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ORIGINAL ARTICLE

The Norwegian versions of the Chronic Pain Acceptance Questionnaire CPAQ-20 and CPAQ-8 – validation and reliability studies

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ABSTRACT

Purpose: The aim of this study was to test the validity and reliability of the translated Norwegian version of the Chronic Pain Acceptance Questionnaire (CPAQ-20) and the shorter version CPAQ-8 based on the same data.

Method: The sample consisted of 120 women with chronic widespread musculoskeletal pain (CWP). The respondents completed CPAQ-20 and visual analogue scales (pain, fatigue, sleep problems and depression), General Health Questionnaire-12, The Pain Catastrophizing Scale, Fibromyalgia Impact Questionnaire and SF-8. Confirmatory factor analyses were performed on a one-factor baseline model, the previous validated CPAQ-20 and CPAQ-8 models, as well as an exploratory generated model based on the current sample.

Results: The two-factor model of CPAQ-20 and a two-factor model of CPAQ-8 obtained adequate model fit and outperformed the baseline model. The exploratory factor, analysis-generated two-factor model obtained only a marginally better fit, supporting the two-dimensional model of CPAQ-20. CPAQ-20 and CPAQ-8 had Cronbach's alphas between 0.75 (Pain Willingness subscales both versions) and 0.85. Both scales correlated significantly in the hypothesised direction with all the other scales.

Conclusion: The Norwegian versions of CPAQ-20 and CPAQ-8 are reliable assessment tools with good construct validity for measurement of acceptance. Future studies should validate the scales in other Norwegian samples.

➤ IMPLICATION FOR REHABILITATION

- CPAQ-20 and CPAQ-8 are valid Norwegian instruments for measuring acceptance of pain.
- Acceptance of pain is an important process in the rehabilitation of persons with chronic widespread pain.
- Treatment models supporting acceptance can now be developed and measured further in Norway.

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Introduction

Chronic musculoskeletal pain (CWP) of diffuse origin affects a considerable part of the population and at significant cost. Two large-scale surveys indicate that approximately 30% of the adult population in Norway suffers from chronic pain [1,2] and this percentage mirrors international rates.[1,2] The impacts of chronic pain on daily life are many and can be severe, including emotional distress, reduced mobility and physical activity, disturbed sleep, damaged social relationships and restricted work or school performance.[3] Furthermore, musculoskeletal disorders are the most frequent cause of visits to the doctor, work absence and disability in Norway, and are thus a significant economic burden.[4]

In a recent paper, McCracken & Morley [5] present and discuss the dominant models for understanding and treatment of CWP. Based in behavioural learning theory, Cognitive Behavioural Therapy (CBT) extended the behavioural model of pain [6] and included focus on how thoughts and feelings influence behaviour. Several reviews and meta-reviews document the effect of CBT-interventions,[7,8] but the effects remains small to moderate and there is a need for improvement of interventions.[9] The "Fear avoidance model" (FA) has been the dominant model for understanding pain and pain disability.[10] A promising model for treating and supporting persons with CWP is based on behavioural contextual models of CWP,[11–13] especially promoting psychological flexibility (PF).[5] Further developments of the models are suggested to improve treatment and support of persons with chronic pain.[5] To do that, valid instruments measuring the proposed working mechanisms are needed.

The aim of the PF-model underlying acceptance and commitment therapy in treatment of pain is to support valued living and to facilitate increased functioning in the presence of chronic pain and distress. Within the PF-model, acceptance is regarded as one of the key processes/competences and is a way of engaging in goal-directed activities without trying to control or avoid negative feelings as well as the pain entailed in having CWP.[5] It is also a valuable construct in understanding individual differences in functioning with chronic pain.[5,14–19]

The Chronic Pain Acceptance Questionnaire (CPAQ) was developed in 1992 [20] and further revised in 2004 to become the currently used CPAQ-20 version.[17] CPAQ-20 has two subscales. The subscale *Activities Engagement (AE)* reflects the degree to which one participates in activities in the presence of pain. The *Pain Willingness (PW)* subscale assesses the degree to which one allows pain to be present without attempting to control or avoid it.

