The construct validity of the Illness Cognition Questionnaire: the robustness of the three-factor structure across patients with chronic pain and chronic fatigue

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Abstract

Background: The Illness Cognition Questionnaire (ICQ) (29) assesses three ways of cognitively evaluating the stressful and aversive character of a chronic illness: helplessness, acceptance and perceived benefits.

Purpose: To evaluate the construct validity of the ICQ in individuals with chronic pain and patients with chronic fatigue.

Method: The ICQ was administered to 821 individuals with chronic pain and 295 patients with chronic fatigue. Confirmatory factor analyses were performed to assess the hypothesized three-factor structure, containing the factors “helplessness”, “acceptance” and “perceived benefits”. A multi-group analysis was performed to investigate the stability of the factor structure in both groups.

Results: Results confirmed the three-factor structure in the two samples. The factor structure was invariant across individuals with chronic pain and chronic fatigue.

Conclusion: As the three-factor structure provided a good fit in both groups, we confirm the usefulness of the subscale scores in research and clinical practice.

Keywords: Chronic pain ; Chronic fatigue ; Factor structure ; Illness Cognition Questionnaire (ICQ)

1. Introduction

Medically unexplained symptoms, including many forms of chronic pain and chronic fatigue, often have a negative impact on quality of life, affecting physical, psychological, cognitive and social domains of functioning (1,2). Symptom severity is often insufficient to fully explain their adverse effects upon functioning. Many variables have been identified that may hinder or promote adjustment to a life with chronic symptoms, such as self-efficacy, coping strategies and illness beliefs (3,4). Although there is a wide variety of Illness beliefs and cognitions (5,6,7) that are relevant for the adjustment to chronic symptoms, in this paper we focus upon the three generic constructs of helplessness, acceptance and experienced benefits of illness.

Some studies found evidence for the beneficial effects of perceived control over symptoms (8,9). Conversely, the repeated experience of lack of control over aversive events may result in helplessness (10). In line with this, several studies have found that a perceived lack of control is associated with unfavourable outcomes in chronic pain conditions (11,12).

Although there is merit in the idea that having control over symptoms may be associated with better adjustment, research in this respect has yielded inconclusive results (13). As an example, it has been found that attempting to control or solve pain when actual control is low, may increase fear, worry, catastrophic thinking and hypervigilance (14,15). In some situations, abandoning the struggle to control symptoms and accepting the illness may be more adaptive. This idea has been much less studied than the role of perceived control. Nonetheless, acceptance is part of several coping models (16,17,18). It has been found that patients who are accepting of pain reported

less depression, anxiety and disability (19). In a questionnaire study in chronic pain patients, Viane et al (20) showed that acceptance was related to better psychological but not physical well-being. In agreement with the above findings, research in patients with chronic fatigue has pointed out that acceptance was related to more emotional stability and less psychological distress (21).

To reduce the emotional strain of adversity, one can also try to make sense out of the losses the situation has caused. Rather than downgrading the importance of the blocked goal and accepting the constraints of the situation, one can give a new, positive evaluation to the aversive situation. Affleck and Tennen (22) were one of the first to underline the importance of "benefit finding" or seeing positive side-effects in otherwise aversive situations. It has already been found that these illness benefits buffer negative effects of perceived health stresses on subjective well-being (23).

Several self-report measures have been developed to assess the above reported concepts of helplessness, acceptance and benefit finding. Some of these instruments are symptom-specific (19,24,25) and, hence, do not allow comparisons between groups with different symptoms. An example of a disease-specific instrument is the Perceived Control and Benefits Questionnaire (25), designed to measure personal control and the perception of benefits in patients with chronic pain. Other measures assess the constructs in a trait-like fashion unrelated to specific situations such as chronic illnesses (26,27,28). For example, the COPE inventory (27) assesses coping strategies as relatively stable preferences. With this type of measures, situational influences or constraints may be easily overlooked.

