrumental support, emotional and religious coping scores between the different beliefs of participants' subjective perception about their physical condition. There was also a significant difference in anxiety and anger scores between the different perceived severity beliefs. Results are presented in Table 4.

DISCUSSION

Facing a life-threatening situation such as a MI, patients may adopt coping strategies or readjustment mechanisms in order to overcome their clinical condition. In our study coping styles were found to be related to mood disturbance and perceived severity.

As far as the first hypothesis is concerned, we found several associations between coping strategies used by the patients and affective states. Anxiety and anger, as predominant mood states, were associated with

Table 4. Significant difference in coping strategies scores (COPE) and in emotional states scores (POMS) between the different patients' beliefs about perceived severity.

Perceived severity	
	U value
Coping	
Active coping	621.0**
Emotional support	574.5**
Instrumental support	448.0**
Religious coping	549.5**
Mood disturbance	
Anxiety	233.5**
Anger	510.0**

N=100 MI male patients, *Abbreviations*: COPE, Coping Orientation to Problems Experienced; POMS, Profile of Mood States; ***p<0.05, **p<0.01*** statistical method: Mann-Whitney.

more coping styles adopted by the patients. These results reveal coping mechanisms and emotional adjustment processing in the early phase of MI. Anxiety and anger not only associated arithmetically with more coping strategies but also with both types of adjustment mechanisms (problem and emotional-focused). Higher scores of anxiety or anger were positively related to active coping, planning, instrumental support, venting of emotions and humor and negatively to emotional support, religious coping and behavioral disengagement. These findings are in accordance with those reported in previous studies in patients with coronary heart disease, which also showed positive correlations between anxiety and specific coping styles (planning, venting of emotions, approach strategies). [13,14,15] In these studies the results show a relation between anxiety and both behavioral and emotional coping strategies. Our results are complying to some point with longitudinal and review research findings in the field of coronary disease[13,14,15] and to this study's first hypothesis. The indication of verification of association between specific coping strategies and mood states in our study and previous ones, leads to the assumption that attention must be paid to patients with coronary heart disease in the early phase and later on, facing distress and using certain coping strategies so to manage it. Emotional distress (anxiety and anger) might be related to specifics behavioral, cognitive or emotional coping styles. This accordance in studies' results suggests that patients with heart diseases might try to find a similar pattern and a variety of coping mechanisms so to deal with negative mood states. MI is a

serious physical condition that brutally constrains patients to confront a new reality, a new compound of demands (behavioral, emotional, and cognitive) in which they are obliged to adjust.[8] An explanation would be that confronting a severe and life threatening health situation may trigger emotional reactions like anxiety and anger and this distress might possibly explains patients' need to handle the situation in both an active and emotional way. A stressful event, like a pathological physical condition, may rise actions of reducing negative mood states as part of an adaptation mechanism and meaning-making process.[1,2,3,4]

In contrast with the other mood states (anxiety and anger), depression was found to be associated to less coping styles by patients. In this study, male patients in the early phase of MI, having more depressive symptoms, were using arithmetically less coping strategies. These results also confirm our first hypothesis that coping styles are related to mood states but in a minor arithmetical climax of associations. Religious coping and behavioral disengagement were positively related to depression. Previous research in MI patients revealed consistent results, indicating a positive association between depression and disengagement coping strategy.[13,14] A research in advanced heart failure patients (Park et al, 2011), found that negative spiritual behaviors predicted future depression.[16] On the other hand, in contrast to our findings, Klein et al., in 2007, reported no significant association between depression and self-distraction.[17] Findings in previous studies in patients suffering from coronary heart disease show evidence of association between depressive symptoms and coping styles.[13,14,16] Our results are confirming our first hypothesis about associations between coping strategies and specific mood state (depression). The findings of the studies are congruent to the extent that certain coping strategies are related to depression and that reveals some evidence that coronary heart patients are using coping mechanisms to manage with depression. We suggest that emotional equilibrium might be a reason for this spiritual or avoiding behavior. Spirituality, finding terms with God or negotiating with the so called "Highest Power" and being emotionally strengthened by praying is a fundamental cultural element of the Greek civilization and may play a major role in the way a patient tries to manage with a similar situation. This behavior may elucidate the association between religious coping and depression in a way that, when being under a serious health con-