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Based on psychometric properties, including content construct and criterion validity, internal consistency, agreement, reliability, responsiveness, floor/ceiling effects and interpretability, CPAQ-20 is currently evaluated as the best measure of acceptance of pain compared to three other instruments.[21] The instrument has been shown to have adequate psychometric characteristics, and the two-factor structure has been replicated in German,[22] Cantonese,[23] Spanish,[24] Korean,[16] Finnish,[17] Persian [18] and Swedish [25] versions. Furthermore, both the total and subscale scores have proved to be strongly related to multiple measures of physical, emotional and social functioning across a wide range of studies, which have included cross-sectional and prospective designs in the contexts of both assessment and treatment.[21] A short version consisting of eight of the items has also been shown to be valid and reliable.[26–29]

In Sweden, CPAQ-20 is included in the Swedish Quality Registry for Pain rehabilitation. To promote acceptance as a measure in pain rehabilitation practice in Norway, a validated Norwegian version of CPAQ-20 is needed. The aim of this study is to investigate the reliability and validity of CPAQ-20 and CPAQ-8 in a Norwegian setting following the COSMIN criteria.[30,31] We will test a CPAQ-20 one-factor baseline model, the original 20 item version (CPAQ-20) by McCracken et al.,[17] as well as test an exploratory generated factor model based on the current sample. We will also test the eight-item, two-factor structure (CPAQ-8) suggested by Fish et al. [26] in the data from the same sample. The factor structure of the translated version will be examined with confirmatory factor analysis (CFA) based on Structural Equation Modelling (SEM).[32] Second, the correlations between the CPAQ and different measures of patient functioning will be investigated. Our hypotheses are (1) that CFA will replicate the two-factor structure found in other studies with CPAQ-20 and CPAQ-8, and that CPAQ-20 and CPAQ-8 will (2) be reliable and (3) show satisfying concurrent validity.

Methods

Design and patients

The sample in this validation study participated in a randomised controlled trial (RCT).[33,34] Of the total of 140 women consecutively sampled with CWP of diffuse origin included in the RCT, 120 patients had the full data sets that were needed to perform the intended psychometric analyses. The patients were recruited from a rehabilitation centre between February 2009 and September 2010. Further information pertaining to recruitment, the sample and the effect of the intervention and follow-up until 1 year after is provided in the publications from the study. The aim of the RCT was to test an after-care intervention with 4-week, web-based counselling inspired by ACT at home after participating in a 4-week, in-house multidimensional rehabilitation program.[33,34] The participants filled in self-administered questionnaires at arrival and at several subsequent intervals (1 month, 2 months, 6 months and 1 year) to evaluate the effect of the RCT.

The inclusion criteria were being female, having widespread pain like fibromyalgia syndrome (IPCS codes CD-10, 79.0 – coded) for at least 3 months, older than 18 years, able to understand Norwegian, and able to use a smartphone. The exclusion criterion was having substantial psychological problems in need of treatment with intensive psychotherapy. Those who fulfilled the criteria to participate in the study received information about the study on beforehand accordance with the Declaration of Helsinki, the study was approved by the Rehabilitation Centre, recommended by the Regional Committee for Medical Research Ethics in Norway and approved by the Norwegian Social Science Data Service. All participants gave informed consent.

Measurement tools

CPAQ-20

The Chronic PAin Acceptance Questionnaire (CPAQ), consisting of 20 items, is a descriptive scale with items scored on seven-point rating scales (from 0 – never true to 6 – always true). Following the scoring procedure of McCracken et al.,[17] a single total score was calculated on the nine reverse-keyed items of the subscale Pain Willingness (PW), and the other 11 items measuring Activities Engagement (AE). The maximal possible total score for all 20 items is 120, with a higher score indicating higher levels of acceptance.[17]

Translations of the CPAQ-20 followed usual guidelines for cross-cultural adaption and translation.[35] Initial translation of the CPAQ was performed independently of this study by two Norwegian researchers (the first author was one) both of whom were familiar with the topic of research. The researchers first translated the questionnaire independently before discussion led to a consensus on the translation. The items were translated back by another bilingual researcher to ascertain that the Norwegian version reflected the same item content as the original version. Any differences between translators were resolved by mutual agreement and in dialogue with the author of CPAQ-20 (Lance McCracken) who consented to the translation and to the Norwegian version tested in this study. Cognitive interviews were performed with five persons who have had CWP for many years (both male and female; age range from 40 to 65). Cronbach's alpha for CPAQ-20 in other studies is between 0.78 and 0.86 for the total scale and for AE 0.89 and PW 0.83.

