


# Associations between emotional instability, coping, and health outcomes among patients with non-cardiac chest pain

Health Psychology Open  
July-December 2015: 1–7  
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sagepub.com/journalsPermissions.nav  
DOI: 10.1177/2055102915608116  
hpo.sagepub.com  


Marie Undheim, Edvin Bru and Terje A Murberg

## Abstract

The main aim of this study was to examine the relationship of emotional instability with illness worry and perceived limitations due to chest pain, and investigate to what degree any associations are mediated by the following chest pain-related coping styles: acceptance, seeking emotional support, seeking instrumental support, and avoidance. Self-reported measures from 94 participants with non-cardiac chest pain were collected. The results showed a relationship between emotional instability, illness worry, and perceived limitations due to chest pain. Moreover, this relationship was mediated by the coping styles avoidance and acceptance.

## Keywords

coping, emotional instability, health outcomes, illness worry, non-cardiac chest pain, perceived limitations

## Introduction

Chest pain is one of the most common symptoms in the general population. Studies have shown that 33 percent of the general population has experienced chest pain at least once (Eslick et al., 2003). A Norwegian study showed that 86 percent of patients referred to a cardiac medical outpatient clinic for an initial evaluation of chest pain did not have any evidence of coronary artery disease (Dammen, 2002). Most of these patients are sent home with the assurance that there is nothing wrong with the heart. However, studies have shown that 47 percent of patients with non-cardiac diagnoses still experienced chest pain 5 months after their cardiac evaluation, and more than 50 percent of these patients were not convinced by their negative cardiac diagnosis (Dumville et al., 2007). A follow-up study of patients who had received reassurance that they were at very low risk of cardiac disease after a full assessment by a chest pain observation unit (including exercise stress testing) found that 33 percent reported that they still worried about their chest pain 1 month after assessment (Goodacre et al., 2001). These findings may indicate that a large proportion of patients who experience non-cardiac chest pain (NCCP) are not reassured and continue to be worried by their chest pain. It is important to mention that the term NCCP means that the pain is of a non-cardiac origin and

that it includes other different etiologies, such as musculoskeletal, gastrointestinal, and psychological causes (Fass and Achem, 2011). That many in this patient group continue to experience pain and worry about cardiac causes of their pain, despite comprehensive medical examination that shows there is no cardiac cause, is a well-documented phenomenon (Dumville et al., 2007; Robertson et al., 2008). It is pertinent to add that NCCP often results in high health-care resource utilization (Fass and Achem, 2011).

Several factors may influence the individuals' experience of chest pain. According to Turk's biopsychosocial model, pain can be modulated by the patient's personality, emotional state, and method of coping with symptoms. Moreover, how patients interpret their symptoms and their expectations about the meaning of their symptoms contribute to their subjective experience and report of pain (Turk and Okifuji, 1999). Because of the large number of individuals who seek medical assistance for their NCCP, factors that influence the experience of symptoms need to be

University of Stavanger, Norway

## Corresponding author:

Marie Undheim, Department of Health Studies, University of Stavanger, Kjell Arholms Hus, 4036 Stavanger, Norway.  
Email: marie.undheim@uis.no



identified. It is well known that personality factors can influence a person's perception of symptoms (Watson and Pennebaker, 1989). There is also evidence indicating that the personality characteristics of emotional instability, which in this study is used synonymously with neuroticism, are linked to the experience of bodily symptoms (Costa and McCrae, 1985; De Gucht et al., 2004; Watson and Pennebaker, 1989). The emotional stability–instability dimension refers to the variation in individuals' disposition to experience situations or bodily sensations as benign or pleasant versus threatening or distressing. Individuals with a higher score on emotional instability are found to be more likely to experience somatic symptoms and interpret these as more threatening compared to emotionally stable individuals (Costa and McCrae, 1987). More emotionally unstable persons may be predisposed to extensive illness worry, which is likely to lead to increased pain-related limitations. Previous research in non-clinical samples has indicated that emotional instability is associated with worries and bodily symptoms (Rosmalen et al., 2007), but to our knowledge there have been no studies that have investigated the associations between emotional instability, illness worry, and perceived limitations due to pain in NCCP patients. Therefore, an important aim of this study was to investigate the association of emotional instability with illness worry and perceived limitations due to chest pain (PLCP) among people with a non-cardiac diagnosis.

