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Assessment section

## Perceived health following myocardial infarction: cross-validation of the Health Complaints Scale in Danish patients

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### Abstract

With an ageing population and a decline in cardiac mortality rates, the number of patients with cardiac disease is increasing, which in turn poses a major challenge for secondary prevention. For this end, appropriate, sensitive, and validated instruments to assess health complaints and quality of life are required. The objectives of the current study were: (1) to cross-validate the Health Complaints Scale (HCS) in a Danish sample of patients with a first myocardial infarction (MI); and (2) to investigate whether perceived health, as measured by the HCS is related to cardiac disease severity. The HCS was originally developed in Belgian patients with coronary artery disease. One-hundred-and-twelve consecutive patients with a first myocardial infarction were assessed by means of a questionnaire four to six weeks post infarction. Clinical measures were sampled from medical records. The factor structure of the HCS and the internal consistency of the Somatic Complaints ( $\alpha = 0.91$ ) and Cognitive Complaints subscales ( $\alpha = 0.94$ ) were confirmed. The construct validity of the scale was confirmed against measures of psychopathology and personality. Patients scored significantly higher on the HCS Somatic and Cognitive scales as compared with self-reports of depression and anxiety ( $p < 0.0001$ ). Health complaints were unrelated to severity of cardiac disease and rather reflected subjective perception of quality of life. These findings show that the HCS is a valid instrument that is equally applicable in Danish cardiac patients to monitor perceived health as a major component of quality of life. © 2002 Elsevier Science Ltd. All rights reserved.

*Keywords:* Coronary artery disease; Health Complaints Scale; Myocardial infarction; Quality of life; Validation

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## 1. Introduction

Health complaints have been associated with impaired quality of life (QOL) (Pocock, Henderson, Seed, Treasure, & Hampton, 1996) and mortality in patients with coronary artery disease (Shekelle, Vernon, & Ostfeld, 1991). Somatic health complaints are often considered to directly reflect the severity of underlying cardiac disorder, but symptoms like fatigue have been found to be unrelated to disease severity (Kop, Appels, Mendes de Leon & Bär, 1996).

In order to identify cardiac patients with health complaints, who may be at risk of recurrent cardiac events, sensitive measures are required. Although standard measures of psychopathology may be useful to identify high-risk patients, cardiac health complaints constitute disease specific aspects that are not reflected in these measures. Moreover, standard measures may be less sensitive to assess outcome following cardiac rehabilitation, whereas measures developed in and tailored specifically to cardiac patients may be more sensitive to detect such a change (Denollet, 1993).

The objectives of the present study were: (1) To cross-validate the Health Complaints Scale (HCS) in a Danish sample of consecutive patients with a first myocardial infarction (MI). (2) To examine whether health complaints and perceived health as measured by the HCS reflect the severity of underlying cardiac disease.

## 2. Methods

### 2.1. Sample

Consecutive patients with a first MI were recruited from August 1999 to January 2001 from Aarhus University Hospital, and Horsens Hospital, Denmark. Patients were assessed four to six weeks post-MI. A diagnosis of MI was based on increased levels of troponin T ( $>0.10$   $\mu\text{g/l}$ ) and ECG changes, according to the most recent guidelines (Joint European Society of Cardiology/American College of Cardiology Committee, 2000). Ethical approval was obtained from the ethical committees in Aarhus and Vejle Municipalities, and the study was conducted in accordance with the Helsinki Declaration. Exclusion criteria were: Other life-threatening diseases, cognitive impairments, history of psychiatric disorders, and inability to understand and read Danish. Of 164 patients screened for inclusion in the study, 3 were excluded and 12 were not approached due to personnel error. Of the remaining 149 patients, 37 (25%) refused to participate. Thus, analyses are based on 112 patients (30% female; mean age =  $60 \pm 9.7$  years; 87% married). Responders were compared with non-responders, but no statistically significant differences were found on gender, age, left ventricular ejection fraction (LVEF), angina pectoris, and treatment with beta-blockers.

### 2.2. Measures

Clinical variables, i.e. LVEF (a measure of cardiac disease severity), angina pectoris, and treatment with beta-blockers were obtained from medical records.