CPAQ-8

Based on psychometric testing, the shorter version containing eight items was tested out in an Internet survey.[26] Subsequent to this, three other papers were published presenting validation data on the eight-item version; one by the original developer,[27] one in a Swedish sample[28] and the last one in an Australian sample.[29] We have tested the same eight items in the current sample.

Pain Catastrophizing Scale

The Pain Catastrophizing Scale (PCS) is a 13-item self-report scale designed to assess the catastrophizing cognitions of individuals.[36] In the PCS, respondents reflect on past painful experiences and indicate the degree to which they experience a number of thoughts or feelings when experiencing pain. The items are rated on a scale from zero to four, and are grouped in three different categories: rumination (four items), magnification (three items) and helplessness (six items). In this study, only the total score was used. Total score range was from 0 to 52, where higher scores indicate a larger degree of pain catastrophizing by patients. Pain catastrophizing is related to various levels of pain, physical disability and psychological disability in clinical and non-clinical populations.[37]

General Health Questionnaire

The General Health Questionnaire (GHQ-12*)* with 12 items was used [38] with modified response alternatives. Emotional distress over the previous couple of weeks is measured. Respondents rated distress levels on a four-point scale ("much less than usual" to "much more than usual"). The bimodal scoring method was used

(symptom present more than usual = 1, absence of symptom or present as usual = 0). Total score range is from 0 to 12, indicating the number of symptoms present more frequently than usual during the last 2 weeks.

Fibromyalgia Impact Questionnaire

The original Fibromyalgia Impact Questionnaire (FIQ) was used to measure the impact of fibromyalgia on functioning and symptom levels during the previous week.[39] It consists of ten questions with different response options. One question includes ten sub-items related to the ability to perform activities of daily living with response alternatives given on a four-point scale. The other questions enquire about general wellbeing, ability to work and level of pain, fatigue, stiffness and symptoms of anxiety and depression. Questions on symptom level are answered using a VAS from 0 to 100 (high symptom level). The score range is 0 to 100; higher scores indicate greater impairment.

Short-Form Health Survey

Short-Form Health Survey (SF-8) with eight items was used to measure physical and mental functioning. The items are scored on five- or six-point Likert scales, regarding level of functioning during the previous week. Summary measures for the mental and physical health components were obtained using SF-8 Scoring Software 4.5^{TM}.[40] Higher scores indicate better functioning; scores above 50 indicate functioning above the average in the US population.

Finally, the questionnaire contained items concerning age, education and time since pain onset. These variables were scored as a continuous variable (in years). Furthermore, the questionnaire contained four visual analogue scales (VAS) concerning pain, depression, fatigue and sleep problems. The VAS consists of a 10-cm-long straight line, the tips of which represent the parameters for the intensity of symptoms (e.g. none to unbearable). The patients estimate intensity of pain, sleep problems, fatigue and depression experienced.

Testing of the CPAQ-20 and CPAQ-8

Face validity

Face validity was assessed during the cognitive interview by asking patients with chronic pain whether they thought that the test could adequately measure their pain acceptance.

Structural validity

The data were analysed using the IBM Statistical Package for the Social Sciences (SPSS), for Windows version 22.0 (SPSS Software Inc., Chicago, IL).[41] Descriptive analyses (mean, *SD*, range) were performed to assess the socio-demographic and clinical characteristics of respondents. Frequency distributions were examined for each item of the CPAQ in order to identify extreme skewness or limited variability. Next, structural equation modelling (SEM) was performed using a covariance-based approach with weighted least squares estimation. LISREL version 8.71 (Scientific Software International, Inc., Skokie, IL) was utilised to perform SEM and the following values indicated acceptable model fit [42]: Chi-square to the Degrees of Freedom ratio (χ^2/df ratio) $\leq$ 3:1, Normed Fit Index (NFI) $>$ 0.90, Non-Normed Fit Index (NNFI) $>$ 0.90, comparative Fit Index (CFI) $>$ 0.90 and Root Mean Square Error of Approximation (RMSEA) $\leq$ 0.10. Our strategy was to test and compare four different models: (1) a baseline 20 item model (i.e. single-factor structure), (2) the two-factor, 20-item model endorsed by McCracken et al. [17], (3) the two-factor, eight-item model endorsed by Fish et al. [26] and (4) our own exploratory, factor-analysis generated model.