dition and distress, turning to God might be a relief solution. In addition, taken into consideration that, in our study and in a previous one (Watkins et al., 1999) though concerning mild-pain patients with rheumatoid arthritis[18], religious coping was associated with age, that might further demonstrate a developmental interpretation as explained in a former study (Folkman et al., 1987), suggesting that older see their condition less alterable and engage to more emotional-focused coping so to adapt.[19] On the other hand, an explanation about avoidance could be that it may seem as an effort to minimize the mood disturbance and seek emotional balance so to deal with the MI condition. Even in an early and acute phase patients might try to manage their illness in a way to adjust in this sudden and overwhelming condition. Reducing stress is one of the main aims of coping strategies.[1,2,3,4]

Furthermore, our findings that coping styles such as venting of emotions and humor can predict anxiety and anger, may yield the interpretation that in the acute phase of MI, emotional strategies are preferred in reducing emotional distress when priority of the patient becomes the immediate decrease of negative mood impact. Being under a severe health condition patients' first reaction might be to handle disturbing feelings. Emotional-focused coping is a way to accomplish that.[1,2,3,4] This might be an important factor to take in mind by the medical staff and by the mental health services. Being under distress, bursting emotions and efforts to amplify it might be patient's reactions to such a severe health condition that clinicians have to manage with caution. Patient's behaviors in the acute phase of a MI must be evaluated by clinicians with special concern and care. These findings also support our first hypothesis but future research must be conducted to confirm or not these preliminary relations.

Finally, as far as the second hypothesis of this study is concerned, there was a significant difference in active coping, instrumental support, emotional support, religious coping, anxiety and anger scores between the different beliefs about perceived severity of the disease. The above results state that there were significant differences in coping styles or mood states scores between the different patients' subjective perception groups about their medical condition. What patients' believe about their health condition might affect their coping mechanisms or emotional adjustment to the early phase of MI. These findings confirm

our second hypothesis that coping strategies and mood states are related to perceived severity as independent variable. In addition, our findings are in accordance with those reported previously (Chiou et al., 1997), in which, patients, in the acute phase of a MI, were interviewed and it was found that participants' perceived severity was related with anxiety.[20] In contrast to our study's results, a study in epilepsy groups (Goldstein et al., 2005), found that patients' recognition of more serious disease aftermath was related with more escape-avoidant coping.[21] While suffering from a heart or another chronic disease, coping styles or mood states may differ when compared to patients' belief about their health condition and our study results corroborate to that. These studies' findings reveal the importance for medical professionals to be vigilant about what patients believe about their health status. Patients' subjective belief about their disease could be an important factor when studying coping styles and emotional states. An explanation might be that our patients apprehended MI as a severe physical circumstance and this realization might trigger emotional distress and efforts were made in the direction of overcoming or handling the situation and downgrading its importance. An interpretation could be that being under an acute and serious health condition, a patient might be in alert so to alter the situation in a behavioral, emotional and cognitive manner. Efforts to lessen or eliminate the threat and its consequential negative mood states is fundamental in the theoretical framework of coping.[1,2,3,4]

To interpret and explain our results in general, we have to take into account the mode and timing of the specific coping styles adopted by patients dealing with a particular stressor like MI. Different samples (gender, culture, religion), different study-designs (cross-sectional or longitudinal), different measurement/assessment tools could also be some yielding factors for incongruent findings between studies. These preliminary results point out the need for more research in this field.

LIMITATIONS

Our study has several limitations. The POMS questionnaire has not been standardized for the Greek population. Patients were assessed in the acute phase of MI and only male patients were involved. Results should

be viewed as preliminary and a need for more studies (long term follow-up data or comparative studies with chronic patients including female participants or control groups) would shed a light in adjustment process.