Recently, the Illness Cognition Questionnaire (ICQ) has been developed as a generic measure of illness beliefs (29). The instrument consists of three subscales, i.e. helplessness, acceptance and perceived benefits. It allows comparison across chronic conditions. Furthermore, items and instructions are not formulated in a trait-like manner, potentially allowing to assess situational influences. Evers et al (29) investigated the psychometric properties (i.e. reliability and validity) of the ICQ. They conducted a principal components analysis with oblique rotation on ICQ scores derived from 263 patients with rheumatoid arthritis and obtained a three-factor solution accounting for 62% of the total variance. The factors were labelled Helplessness, Acceptance and Perceived Benefits. They also performed a confirmatory factor analysis on ICQ scores obtained from 167 patients with Multiple Sclerosis. Analyses indicated that the three-factor structure of the ICQ provided a satisfactory fit to the data. In sum, the ICQ showed a strong internal consistency, reliability, and good construct and predictive validity. Helplessness was associated with unfavourable changes, whereas acceptance and perceived benefits were related to beneficial changes in physical and psychological health on the long term.

Although the ICQ has shown good psychometric qualities, the question remains whether the factor structure can be replicated in patient groups with medically unexplained symptoms, such as chronic pain and chronic fatigue. Therefore, the aims of this study were twofold: First, we investigated the construct validity of the Illness Cognition Questionnaire by means of a confirmatory factor analysis in samples of individuals with chronic pain and chronic fatigue. Second, we investigated the stability of the factor structure

across the two groups using a multi-sample analysis. To invigorate further research and clinical practice, we provided norms for the subscales of the ICQ.

2. Method

2.1. Participants

Data were collected from two samples who completed the same Dutch version of the Illness Cognition Questionnaire (ICQ). For both samples, no data are available on response rate and reasons for non-participation. Additionally, participants received no reward for participation.

The first sample consisted of 871 Dutch individuals with chronic pain who were a member of one of two self-help groups. For fifty patients, some item scores were missing, reducing our sample to 821 patients (19% males; 81% females), aged between 19 and 99 (mean age = 50.75 years, *SD* = 10.4). The average pain duration was 183 months (*SD* = 131, range 12-732). Most patients reported pain at multiple sites (45.9%), or back pain (28.8%). The majority of the entire sample reported secondary education as highest education level (66.9%), whereas only small groups received either a lower education (6.5%) or a higher education (longer than the age of 18) (26.6%). Within the entire sample, the majority was married or living together (76.3%).

After reduction because of incomplete data, the second sample consisted of 295 Flemish chronic fatigue patients, who where on a waiting list for cognitive behavioural therapy, and fulfilled all the “Center for Disease Control and Prevention”-criteria for chronic fatigue syndrome (30). The sample consisted of 12.5% men and 87.5% women, aged between 18 and 64 (mean

age = 40.32 years, *SD* = 8). A small group reported a lower education as highest education level (8.3%), 56.3% had secondary education and 35.4% received a higher education.

2.2. Measures

2.2.1. Illness Cognitions

The ICQ (29) was used to measure helplessness, acceptance and perceived benefits. This is a 18-item questionnaire that contains three 6-item scales related to the factors helplessness, acceptance and perceived benefits, each with a scoring range of 6-24 (e.g., helplessness: “My illness limits me in everything that is important to me”, “My illness frequently makes me feel helpless”; acceptance: “I have learned to live with my illness”, “I can accept my illness well”; perceived benefits: “Dealing with my illness has made me a stronger person”, “My illness has taught me to enjoy the moment more”). Each item is answered on a 4-point Likert scale to the extent to which one agrees with the item (1 = *not at all*, 2 = *somewhat*, 3 = *to a large extent*, 4 = *completely*).

Exploratory factor analysis in a sample of patients with rheumatoid arthritis (*n* = 263) revealed a three-factor solution accounting for 62% of the variance. Confirmatory factor analysis in a sample of patients with multiple sclerosis (*n* = 167), has confirmed the assumed three-factor structure. Cronbach’s alpha demonstrated adequate internal consistencies for all scales, ranging from .84 to .91 in both samples. Pearson’s correlation coefficients between two administrations of the questionnaire with a 1-year time interval were all above .67, indicating good test-retest reliability for all scales in both samples. Evidence has also been found for good concurrent and predictive validity (29).