Emotional instability may influence the perception and understanding of pain indirectly by affecting the use of coping styles. There is substantial evidence indicating that emotional instability is linked to less adequate coping strategies. Findings from a meta-analysis of the relationships between personality and coping revealed that emotional instability is related to less use of problem-focused coping and acceptance but more emotion-focused coping and support seeking (Connor-Smith and Flachsbart, 2007).

Stress and lack of perceived control are found to be important morbidity factors in a previous study among NCCP patients (Rosenbaum et al., 2012). Living with chronic chest pain may generate overwhelming stressors for the individual and, in turn, create significant challenges in terms of adaptive coping demands. Turk's biopsychosocial model of pain indicates that coping can modulate pain. However, limited attention has been given to how coping styles as factors can influence pain perception among people with NCCP and how the individuals' coping styles may mediate the link between emotional instability and the experience or interpretation of chest pain symptoms. Knowledge about how coping styles may mediate this link could help target interventions.

There is some empirical support for the existence of several primary dimensions of coping. These dimensions can be organized into two higher-order categories: engagement and disengagement coping. Disengagement coping involves disengaging the individual from the person/environment

transaction (Tobin et al., 1989). Previous research shows that emotional instability is positively related to disengagement coping (Carver and Connor-Smith, 2010). In NCCP patients, disengagement coping are likely to imply different forms of avoidance in order to avoid the experience of pain or heart attack. However, instead of relief from pain, avoidance coping are likely to deprive the person from learning that they can carry out also physically strenuous activities without experiencing pain, and thus result in maintained worry and perceived physical limitations. On the other hand, engagement coping implies that individuals engage in active efforts to control, manage, or change stressful circumstances as well as to manage emotional responses to the stressor (Tobin et al., 1989). Support seeking and acceptance are coping styles included in engagement coping (Carver and Connor-Smith, 2010).

Acceptance of the life situation including the possibility of experiencing pain could reduce worry and improve how the individual deals with the experience of pain (Carver et al., 1989). Previous research suggests that this type of acceptance is particularly difficult for people with NCCP (Dumville et al., 2007) and that this may be one reason why they continue to worry about their health and the experience of chest pain. Moreover, accepting the possibility of experiencing pain and avoiding a strong focus on the possibility of pain are likely to be more difficult for people with higher scores on emotional instability (Carver and Connor-Smith, 2010).

Seeking support is another important form of engagement coping. Support, both from family and health services, is usually used to obtain information and to interpret symptoms positively. From this perspective, seeking support could contribute to a decrease in illness worry and improve the ability to carry out daily activities despite the possibility of experiencing chest pain. However, seeking support may also reflect increased concerns about what the experienced bodily symptoms may indicate, and could increase the likelihood that some individuals continue to worry about their chest pain. In that regard, it is relevant to note that emotional instability is found to be linked to more seeking of emotional support (Carver and Connor-Smith, 2010). Yet, a previous meta-analysis suggests that emotional instability, on average, is unrelated to coping by the seeking of social support (Connor-Smith and Flachsbart, 2007). The role of support seeking in the experience of chest pain among NCCP patients is poorly understood and therefore important to explore.

### *Aims of the study*

The main aim of this study was to (1) examine the relationship of emotional instability with illness worry and PLCP and (2) investigate to what degree any associations are mediated by the following chest pain–related coping styles: acceptance, seeking emotional support, seeking instrumental support, and avoidance.

## Methods

This study was conducted in an out-patient cardiac clinic in a city in Norway and is part of a larger longitudinal study. It was approved by the Norwegian Regional Ethic Committee (reference no. 2009/2243) and conducted in accordance with the Declaration of Helsinki. All the participants volunteered and were able to withdraw at any time.

### Subjects and recruitment

All patients who were referred to an out-patient clinic for an investigation of new onset chest pain were invited to participate in this study. Inclusion criteria were the following: (1) new onset, non-acute chest pain; (2) age more than 18 years; (3) ability to read and communicate in Norwegian; and (4) ability to give informed consent. Exclusion criteria were the following: (1) previously diagnosed with heart disease, (2) no symptoms of chest pain, (3) cardiac investigation as part of pre-surgical procedure, (4) pregnancy, (5) participation in other studies, and (6) life-threatening disease.