CONCLUSIONS

Our results showed positive associations between negative mood states (anxiety, anger) with specific coping styles (active coping, venting of emotions). On the other hand, emotional distress (anxiety, anger) were negatively related to emotional support and religious coping. Depression was positively related to religious coping, behavioral disengagement and self-distraction. There was a significant difference in coping styles scores and emotional states scores between the different participants' beliefs about perceived severity of their health condition. Our hypotheses about coping strategies, mood states and perceived severity were confirmed.

Acute coronary syndrome such as MI is a serious health condition. It is important for mental health care professionals to mind the medical profile but also the readjustment efforts and emotional status of the patient. Mental health care staff must focus on patient's early adaptation reactions so to intervene in the most effective supporting way. Being informed for the clinical profile by the medical staff and evaluating the adjustment process, a psychologist could apply suitable support sessions specialized to patient's needs.

ACKNOWLEDGMENTS

ABBREVIATIONS

1. Myocardial Infarction (MI)
2. Coping Orientation to Problems Experienced (COPE)
3. Profile of Mood States (POMS)
4. Confidence Intervals (CI)

Στρατηγικές διαχείρισης και συναισθηματική κατάσταση κατά την οξεία φάση του εμφράγματος του μυοκαρδίου

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ΠΕΡΙΛΗΨΗ: *Σκοπός:* Η ψυχολογική προσαρμογή στην οξεία φάση ενός Εμφράγματος του Μυοκαρδίου (ΕΜ) αποτελεί αντισταθμιστικό μηχανισμό των ασθενών στην προσαρμογή στη νέα πραγματικότητα μιας ανάλογης απειλητικής συνθήκης. Υπάρχουν ελάχιστα δεδομένα που καταδεικνύουν τη σχέση ανάμεσα στις στρατηγικές διαχείρισης από ενδονοσοκομειακούς ασθενείς και στη συναισθηματική τους κατάσταση. Η μελέτη ερευνά τη συγκεκριμένη σχέση σε ασθενείς που έχουν υποστεί ένα ΕΜ.

Μέθοδος: Εκατό άνδρες ασθενείς που έχουν υποστεί ΕΜ, ηλικίας 60.5 (Διάστημα Εμπιστοσύνης (Δ.Ε): 57.5-62.7) ετών, έδωσαν συνέντευξη μετά την οξεία φάση ΕΜ κατά την τελευταία μέρα παραμονής τους στη Στεφανιαία Μονάδα. Ιατρικές πληροφορίες δόθηκαν από τους ιατρικούς φακέλους των ασθενών. Τα ερωτηματολόγια Προσανατολισμός Διαχείρισης Προβλημάτων (COPE) και Προφίλ Ψυχολογικής Διάθεσης (POMS) χρησιμοποιήθηκαν στην αξιολόγηση του τρόπου διαχείρισης και της συναισθηματικής κατάστασης αντίστοιχα.

Αποτελέσματα: Η ενεργή διαχείριση σχετίστηκε θετικά με το άγχος και το θυμό. Η συναισθηματική υποστήριξη βρέθηκε να σχετίζεται αρνητικά με τις συγκεκριμένες μεταβλητές. Η πνευματική αναζήτηση και η συμπεριφορική αποδέσμευση σχετίστηκαν θετικά με την κατάθλιψη. Σημαντική διαφορά βρέθηκε στις στρατηγικές διαχείρισης και τη συναισθηματική διάθεση συγκρινόμενες με την υποκειμενική αντίληψη της σοβαρότητας.

Συμπέρασμα: Οι ασθενείς μετά απο ένα ΕΜ, αναπτύσσουν στρατηγικές διαχείρισης που σχετίζονται με την συναισθηματική διάθεση. Η σημασία αυτών των συσχετίσεων μένει να εξακριβωθεί και σε μελλοντικές μελέτες.

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