2.3. Analytical strategy

Confirmatory factor analyses were performed using AMOS 7.0 (31). The hypothesized three-factor structure was tested in the chronic pain sample. The chronic fatigue sample was used to cross-validate the structure. The fit of the model was estimated with the Maximum Likelihood algorithm while allowing the latent variables to correlate. Each item was assumed to load only on one factor. Subsequently, a multi-group analysis was carried out in order to examine the invariance of the factor structure across both groups. Model fit is usually evaluated using the χ^2 goodness-of-fit statistic and several fit indices (32). As recommended by Hu and Bentler (33), we used a strategy combining the following fit indices: the standardized version of Jöreskog and Sörbom's (34) root mean square residual (SRMR)(35) and the comparative fit index (CFI)(36).

The χ^2 goodness-of-fit statistic assesses the overall fit of the model and, in particular, whether a significant amount of observed covariance between items remains unexplained by the model. A significant χ^2 is indicative of a bad model fit. The main shortcoming of this fit index is its sensitivity to sample size. In a small sample, a poor fit may result in a χ^2 that is nonsignificant. Equally, it is also possible that in large samples, a good fit results in a statistically significant χ^2 (37). Therefore, for further interpretation, we rather looked at the fit index χ^2/df (CMIN/DF), which is the minimum sample discrepancy divided by the degrees of freedom. According to Marsh and Hovecar (38), CMIN/DF values between 2 and 5 represent a reasonable model fit.

The standardized version of the Jöreskog and Sörbom's (34) root mean square residual (SRMR) (35) is an absolute fit index, assessing how well an a priori model reproduces the sample data. Hu and Bentler (33) found that the SRMR is the most sensitive fit index for models with misspecified factor covariances. Values close to 0 suggest that the data fit the model.

To measure the proportionate improvement in model fit by comparing the target model with a baseline model, we used the comparative fit index (CFI). The CFI is one of the most sensitive indices to models with misspecified factor loading(s). The CFI usually ranges between 0 and 1, with values above .95 indicating a good fit (33).

We used a combination of indices to evaluate model fit, in particular CFI and SRMR. A model has a good fit when the CFI value is close to .95 or larger and when the SRMR value is close to .09 or lower. In line with Hu and Bentler (33), we used the following criteria: for a good model fit, CFI > .94 and SRMR < .09; for an adequate model fit, CFI > .90 and SRMR < .09; and for a poor model fit, CFI < .90 and SRMR > .09.

3. Results

3.1. Descriptive and Correlational Statistics.

Table 1 reports the means, standard deviations, internal consistencies of the subscales and Pearson correlation coefficients between the subscales of the Illness Cognition Questionnaire (ICQ). The internal consistencies of all subscales in the two groups were good (range = .81 - .91). Overall, the pattern of correlations amongst the subscales of helplessness, acceptance and perceived benefits was as expected. Helplessness was negatively related

to the two other constructs acceptance and perceived benefits respectively. However, the association with perceived benefits was less pronounced. In contrast, acceptance was positively related to perceived benefits. There were no significant age effects, except for a positive correlation between helplessness and age in chronic pain patients (r = .16, p < .001), indicating greater helplessness among older patients in the pain sample.

Table 1 about here

3.2. Confirmatory factor analyses

The standardized factor loadings of the three-factor model for the chronic pain and chronic fatigue sample are presented in Figure 2. As for the individuals with chronic pain, although results showed a significant χ^2 (χ^2 (df) = 683.176 (132), p < .001, CMIN/DF = 5.20*)*, the fit indices supported the adequate fit of the model (CFI = 0.93, SRMR = 0.06). In the chronic fatigue sample, we found significant overall fit (χ^2 (df) = 326.84 (132), p < .001, CMIN/DF = 2.48) of the three-factor model to the data. The fit indices indicated an adequate fit (CFI = 0.92, SRMR = 0.07). After inspection of the Modification Indices, a correlated residual between items 7 (“My illness makes me feel useless at times”) and 15 (“My illness frequently makes me feel helpless”) was detected in both samples. This finding indicates that these items have something in common, which is not reflected by the remaining items that load on the helplessness subscale. The residual may probably be due to content overlap between the items. In both samples, the model was refitted to the data, allowing a free estimation of the error covariance between