A total of 282 patients were recruited; 59 were excluded based on inclusion and exclusion criteria or because they missed their appointment. In all, 115 patients (of 223) refused to participate (51.4%). The number of patients included in this study was 108 (48.6%). Of these patients, 4 had a positive test result, and 10 had an inconclusive test result. The sample for this study included 94 participants, and all had a negative test result. The response rate is a challenge among NCCP patients, but the response rate in this study is in line with that of other studies conducted among this group of patients (Kisely et al., 2012).

The employees in the clinic recruited the patients based on the inclusion and exclusion criteria. The patients received information about the study and a questionnaire together with an appointment at the cardiac investigation. The questionnaire had to be completed before the appointment and was collected at the visit. The employees at the clinic were called to remind them about the study 2–5 days before their appointment. When they arrived, they were once again checked against the inclusion and exclusion criteria, and written informed consent was collected. They all underwent both echocardiogram and electrocardiogram (ECG)-stress test as a part of the investigation. Before they left the clinic, they received the results of the tests and answered five questions about the extent to which they had been reassured. The characteristics of the patients are presented in Table 1. The mean duration of chest pain was 17 months, ranging from 1 to 96 months.

### Measures

**PLCP.** To measure the patients' PLCP, eight items from The Medical Outcomes Study Pain Measurement (McDowell, 2006) and the Seattle Angina Questionnaire (Spertus

**Table 1.** Characteristics of the patients included in the study (N=94).

Variable	Years	% (n)
Age (mean ± SD)	51.2 ± 12.6	
Gender		
Women		56.4 (53)
Men		43.6 (41)
Employed		72.3 (68)
Sick leave or disability pension because of chest pain		4.3 (4)
Previously investigated for chest pain		54.3 (51)

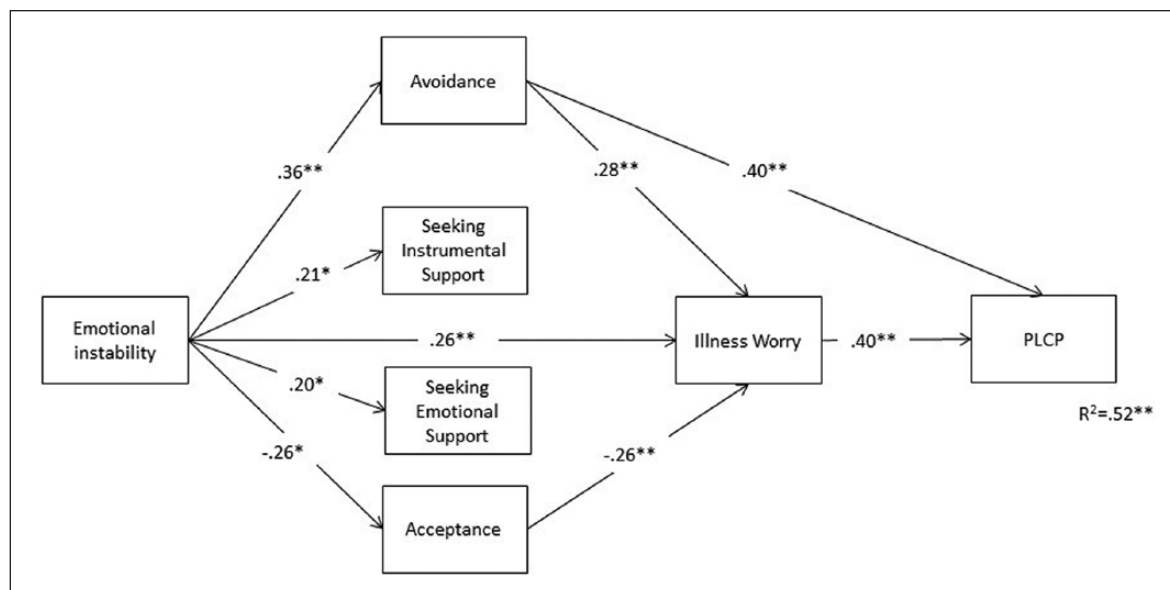
SD: standard deviation.