The HCS is a 24-item questionnaire designed to reflect 5 core symptom clusters pertinent to cardiac patients (Denollet, 1994). The somatic subscale (12 items) represents 'cardiopulmonary',

'fatigue' and 'sleep' problems, and the cognitive subscale (12 item) represents 'health worry' (anxious concern about health) and 'illness disruption' (the extent to which the illness interferes with one's life). The scale has five answer categories from 0 (not at all) to 4 (extremely), yielding a score range of 0–48 for the subscales and 0–96 for the total scale. A higher score reflects more impaired health. The HCS measures symptoms that are related to but distinct from psychopathology. It is sensitive to detect change following rehabilitation (Denollet, 1994), and has been used as a measure of QOL (Denollet, Vaes, & Brutsaert, 2000).

Measures of psychopathology and personality were included to examine the construct validity of the HCS. Anxiety and depression were assessed by the Trauma Symptom Checklist (TSC) (Briere & Runtz, 1989). Neuroticism and extroversion were assessed by the short version of the Eysenck Personality Questionnaire (Sanderman, Arrindell, Ranchor, Eysenck, & Eysenck, 1995). Negative affectivity (the tendency to experience negative emotions) and social inhibition (the tendency to inhibit the expression of emotions) were assessed by the Type D Scale-16 (Denollet, 1998). The psychometric properties of all scales have proven satisfactory.

### 2.3. *Statistical analyses*

Principal components analysis (varimax rotation; scree plot criteria) was used to examine the internal-structural validity of the Danish HCS, and Cronbach's alpha was calculated to determine the internal consistency of the subscales. Pearson's correlations and second-order factor analysis of scale scores were used to examine the construct validity of the HCS. Paired *t*-tests were used to examine differences in mean scores between the HCS scales and the depression and anxiety scales of the TSC. Since both instruments have a different range of scores, scores with a range of 0–100 were extrapolated in the following manner:  $HCS = \text{scale scores}/48 \times 100$ ;  $TSC = \text{scale score}/27 \times 100$ . Finally: ANOVA with a post-hoc Bonferroni test was used to investigate differences on somatic and cognitive complaints, and perceived health, in relation to three levels of cardiac disease severity. All analyses were performed using SPSS 9.0. for Windows.

## 3. Results

Prior to investigating the separate validity of the somatic and cognitive complaints subscales, we subjected all 24 items of the HCS to a factor analysis. We were able to confirm that the scale measures the five symptom clusters of 'cardiopulmonary problems', 'fatigue', 'sleep problems', 'health worry', and 'illness disruption' (results not shown).

Six items on the somatic complaints subscale were marked positively (score > 0) by the patients in at least 50% of the cases (Table 1). The mean frequency of a positive score on the subscale was 53%. The three-factor structure ('cardiopulmonary problems', 'fatigue', and 'sleep problems') of the subscale was confirmed. The internal consistency measured as Cronbach's alpha was 0.91. Ten items on the cognitive complaints subscale were marked positively (score > 0) by the patients in at least 50% of the cases (Table 2). The mean frequency of a positive score on the subscale was 61%. The two-factor structure ('health worry' and 'illness disruption') of the subscale was confirmed, although compared with the results of Denollet (1994), items 9 and 10

Table 1

Frequency of endorsement, factor loadings, and internal consistency of the Somatic Health Complaints Subscale

Items of the HCS	Frequency of endorsement (%)		Factor analysis <sup>a</sup>			Internal consistency <sup>b</sup>
	Current study <sup>c</sup>	Denollet (1994) <sup>d</sup>	Factor I	Factor II	Factor III	
A1. Restless sleep	61	64	0.21	0.20	<b>0.85</b>	0.63
A2. Tightness of chest	63	50	<b>0.76</b>	0.27	0.10	0.58
A3. Feeling of not being rested	64	57	0.15	<b>0.75</b>	0.43	0.72
A4. Fatigue	86	69	0.16	<b>0.89</b>	0.18	0.68
A5. Trouble falling asleep	42	60	0.18	0.20	<b>0.90</b>	0.64
A6. Inability to take a deep breath	21	43	<b>0.75</b>	0.24	0.08	0.55
A7. Stabbing pain in heart or chest	31	36	<b>0.83</b>	0.02	0.25	0.55
A8. Exhausted without reason	62	49	0.29	<b>0.84</b>	0.12	0.68
A9. Shortness of breath	41	51	<b>0.76</b>	0.19	0.11	0.54
A10. Pain in heart or chest	48	52	<b>0.83</b>	0.15	0.19	0.60
A11. Feeling weak	76	66	0.21	<b>0.86</b>	0.20	0.70
A12. Feeling you can't sleep	41	49	0.16	0.27	<b>0.91</b>	0.70
		<b>eigenvalue</b>	<b>I = 2.00</b>	<b>II = 1.90</b>	<b>III = 1.49</b>	<b>α = 0.91</b>

<sup>a</sup> Items assigned to a factor are written in bold

<sup>b</sup> Corrected item-total correlations

<sup>c</sup> Mean = 53%

<sup>d</sup> Mean = 54%

loaded on the 'health worry' cluster rather than on 'illness disruption'. The internal consistency of the subscale measured as Cronbach's alpha was 0.94.