items 7 and 15. The improvement in fit provided by the model with residual correlation between items 7 and 15 was significant in individuals with chronic pain ($\Delta\chi^2_{(1)}$ = 71.37, p < 0.001, CMIN/DF = 4.70) and in individuals with chronic fatigue ($\Delta\chi^2_{(1)}$ = 27.90, p < 0.001, CMIN/DF = 2.30). After refitting the model, the three- factor structure had an adequate fit to the data, both in the chronic pain sample (CFI = 0.94, SRMR = 0.06) and in the chronic fatigue sample (CFI = 0.93, SRMR = 0.07). Inspection of the modification indices indicated that other minor improvements were possible in both samples. It was decided not to include these changes because of model parsimony.

Figure 1 about here

3.3. Invariance of the factor structure

To examine whether the three-factor structure is invariant across the two chronic conditions, a multi-group analysis was performed. A restrictive model (39), equating the number of factors, the factor loadings, the correlations between the factors and the error variances, was investigated. The overall fit showed was shown to be significant (χ^2 (df) = 1143.800 (303), p < .001, CMIN/DF = 3.78). The fit statistics for the restrictive model reflected an adequate fit to the data (CFI = 0.93, SRMR = 0.06).

3.4. Norms

Levene's Test for Equality of Variances was conducted in order to examine if equal variances could be assumed. Because equal variances were assumed for the subscale perceived benefits, we further used the t-test for equality of variances in order to analyze differences in scores. For the

subscales helplessness and perceived benefits, equality of variances could not be assumed. Therefore, we used a t-test for inequality of variances to analyze differences in scores in those subscales. Analyses revealed significant differences for the scores on helplessness (t(574.5) = -7.59, p < .001), acceptance (t(570.25) = 10.16, p < .001) and perceived benefits (t(1114) = 8.70, p < .001) between individuals with chronic pain (n = 821) and individuals with chronic fatigue (n = 295). As a result, separate norms were calculated for the two different chronic conditions (see Table 2).

When examining gender differences, we found a significant difference in scores on acceptance (t(731) = 2.68, p < .01), with men scoring higher (M=14, SD=4) then women (M=13, SD=4). Scores on helplessness (t(731) = .144, *ns*) and perceived benefits (t(272.42) = -.64, *ns*) did not differ between the two sexes. To investigate whether the gender effect for acceptance was due to the type of medically unexplained complaint (chronic pain versus chronic fatigue), we performed an (Group x Gender) ANOVA upon the subscale acceptance. The ANOVA showed a significant effect of Group, F(1,729) = 25.032, p < .001. The main effect of gender was not significant, F(1,729) = 1.113, p = .29. There was also no interaction effect between condition and gender, F(1,729) = 0.087, p = .77. Results seem to indicate that there is no effect of gender on acceptance.

Table 2 about here.

4. Discussion.

The present study investigated the construct validity of the Illness Cognition Questionnaire (29) using CFA in two different samples, namely individuals with chronic pain and individuals with chronic fatigue. Furthermore, the invariance of the factor structure across the two groups was examined using a multi-group analysis.

The goodness-of-fit indices of the three-factor solution indicated an adequate fit to the data in both samples. Furthermore, although the chronic pain and chronic fatigue samples differed with regard to the mean scores on the subscales, the factor structure proved to be invariant across the two samples. It seems likely to assume that equivalent illness beliefs, reflected by the subscales of the ICQ, are tapped in both conditions. To our knowledge, the current study is the first to support the invariance of the factor structure of the ICQ across different samples with medically unexplained symptoms.