Internal consistency

Internal consistency was evaluated and Cronbach's alpha was used to evaluate the internal consistency of the CPAQ-N20, CPAQ-N8 and the subscales pain willingness (PW) and activity engagement (AE). Cronbach's alpha reflects the homogeneity of the items and was calculated for each subscale separately and for the total score. Cronbach's alpha of 0.7 is widely recognised as the minimum necessary for group comparisons although 0.8 has been cited in recent years. For individual comparisons, 0.9 is the minimum recommended.[43]

Construct validity

Construct validity was determined by correlating the CPAQ-20 and CPAQ-8 total sum and subscale score sums to Norwegian versions of the above-mentioned instruments and comparing the results with those obtained from studies of other versions of the CPAQ. Only correlations of $p < (0).001$ were considered significant. Missing data were excluded by analyses. The number of respondents (N) is therefore different in different tables.

As the VAS-scores, GHQ-12 and PCS reflect health status, psychological and emotional distress (catastrophizing) in patients with chronic pain, it is anticipated that higher CPAQ-20 scores will result in low scores on the other scales, resulting in a negative correlation. FIQ reflect functioning with pain and other fibromyalgia-related symptoms and we hypothesised a negative correlation with CPAQ. SF8 has a positive direction of the scale – a higher score indicating better mental and physical health – and was expected to correlate positively with a higher degree of acceptance.

Furthermore, confirmatory factor analyses (CFA) based on structural equation modelling (SEM) were carried out as part of the validity test. Because there was no other Norwegian instrument measuring acceptance, criterion validity was not tested.

Results

Characteristics of the respondents

Of the 140 persons attending the rehabilitation programme at the centre (half of the randomly chosen participants in the intervention study), 120 respondents had full datasets to be used in the current study. Of the 20 not included, seven respondents had incomplete datasets due to problems with the administration of the questionnaire that resulted in patients receiving only half of the items in the questionnaires to be filled inn. Thirteen respondents chose to drop out of the study and did not complete the questionnaires on the follow-up measurements. The average age of the respondents was 44.1 years (*SD* 10.0). On average, the patients had suffered from pain for 14.1 years. On average, the sample scored 61.8 (*SD* 20.1, range 8–100) on the VAS concerning pain intensity. Furthermore, the education level was 13.2 years on average. The characteristics of the respondents and the scores on the other instruments are shown in Table 1.

Face validity, descriptive information and items statistics of the CPAQ-20 and CPAQ-8

The persons taking part in the cognitive interviews confirmed the face validity of the questions in CPAQ-20.

In the rehabilitation centre study, 87 (71.9%) respondents completed the CPAQ-20 without missing any items and only four

Table 1. Overview participants scores on the different measures and correlations between CPAQ-N20, CPAQ-N8 and demographic and health variables.

Variables	Mean (SD/range/*N*)	CPAQ-20 Total	Correlation AE	Correlation PW	Correlation CPAQ-8
Demographics					
Age	44.1 (10.0/18–69/118)	0.32**	0.34**	0.07	0.19*
Education level[a]	13.2 (3.0/8–22/113)	0.11	0.13	0.02	0.06
Pain duration[b]	14.1 (10.5/1–56/114)	−0.07	0.01	−0.15	−0.02
Health measures					
GHQ-12	20.2 (20.2/9–30/101)	−0.43**	−0.31**	−0.38**	−0.39**
PCS	20.9 (9.9/3–45/119)	−0.48*	−0.32**	−0.56**	−0.51**
SF8-mental	39.3 (9.9/9.9–56.5/119)	0.42**	0.31**	0.41**	0.38**
SF8-physical	33.9 (7.4/17.4–52.8/119)	0.38**	0.36**	0.28**	0.39**
FIQ-sum	58.1 (16.4/13.7–88.3/120)	−0.59**	−0.54**	−0.43**	−0.54**
VAS-pain	61.8 (20.1/8–100/119)	−0.34**	−0.30**	−0.28**	−0.25**
VAS-sleep problems	55.5 (24.4/0–100/119)	−0.28**	−0.27**	−0.20*	−0.31**
VAS-fatigue	66.2 (22.9/5–100/120)	−0.35**	−0.31**	−0.19	−0.21*
VAS-depression	33.0 (28.7/0–100/119)	−0.33**	−0.31**	−0.21*	−0.29**