Significant positive correlations were found between the subscales of the HCS, anxiety, depression, neuroticism, and negative affectivity, respectively (Table 3, correlation matrix). The maximum shared variance was found between the HCS subscales and the anxiety and depression subscales of the TSC. The overlap between the HCS subscales and neuroticism/negative affectivity was less than between the HCS and the TSC subscales. Neither extroversion nor social inhibition was significantly correlated with somatic and cognitive complaints. A second-order factor analysis further corroborated that the HCS subscales are related to measures of psychopathology, but distinct from the personality traits neuroticism/negative affectivity and extroversion/social inhibition (Table 3, factor analysis).

As presented in Fig. 1, paired *t*-tests showed that patients scored significantly higher on somatic complaints compared with depression (mean difference (SD) = 9.9 (14.0);  $t(107) = 7.36$ ,  $p < 0.0001$ ) and anxiety (mean difference (SD) = 16.8(16.2);  $t(100) = 10.40$ ,  $p < 0.0001$ ). Patients also scored significantly higher on cognitive complaints compared with depression (mean difference (SD) = 15.1(20.0),  $t(107) = 7.83$ ,  $p < 0.0001$ ) and anxiety (mean difference (SD) = 21.8(21.3);  $t = 10.30$ ,  $p < 0.0001$ ). There was no significant difference on somatic ( $p = 0.661$ ) and cognitive complaints ( $p = 0.304$ ) according to disease severity as measured by LVEF.

Table 2

Frequency of endorsement, factor loadings, and internal consistency of the Cognitive Health Complaints Subscale

Items of the HCS	Frequency of endorsement (%)		Factor analysis <sup>a</sup>		Internal consistency <sup>b</sup>
	Current study <sup>c</sup>	Denollet (1994) <sup>d</sup>	Factor I	Factor II	
B1. Bad health is the biggest problem in life	60	51	<b>0.66</b>	0.49	0.77
B2. Not being able to work fluently	56	66	0.36	<b>0.76</b>	0.70
B3. Being afraid of illness	63	59	<b>0.84</b>	0.19	0.73
B4. Able to take on more work formerly	63	78	0.07	<b>0.73</b>	0.44
B5. Feeling blocked in getting things done	70	75	0.36	<b>0.76</b>	0.70
B6. The idea that you have a serious illness	72	52	<b>0.88</b>	0.22	0.79
B7. Feeling you are not able to do much	58	70	0.52	<b>0.73</b>	0.82
B8. Something serious is wrong with body	63	56	<b>0.83</b>	0.37	0.84
B9. No longer worth as much as used to be	47	76	<b>0.70</b>	0.38	0.72
B10. Feeling despondent	51	49	<b>0.57</b>	0.51	0.69
B11. Worrying about health	76	71	<b>0.85</b>	0.24	0.77
B12. All worries over if physically healthy	49	52	<b>0.66</b>	0.37	0.70
		<b>eigenvalue</b>	<b>I = 7.28</b>	<b>II = 1.10</b>	<b>α = 0.94</b>

<sup>a</sup> Items assigned to a factor are written in bold

<sup>b</sup> Corrected item-total correlations

<sup>c</sup> Mean = 61%

<sup>d</sup> Mean = 63%

#### 4. Discussion

These findings confirm the validity of a Danish version of the HCS in post-MI patients. We were able to replicate the internal-structural validity of the HCS, the internal consistency of the somatic and cognitive subscales, and its construct validity against measures of psychopathology and personality. Although there was some overlap with the latter measures, the shared variance was less than 50%. Overall, these results corroborate that the Danish HCS measures symptoms that are related to but distinct from psychopathology, as proposed by Denollet (1994).