et al., 1995) were selected. The participants were asked to indicate the extent of limitations they had experienced due to chest pain during the previous 4 weeks. Items concerned limitations regarding various daily activities, and how the pain had affected their sleep and mood. The items were rated on a 5-point scale, from 1 = not at all to 5 = extremely, and were answered before the appointment. Factor analyses with principle axis extraction and eigenvalue set to 1.0 for these items resulted in a one factor solution that accounted for 57.3 percent of variance in items. Results from the factor analysis indicate that the items included in the scale measuring PLCP assess a uniform concept. Cronbach's  $\alpha$  for the scale was .88.

**Illness worry.** To investigate chest pain-related worries, we used two items from the Reassurance Questionnaire (Donkin et al., 2006) and one item from the Brief Illness Perception Questionnaire (Broadbent et al., 2006). The scale based on these three items yielded high internal consistency ( $\alpha = .89$ ), and a factor analysis with eigenvalue set to 1.0 gave a one factor solution (explained variance = 82.5%), indicating that the scale measured a uniform concept. The items included were as follows: (1) "How worried are you about your health?" (2) "To what extent do you believe you have a serious illness?" and (3) "How concerned are you about your chest pain?"<sup>1</sup> All of these items were rated on a 10-point scale, ranging from 0 = not at all to 10 = very much, and were answered before the appointment.

**Emotional instability.** Emotional instability was assessed by using the neuroticism subscale from the Eysenck Personality Questionnaire (Eysenck and Eysenck, 1975). This scale consists of 22 items and is scored according to a yes-no format. Scoring range is 22–44, a higher score indicating more emotional instability. Cronbach's  $\alpha$  of the scale for the sample used in this study was .88.

**Coping.** Chest pain-related coping styles were assessed using four subscales from the COPE Scale (Carver et al.,



**Figure 1.** Results of the path analysis.

Note that only statistically significant coefficients are given, and that all coefficients are adjusted for the control variables age and gender.

1989): Acceptance, Seeking Instrumental Support, Seeking Emotional Support, and Disengagement. The subscale for Disengagement was modified to suit the context of this study, two items were removed, and a new item was added. The items included in this subscale were the following: “I’ve avoided activities that can lead to chest pain,” “I’ve given up trying to live a normal life,” and “I have become less active due to chest pain.” This shifted the content of this scale toward coping by avoidance, and the included measure was therefore labeled Avoidance. The introduction to the scale on coping was modified to relate the items to coping with chest pain. Additionally, some items were modified to assure that coping-related chest pain was assessed. The original response alternatives were used, and items were scored on a 4-point scale ranging from 1 = never to 4 = often.

A factor analysis yielded a four factor solution that was in accordance with the intended grouping of items but suggested that one item from instrumental support should be included in the subscale for emotional support. However, the original solution from Carver et al. (1989) was chosen. The factor analysis with principle axis extraction and the number of factors set to four accounted for 67.9 percent of the total variance. The explained variances and Cronbach’s  $\alpha$ s for the factor-based indexes were as follows: Seeking Instrumental Support: 7.1 percent,  $\alpha = .73$ ; Seeking Emotional Support: 31 percent,  $\alpha = .81$ ; Acceptance: 19.7 percent,  $\alpha = .88$ ; and Avoidance: 10.1 percent,  $\alpha = .73$ .

**Control variables.** Previous research on NCCP showed that those who sought treatment had higher rates of NCCP, were more likely to be women, were younger, and had higher levels of self-reported anxiety (Huffman and Pollack,

2003). Therefore, age and gender were included as control variables. Gender was coded: 1 = women and 2 = men.

### Procedures and statistical analyses

Data were collected from 2012 to 2013 by using self-report. IBM SPSS version 21.0 software was used to conduct the statistical analyses (SPSS, 2012). The selected statistical procedures were descriptive analyses, reliability testing (Cronbach’s  $\alpha$ ), factor analysis, product-moment correlations, and multiple regression analysis. Path analysis was conducted by performing three multiple regression analyses in which the variables for chest pain-related coping styles, illness worry, and PLCP were regressed on the variables to the left in the path model depicted in Figure 1. The missing values varied from 0 to 6.5 percent. The missing values were replaced with the mean score for the variable.