*Pearson's *r* is significant at $p = 0.05$ level (2-tailed).
**Pearson's *r* is significant at $p = 0.01$ level (2-tailed).
[a]$N = 88$ in the correlation analyses.
[b]$N = 89$ in the correlation analyses.
Abbreviations: AE: Activity Engagement subscale (11 items); PW: Pain Willingness subscale (9 items); VAS: Visual Analogue Scale; GHQ-12: General Health Questionnaire (12 items); FIQ: Fibromyalgia Impact Questionnaire; PCS: Pain Catastrophizing Scale.

(3.31%) did not answer any of the 20 items. Item 19, "It is a relief to realise that I don't have to change my pain to get on with my life", had the lowest response rate, with 15 (12.5%) missing values. The frequency distributions for the CPAQ-20, however, showed no items with significantly skewed distribution. Most of the items had a satisfactory item to scale correlation above 0.40. Descriptive information for individual items and item-to-scale statistics are shown in Table 2.

The internal consistency measured by Cronbach's alpha for the total CPAQ-N20 was 0.85, whereas Cronbach's alpha for the subscales AE and PW were 0.83 and 0.75, respectively. Cronbach's alpha for CPAQ-8 was 0.81 (Table 2).

The total mean score of the CPAQ-20 was 55.0 (SD 14.5, range 18–94). This amounted to a mean item rating of 2.82, which most closely corresponds with the middle of the 0–6 scale, and the rating category "Sometimes true" for the average acceptance item. The mean for the subscales of activities engagement and pain willingness were 33.1 (SD 9.5, range 9–58) and 22.2 (SD 7.9, range 4–38), respectively. The mean score of the CPAQ-8 was 23.5 (SD 7.4, range 6–48).

Exploratory factor analysis

With the objective of generating a sample-based model to test with SEM analysis, we performed a semi-exploratory factor analysis (EFA). SPSS was used to perform EFA on a 20-item model with a fixed number of factors set to two. We used maximum likelihood estimation with direct oblimin rotation. Each single item generated a factor loading on each of the two factors. The strongest factor loading of these two indicated the specific factors that were associated with each respective item. Table 3 shows the item patterns from the EFA analysis, i.e. named as the exploratory sample model. The factor loadings shown in Table 3 are from the SEM test of the EFA model.

Structural equation modelling

LISREL was used to perform SEM on a single 20-item model (i.e. a baseline model), a two-factor 20-item model,[17] a two-factor, eight-item model [17] and finally our own exploratory factor analysis-generated model (Table 3). The single factor model showed fit values below the level of acceptable fit (Table 4), while the three other models showed acceptable model fit on at least two out of five fit indices. Only the two-factor, eight-item model showed acceptable model fit on all indices. However, it is common that LISREL models seldom show adequate fit values in all the indices.[44] As shown in Table 3 (cf. the exploratory sample model), the EFA generated a factor solution that was comparable with the model generated by McCracken et al.[17] Only three out of 20 items loaded on the wrong factor if we compare with McCracken et al.[17] This marginal deviation in item patterns in CPAQ-20 by McCracken et al. [17] and "our model", together with a marginal difference in model fit, led us to conclude that CPAQ-20 is a valid measurement model. CPAQ-8 is better than CPAQ-20 based on a comparison of model fit, but this is not a valid comparison as long as these two models are based on different numbers of items.

Validity of CPAQ-20 and CPAQ-8

Correlation analyses (Persons *r*, 2-tailed) were used to assess the relationship between the CPAQ-20, CPAQ-8 and the other instruments, and the results are summarised in Table 1. The total score of the CPAQ-20, the subscale activities engagement and CPAQ-8 had significant correlations in the expected direction with all of the other psychometric instruments at *p* values of <0.001. The pain willingness scale also had significant correlations with the scales and the VAS scale depression, but no correlation with the other VAS-scales. This indicates that greater acceptance of pain, participation in activities and pain willingness were significantly associated with lower reported levels of general health, pain catastrophizing, function (FIQ) and mental and physical functioning (SF-8). Furthermore, high levels of pain acceptance and activities engagement are associated with lower levels of reported pain, depression, sleep problems and fatigue (Table 1).