It is noteworthy that patients scored significantly higher on the somatic and cognitive subscales than on measures of psychopathology, and that these differences were substantial. Patients perceived scale items as highly relevant to their situation with mean endorsements of 53% and 61% on the somatic and cognitive subscales, respectively. These endorsements are similar to those found by Denollet (1994). Hence, the addition of measurements of health complaints to standard distress measures may provide a more accurate picture of the overall well-being of cardiac patients. The results also imply that the effects of intervention may be more easily detected when using health complaints as the outcome measure. Standard distress scales do not necessarily cover issues pertinent to cardiac patients, which results in low scores at baseline and a floor effect that may impede sensitive outcome assessment (Denollet, 1993). The HCS has been demonstrated to be sensitive to detect change following cardiac rehabilitation (Denollet, 1994).

Table 3  
Construct validity of the subscales of the Health Complaints Scale

	Intercorrelation Matrix								Factor Analysis <sup>a</sup>		
	1	2	3	4	5	6	7	8	I	II	III
1. HCS Somatic complaints	–								<b>0.93</b>	0.15	–0.03
2. HCS Cognitive complaints	0.76**	–							<b>0.83</b>	0.27	0.06
3. TSC Depression	0.69**	0.61**	–						<b>0.79</b>	0.30	–0.02
4. TSC Anxiety	0.65**	0.60**	0.60**	–					<b>0.64</b>	0.55	–0.01
5. EPQ Neuroticism	0.37**	0.45**	0.45**	0.57**	–				0.23	<b>0.90</b>	0.02
6. EPQ Extroversion	0.12	0.03	0.07	0.06	–0.06	–			0.12	–0.02	<b>–0.86</b>
7. DS16 Negative affectivity	0.41**	0.53**	0.48**	0.56**	0.56**	–0.16	–		0.39	<b>0.72</b>	0.28
8. DS16 Social inhibition	0.09	0.10	0.03	0.17	0.09	–0.48**	0.28**	–	0.11	0.13	<b>0.84</b>

\*\*Correlation is significant at the 0.01 level (two-tailed)

<sup>a</sup> Items assigned to a factor are written in bold

HCS: Health Complaints Scale

TSC: Trauma Symptom Checklist

EPQ: Eysenck Personality Questionnaire

DS16: Type D Scale-16

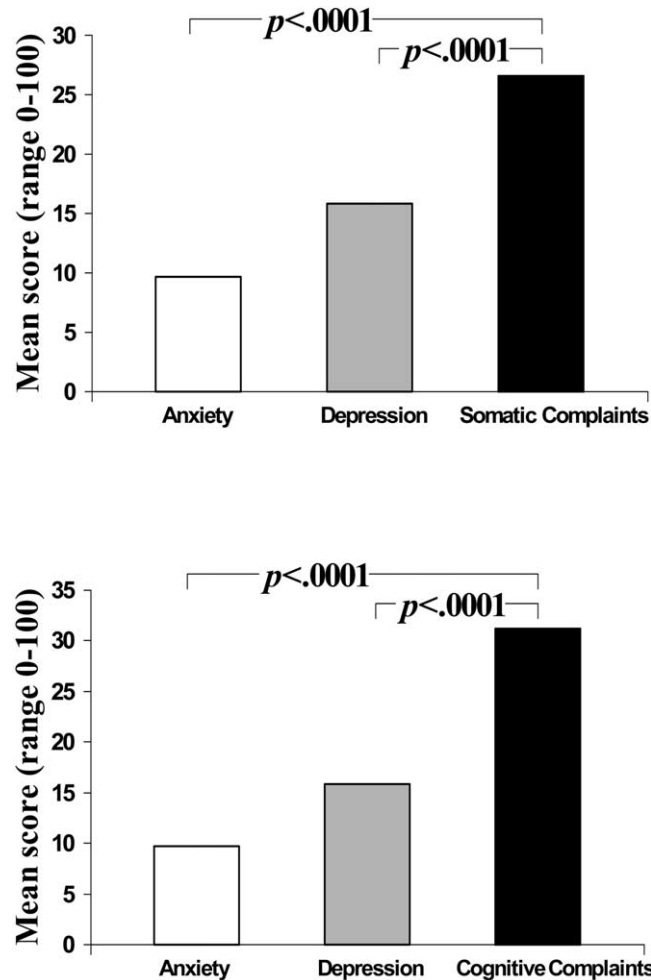


Fig. 1. Mean differences on measures of psychopathology and health complaints.