### Results

The bivariate relationships between the variables are given in Table 2. Scores for Emotional instability were moderately to strongly positively correlated with scores for Illness worry and PLCP. Emotional instability also showed significant positive associations with scores for Avoidance and Seeking Emotional Support and a negative correlation with Acceptance. The strongest bivariate correlations were computed for the associations of Seeking Emotional Support with Seeking Instrumental Support, Avoidance with PLCP, and Illness worry with PLCP. Moreover, correlational analysis revealed tendencies for older patients and women to have lower scores on Illness worry and Avoidance.



**Table 2.** Pearson correlations between the measures Age, Gender, Emotional instability, Acceptance, Seeking Emotional Support, Seeking Instrumental Support, Avoidance, Illness worry, and Perceived limitations due to chest pain (PLCP) ( $N=94$ ).

Variables	Age	Gender	Emotional instability	Acceptance	Seeking Emotional Support	Seeking Instrumental Support	Avoidance	Illness worry
Gender	-.42 <sup>a</sup>							
Emotional instability	-.08	-.09						
Acceptance	-.08	-.02	-.22 <sup>b</sup>					
Seeking Emotional Support	-.07	-.12	.24 <sup>b</sup>	.02				
Seeking Instrumental Support	-.12	.05	.19	.07	.63 <sup>a</sup>			
Avoidance	-.27 <sup>a</sup>	.20 <sup>b</sup>	.36 <sup>a</sup>	.04	.47 <sup>a</sup>	.33 <sup>a</sup>		
Illness worry	-.30 <sup>a</sup>	.22 <sup>b</sup>	.44 <sup>a</sup>	-.29 <sup>a</sup>	.23 <sup>b</sup>	.23 <sup>b</sup>	.45 <sup>a</sup>	
PLCP	-.14	.15	.37 <sup>a</sup>	-.09	.20 <sup>b</sup>	.17	.58 <sup>a</sup>	.52 <sup>a</sup>

<sup>a</sup>Correlation is significant at the .01 level (two-tailed).

<sup>b</sup>Correlation is significant at the .05 level (two-tailed).

The results from the path analysis are given in Figure 1. Age and gender were controlled for in the analyses. The results from the path analysis showed that most of the associations of Emotional instability with Illness worry and PLCP were mediated by coping styles. The link from Emotional instability to PLCP via Avoidance yielded the strongest indirect association. The results reflected a tendency for those with high scores for emotional instability to report more avoidance, which in turn was associated with more illness worry and PLCP. Moreover, there was a moderate tendency for high scores on Emotional instability to be associated with low scores for Acceptance, which in turn was related to lower scores on Illness worry. Variables assessing the seeking of support did not mediate the relationship between Emotional instability and Illness worry and PLCP. The regression equation accounted for 52 percent of the variance in PLCP.

## Discussion

To the best of our knowledge, no previous studies have investigated the associations between emotional instability, coping styles, illness worry, and PLCP in NCCP patients. This study might therefore provide new and important information about the role of emotional instability and coping styles in NCCP.

The results from the correlation analyses showed moderate to strong relationships between Emotional instability and Illness worry and between Emotional instability and PLCP. These results are in accordance with the general findings of individuals who score high on emotional instability to have more worries and to report more bodily symptoms (Costa and McCrae, 1987; Rosmalen et al., 2007; Watson and Pennebaker, 1989) as well as to report more chest pain than others (Costa et al., 1982). Moreover, a previous study among cardiac patients suggested that those

with high scores for emotional instability reported lower health-related quality of life (Van den Berg et al., 2005). In this study, Emotional instability was found to be indirectly related to PLCP via Illness worry. This finding is likely to indicate that individuals with a higher score on emotional instability experience more limitations due to chest pain because they restrict their activity and are prone to believe that such activity may have serious negative effect on the health, despite the fact that such activity most likely will improve their health condition.