There was no significant association between CPAQ-20 total score and pain duration or education level of the respondents. However, the age of the respondents was correlated to CPAQ-20 ($r = 0.33$, $p = 0.001$); in addition, age correlated significantly with the AE subscale (0.35, $p = 0.001$), suggesting that there is an association between age and acceptance of pain (Table 1).

Sensitivity of the scales

The regression analysis showed that CPAQ-8 explained 85% of the variance in CPAQ-20 with a Beta coefficient of 0.92 ($p = 0.00$).

Table 2. Item statistics for the chronic pain acceptance questionnaire.

		Single item statistics		CPAQ-20		ITC CPAQ-8			ITC CPAQ-20		
		N (%)	Mean (SD) range	Mean	SD	Total	AE	PW	Total	AE	PW
1 (1)	I am getting on with the business of living no matter what my level of pain is.	119 (99.2)	4.13 (1.24) 1–6	4.19	1.22	0.511	0.474		0.498	0.482	
2	Life is going well, even though I have chronic pain.	119 (99.2)	3.48 (1.21) 0–6	3.41	1.17				0.525	0.572	
3	It is OK to experience pain.	119 (99.2)	2.13 (1.29) 0–6	2.09	1.31				0.207	0.232	
4	I would gladly sacrifice important things in my life to control this pain better.	117 (97.5)	2.42 (1.57) 0–6	2.35	1.50				0.274		0.418
5	It is not necessary for me to control my pain in order to handle my life well.	116 (96.7)	2.34 (1.50) 0–6	2.31	1.50				0.520	0.583	
6 (2)	Although things have changed, I am living a normal life despite my chronic pain.	118 (98.3)	3.07 (1.47) 0–6	3.00	1.45	0.564	0.646		0.527	0.648	
7	I need to concentrate on getting rid of pain.	119 (99.2)	2.71 (1.59) 0–6	2.70	1.61				0.071		0.273
8	There are many activities I do when I feel pain.	120 (100)	3.05 (1.50) 0–6	3.06	1.48				0.303	0.311	
9 (3)	I lead a full life even though I have chronic pain.	118 (98.3)	2.87 (1.50) 0–6	2.81	1.49	0.615	0.682		0.685	0.736	
10	Controlling pain is less important than any other goals in my life.	114 (95.0)	3.02 (1.49) 0–6	2.86	1.53				0.547	0.410	
11	My thoughts and feelings about pain must change before I can take important steps in my life.	111 (92.5)	2.84 (1.49) 0–6	2.78	1.47				0.382		0.362
12	Despite the pain, I am now sticking to a certain course in my life.	116 (96.7)	3.71 (1.46) 0–6	3.73	1.48				0.419	0.524	
13 (4)	Keeping my pain level under control takes first priority whenever I am doing something.	117 (97.5)	2.76 (1.39) 0–6	2.73	1.36	0.467		0.596	0.395		0.507
14 (5)	Before I can make any serious plans, I have to get some control over my pain.	120 (100)	2.73 (1.48) 0–6	2.80	1.49	0.685		0.664	0.596		0.486
15 (6)	When my pain increases, I can still take care of my responsibilities.	119 (99.2)	2.89 (1.33) 0–6	2.89	1.33	0.482	0.565		0.534	0.573	
16	I will have better control over my life if I can control my negative thoughts about pain.	113 (94.2)	2.35 (1.37) 0–6	2.32	1.43				0.315		0.503
17 (7)	I avoid putting myself in situations where my pain might increase.	120 (100)	2.35 (1.42) 0–6	2.26	1.48	0.455		0.459	0.435		0.422
18 (8)	My worries and fears about what pain will do to me are true.	112 (95.0)	2.67 (1.50) 0–6	2.55	1.41	0.395		0.460	0.429		0.519
19	It is a relief to realise that I do not have to change my pain to get on with my life.	105 (87.5)	2.73 (1.60) 0–6	2.74	1.61				0.542	0.521	
20	I have to struggle to do things when I have pain.	118 (98.3)	1.45 (1.25) 0–6	1.41	1.28				0.450		0.336
Cronbach's alpha						0.81	0.78	0.75	0.85	0.83	0.75
N				88		109	114	112	88	94	102

Table 3. Factor loadings for alternative CPAQ models.