Concerning the psychometric properties of the Illness Cognition Questionnaire, results demonstrated adequate internal consistencies for all scales. Intercorrelations between the scales were in line with the expectations and at the same time insignificant to moderate, which revealed their content validity. Based on these findings, we confirm the usefulness of the subscale scores in research and clinical practice. Our norms may be used to describe patient samples in terms of the illness cognitions. Differences in cognitions can be expected between samples from different settings. Furthermore, clinicians may use the upper quartile cut off scores of the illness cognitions for screening and diagnostic purposes.

The results of this study have a number of implications. First, they give support to the idea that the ICQ is an instrument that can be used for individuals with different medically unexplained symptoms. Second, although there are large differences in nature and experience of complaints between chronic pain and chronic fatigue, the ICQ seems to assess the same processes of illness beliefs. Thus, differences in subscale scores between those samples are rather quantitative than qualitative in nature. Third, our results are in line with the idea that acceptance and perceived benefits play a role in the adaptation to uncontrollable symptoms. We endorse the view of Rothermund (40) stating that, although somewhat neglected in the past, we cannot overlook the importance of disengagement and acceptance in situations where control is low or nonexistent.

The strength of the current study lies in the large sample size for both the chronic pain and chronic fatigue group. That way, the study has adequate statistical power and results in more accurate estimates of the statistics. There are a number limitations to this study. First, more studies are needed in individuals with chronic pain and chronic fatigue to investigate whether the results generalize to other samples and to investigate the relationships between the ICQ scales and health related outcomes. Second, prospective studies are needed to examine the predictive validity of the ICQ scales in long-term adaptation to chronic illness. Third, the stability over time (i.e., test-retest reliability) was not investigated in the present study and should be looked upon in future studies. Fourth, further research may examine if certain illness beliefs are involved in the maintenance of chronic suffering. There is evidence that, in chronic pain patients, repeating attempts to control or solve

the pain problem may fuel negative consequences (14). Beliefs related to the loss of control, like helplessness, may be more prominent in patients who continuously fail in finding a solution for their symptoms, like pain or fatigue. Conversely, the acceptance of illness may buffer against the adverse impact of symptom severity. Finally, research is needed to investigate to what extent treatment is able to change these cognitions, and to what extent these changes mediate treatment success.

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Table 1
Means (*M*), standard deviations (*SD*), internal consistency (α), Pearson correlation coefficients and their 95% confidence intervals among ICQ subscales: Helplessness, Acceptance and Perceived benefits.

	M (SD)	α	2	3
Chronic pain				
1. Helplessness (ICQ)	14.52 (*4.30*)	.88	-.48***[-.53;-.43]	-.07[-.14;0]
2. Acceptance (ICQ)	14.60 (*4.13*)	.91	-	.44***[.38;.50]
3. Perceived Benefits (ICQ)	15.02 (*4.31*)	.83	-	-
Chronic fatigue				
1. Helplessness (ICQ)	16.57 (*3.86*)	.83	-.53*** [-.61;-.45]	-.29***[-.39;-.18]
2. Acceptance (ICQ)	11.95 (*3.73*)	.90	-	.48***[.39;.57]
3. Perceived Benefits (ICQ)	12.50 (*4.09*)	.81	-	-

Notes. ICQ = Illness Cognition Questionnaire
* $p < .05$ ** $p < .01$ *** $p < .001$.

Table 2

Deciles and quartiles for the chronic pain (*n* = 821) and chronic fatigue sample (*n* = 295).

	Chronic pain			Chronic fatigue		
	Helpless-ness	Acceptance	Perceived benefits	Helpless-ness	Acceptance	Perceived benefits
Deciles						
10	9	9	9	7	11.6	7
20	11	11	11	8	13	9
30	12	12	12	10	14	10
40	13	13	14	11	16	11
50	14	14	15	12	17	12
60	15	16	16	12	18	13
70	17	17	17	13.2	19	15
80	18	18	19	15	20	16
90	21	20	21	17	22	18
Quartiles						
25	11	12	12	9	13	9
50	14	14	15	12	17	12
75	18	18	18	14	19	15

Figure 1

Standardized factor loadings as obtained with confirmatory factor analysis shown for chronic pain patients and patients with chronic fatigue (between parentheses).