We found no relationship between cardiac disease severity and health complaints. This suggests that somatic and cognitive symptoms are not likely to be a product of underlying cardiac pathology. Health complaints like fatigue and exhaustion have also been found to be unrelated to the severity of cardiac disease (Kop, Appels, Mendes de Leon & Bär, 1996), and to be less influenced by cardiac intervention than might be expected (Pedersen & Middel, 2001). In addition, given the relationship between health complaints and increased risk of morbidity and mortality (Denollet, et al., 2000; Domburg van, Pedersen, Van den Brand & Erdman, 2001), clinicians have a useful and valid instrument with which to identify patients at risk of recurrent events and impaired QOL. Thus, self-reported health measures could play a pivotal role in secondary prevention.

The results of this study should be interpreted with caution due to the inclusion of only one measure of disease severity. Personality factors, such as neuroticism, may also have influenced the reporting of health complaints, which has been indicated in other studies (Shekelle, Vernon & Ostfeld, 1991). Nevertheless, neuroticism accounted for a maximum of 20% of the variance in



health symptoms in the current study. The sample size was also relatively small, but claims of the appropriate ratio of subjects to variables to use in factor analysis has varied considerably from 10:1 to 2:1 and it has been suggested that this ratio is less important than the ratio of subjects to factors (Arrindell & Ende van der, 1985).

In conclusion, the validity of the HCS was confirmed in a Danish sample of consecutive patients with a first MI. The HCS is a relatively brief and valid instrument that assesses two types of health symptoms and overall health as perceived by the patient. Thus, the HCS is a worthwhile tool to include in cardiovascular research and outcome assessment. It may also serve as a screening instrument for patients at risk of recurrent events and impaired QOL together with measures of psychopathology, since the combination of distress and health complaints measures is likely to capture most of the symptoms experienced by cardiac patients.

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### Appendix. Health Complaints Scale (Danish version)

Nedenfor finder du en række problemer eller klager, som syge mennesker ofte har. Læs venligst hvert spørgsmål og sæt en cirkel omkring det for dig rigtige tal i forhold til, hvor meget hvert problem har generet dig i den sidste tid. Besvar hvert spørgsmål ud fra nedenstående skala.

0=overhovedet ikke; 1=en smule; 2=moderat; 3=en del; 4=meget

**I hvilken grad har de følgende specifikke problemer generet dig i den sidste tid:**

- |  |           |
|--|-----------|
| 1. Vågnet op om natten eller har ikke kunnet finde hvile | 0 1 2 3 4 |
| 2. Haft en trykkende fornemmelse i brystet               | 0 1 2 3 4 |
| 3. Haft en følelse af ikke at være udhvilet              | 0 1 2 3 4 |

**I hvilken grad har de følgende generelle problemer generet dig i den sidste tid:**

- |   |           |
|---|-----------|
| 1. Følt, at dit dårlige helbred er det største problem i dit liv                    | 0 1 2 3 4 |
| 2. Været ude af stand til at arbejde og dyrke fritidsinteresser, når du gerne ville | 0 1 2 3 4 |
| 3. Været bange for sygdom   | 0 1 2 3 4 |

4. Lidt af træthed	0 1 2 3 4	4. Haft en fornemmelse af, at du var i stand til at få meget mere fra hånden tidligere	0 1 2 3 4
5. Haft problemer med at falde i søvn	0 1 2 3 4	5. Haft en fornemmelse af, at du ikke kan tage dig sammen til at gøre ting	0 1 2 3 4
6. Været ude af stand til at tage dybe vejrtrækninger	0 1 2 3 4	6. Tænkt, at du lider af en alvorlig sygdom	0 1 2 3 4
7. Haft knivskarpe smerter i hjertet eller brystet	0 1 2 3 4	7. Følt, at du ikke længere kan ret meget	0 1 2 3 4
8. Følt dig udmattet uden grund	0 1 2 3 4	8. Tænkt, at der er noget alvorligt galt med din krop	0 1 2 3 4
9. Haft problemer med at få vejret	0 1 2 3 4	9. Følt, at du ikke længere er så meget værd	0 1 2 3 4
10. Haft smerter i hjertet eller brystet	0 1 2 3 4	10. Følt dig modløs	0 1 2 3 4
11. Følt, at du ingen energi har	0 1 2 3 4	11. Bekymret for dit helbred	0 1 2 3 4
12. Følt, at du ikke kan sove	0 1 2 3 4	12. Tænkt, at alle dine sorger ville forsvinde, hvis du var ved fysisk godt helbred	0 1 2 3 4

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