		CPAQ-20 (two-factor)		CPAQ-8 (two-factor)		Exploratory sample model (two-factor)	
Item	CPAQ-20 (Single factor)	Activities engagement	Pain willingness	Activities engagement	Pain willingness	Activities engagement	Pain willingness
CPAQ1	0.58	0.57		0.56		0.58	
CPAQ2	0.62	0.66				0.65	
CPAQ3	0.28	0.28				0.26	
CPAQ4	0.36		0.46				0.52
CPAQ5	0.61	0.62				0.62	
CPAQ6	0.69	0.78		0.79		0.74	
CPAQ7	0.15		0.36				0.37
CPAQ8	0.39	0.39				0.39	
CPAQ9	0.77	0.81		0.81		0.80	
CPAQ10	0.61	0.56					0.64[a]
CPAQ11	0.47		0.53				0.55
CPAQ12	0.49	0.54				0.56	
CPAQ13	0.45		0.64		0.72		0.53
CPAQ14	0.62		0.69		0.92	0.57[a]	
CPAQ15	0.56	0.59		0.59		0.60	
CPAQ16	0.35		0.53				0.60
CPAQ17	0.44		0.46		0.42	0.43[a]	
CPAQ18	0.48		0.65		0.45		0.61
CPAQ19	0.51	0.52				0.53	
CPAQ20	0.49		0.50				0.61

[a]Indicators that loaded on the wrong factor if we compare with CPAQ-20 by McCracken et al. (2004).

Table 4. Model fit values for alternative CPAQ models.

Comparison criteria	CPAQ-20 (Single factor)	CPAQ-20 (two factor)	CPAQ-8 (two factor)	Our model (two factor)
χ^2	450.39	380.28	35.86	341.91
df	170	169	19	169
p values	0.00	0.00	0.01	0.00
χ^2/df ratio	2.65	2.25	1.89	2.02
NFI	0.76	0.80	0.91	0.80
NNFI	0.82	0.86	0.93	0.86
CFI	0.83	0.88	0.95	0.87
RMSEA	0.12	0.10	0.09	0.09

Discussion

A growing body of empirical evidence suggests that acceptance plays an important role in coping with chronic pain. Pain acceptance is the process of giving up the struggle with pain, remaining active and learning to live a meaningful life despite pain. This study shows that the Norwegian version of the translated CPAQ-20 with two dimensions has satisfactory psychometric properties in this sample of women with long-lasting chronic pain. In addition, CPAQ-8 with two dimensions showed satisfactory psychometric properties, and in this study better than CPAQ-20. Both CPAQ-20 and CPAQ-8 are valid measurement models.

Acceptance of chronic pain is associated with reports of lower pain intensity, less pain-related anxiety and avoidance, less depression, less physical and psychosocial disability, more daily uptime and better work status.[17,45,46] Reliable and valid instruments are needed to further explore acceptance in chronic pain. The CPAQ is an instrument that enables assessment of acceptance in persons with chronic pain.

The women in this sample all had severe pain for a long time, and the items seem to capture the reality in which they live. In the process of translating, the CPAQ into Norwegian, general guidelines for transcultural adaption were followed,[35] and no major problems were encountered. Missing data are not uncommon because of the relatively large item pool. The low response rate on item 19, "It is a relief to realise that I don't have to change my pain to get on with my life" (10.2% missing values) might indicate that the statement is difficult for the respondents to decide about. This is also the case with other items.

The items with item-to-scale correlation below 0.40 (3, 4, 7, 8, 16) belong to the activities engagement subscale as well as to the pain willingness scale. None of these items are included in the CPAQ-8. Therefore, it seems that the items in this sample should be further developed as well as the items with the lowest response rate (10, 11, 16, 18, 19). The items that do not function well are not the same in all studies, which indicates that the responses could be dependent on the patient group and/or the intervention given. In the Swedish study by Rowner et al.,[28] items 4, 7, 8 and 16 also showed low item-to scale-correlation. In addition, items 4 and 11 showed low correlation in their large sample.

In a recent paper addressing content analysis of acceptance instruments, especially the reversed key items are discussed as problematic in capturing a phenomenon.[47] The pain willingness items are all reversed key items. There is a need for further development of many of the items measuring acceptance; and patients should be more involved in further development.