Emotional instability can influence coping styles, which in turn influence outcomes (Carver and Connor-Smith, 2010). Previous research indicates that more emotionally instable individuals tend to use more passive or disengagement coping styles when dealing with stressful life-events and that such disengagement coping predicts poorer outcomes (Carver and Connor-Smith, 2010; Lahey, 2009). This has, however, not been investigated among people with NCCP. The main purpose of this study was thus to examine the mediating role of coping styles in the relationship between emotional instability and health outcomes expressed by illness worry and PLCP among NCCP patients. Results from the path analysis indicate that disengaged or avoidant coping mediate the relationship of Emotional instability with both Illness worry and PLCP. These findings may suggest that more emotionally instable NCCP patients are prone to avoid activities they fear can elicit chest pain. Moreover, this type of avoidant behavior may reduce opportunities to learn that activities could be performed without chest pain, and is likely to maintain an irrational belief that these activities could lead to a serious health condition. This type of belief and coping could seriously reduce the quality of life among more emotionally instable persons experiencing chest pain. The results showed a moderate negative association between Emotional instability and Acceptance, which is in accordance with a

previous report (Connor-Smith and Flachsbart, 2007), and that Acceptance coping style mediated the association of Emotional instability with Illness worry, which in turn was related to PLCP. Accepting their condition is difficult for NCCP patients, and this leads to continued worry. Findings indicate that this is especially so for more emotionally instable patients. Results from this study suggest that it is important to identify more emotionally instable patients, and give priority to helping them accept their condition and encourage them to maintain or resume their normal activities.

Coping by support seeking could provide patients with information that could reduce worry, but it could also contribute to maintaining worry because of the persistent focus on the possible health threats the chest pain may signal. In this study among NCCP patients, there was a slight tendency for more emotionally instable patients to seek more support. However, the seeking of support was unrelated to chest pain-related worry and limitation. These findings are interesting because this factor concerns a core challenge among NCCP patients. Many people with NCCP continue to seek medical help for their perceived condition without being reassured that they do not have a serious somatic condition. Findings suggest that the type of support seeking that NCCP patients perform is not likely to be beneficial to them.

The correlational analyses also indicate that men tend to use more avoidant coping and to be more worried by their chest pain. Generally, men have a tendency to use more avoidant coping styles, which in turn may be more adaptive in handling everyday stress (Krohne, 1996). An explanation for this phenomenon could be that chest pain due to heart disease, such as myocardial infarction, is still viewed as a male condition, and women might interpret their chest pain as a less severe symptom (Granot et al., 2004).

Several limitations must be acknowledged. First, this study is cross-sectional, which means that caution is necessary if causality is inferred. Second, data are based on self-report, and reporting bias may have influenced results. Third, approximately 50 percent of the eligible patients did not participate in this study. Low participation rate is common in research among this patient group (40%–60%) (Hicks et al., 2014; Kisely et al., 2012) and may represent a validity problem. Yet, as relationships are assumed to be linear, we do not have reason to believe that a low participation rate has affected results in a significant way. However, more research is needed in order to make firm conclusions.

## Conclusion

The findings support the opinion that higher score on emotional instability is associated with NCCP patients' illness worry and their PLCP. Moreover, findings show that these associations are mediated by the coping styles acceptance and avoidance. Findings suggest that more emotionally instable patients need to be identified and given special

attention. They should be carefully informed about possible causes of their chest pain and how they best can adapt to their condition. Reliable information may help them better understand and accept their situation and contribute to decreased illness worry as well as less PLCP. Moreover, these patients are likely to benefit from opportunities to expose themselves to situations and activities they usually avoid, preferably in a safe and supervised environment. Such experience may help them to learn that normal daily activity and even strenuous physical activity is no danger to but rather promotes their health.

Based on the findings in this study, future considerations for interventions among NCCP patients should also involve stress management techniques. Mindful techniques or cognitive behavioral interventions to reduce worry and accept the chest symptom as unharmed could be helpful (Querstreet and Cropley, 2013).

## Acknowledgements

The authors are very grateful to the participants who took part in this study. They would also like to thank the employees at Sentrum Hjerteklinikk for their contribution in recruiting participants and Professor Paul Stevens for valuable comments on an earlier draft of this manuscript.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## Note

1. In this study, we chose to use the term *chest pain* instead of *illness*, as was used in the original scale.

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