The covariance-based SEM analysis indicated that there is a substantial difference in model fit between the two-factor model by McCracken et al. [17] and the single-factor baseline CPAQ model. The two-factor model, originally developed by McCracken et al. [17], was therefore tested against our own exploratory generated model. Seventeen out of 20 items in the EFA model loaded on the expected factors when compared with the model developed by McCracken et al. [17] and obtained only a marginally better fit. Our conclusion is therefore that the two-dimensional model of CPAQ-20 by McCracken et al. [17] is valid in Norwegian samples as well as the short CPAQ-8 version by Fish et al. [26] that obtained a better fit than the three 20-item models.

The internal consistency in the total CPAQ-20 and in the subscale activities engagement showed high reliability with Cronbach's alpha of 0.85 and 0.83, respectively. These are values representing relatively high reliability. The subscale of pain willingness showed a Cronbach's alpha of 0.75 indicating a slightly less homogenous and compatible item-pool. The Cronbach's alphas found in this study are in line with previous research.[21] Further development of the scale is necessary to reach an alpha level of 0.90 for use in measuring individual acceptance.

To assess the construct validity of the CPAQ-20, the correlation between both total score and subscales with the four VAS-scales, GHQ-12, PCS, FIQ-sum and SF-8 mental and physical health were examined. In addition to correlation with age, the relationship between education level and pain duration was examined. The correlation analyses showed that acceptance of pain and activity participation were associated with lower reported pain, depression, sleep problems, fatigue, pain catastrophizing, general emotional distress and impact of fibromyalgia. These findings are similar to reports from McCracken [1998], Nicholas et al. [48] and Ning et al. [23]

In this study, as in the majority of CPAQ-studies, no correlation with duration of pain or educational level was found, suggesting that the length of time a person has suffered from pain or the length of education may not be indicative of a person's pain acceptance. However, a small positive correlation between age and acceptance of pain was found, indicating that older females in this study might have greater acceptance of pain than younger participants have. A similar correlation with age was found by Nicholas et al.[48] Differences in correlations might be explained by differences in the patient group, or by difficulties in understanding the questions in the translated version. This might create inconsistent scores among different items in subscales, and hence poor correlation with demographic variables or with other psychometric instruments. Further studies may be required to clarify factors contributing to such discrepancy.

The sample in this study consists of females only. This provides no information on factorial invariance of the CPAQ-20 or CPAQ-8 across gender. Most previous factor analyses of CPAQ-20 and CPAQ-8 do not provide information on gender-associated differences.[17,26,27,48] However, Wicksell and colleagues [25] demonstrated no differences in Activities Engagement or Pain Willingness with regard to gender, and several studies have shown that there is no significant association between gender and the CPAQ total score.[23,49,50] All of this gives grounds to believe that gender differences do not provide factor invariance. This, however, will need to be investigated further in a study conducted with both men and women.

The CPAQ-20 is also found to be sensitive to change and to discriminate between groups participating in a RCT in Norway. This is in correspondence with other studies measuring change over time.[51,52]

Methodological limitations

Limitations of this study are that the sample was recruited from a specialised clinic, that only women were recruited and that the sample size is somewhat small. The sample may thus not be representative for all patients with CWP in Norway. However, the similarity between the correlations of CPAQ-20 and CPAQ-8 found in

this study compared to other studies, and correlations between CPAQ-20/8 and measures of disability support the validity of the Norwegian versions of CPAQ-20 and CPAQ-8. A limitation in this study is that the analyses of the short version were performed on the data that the full version delivered. Further research is needed to assure the validity. As all measures are self-report measures and share variance, this may have contributed to inflated correlations.

The relatively low sample size ($N = 120$) may raise doubt about in the reliability of the results. Therefore, we decided to determine the minimum sample size recommendation for CPAQ-8. The reason for using CPAQ-8 in this connection is that this model has the lowest variables-to-factors ratio (i.e. numbers of items divided by the number of factors). In general, we can say that the lower the variables-to-factors ratio, the higher the sample size requirements.[53,54] To identify the minimum sample size, we utilised a sample size table generated by Mundfrom and Shaw.[55] Our lookup in this table were based on the following two criteria:

1. A population condition that allows for "good" agreement between sample and population solutions (i.e. coefficient of congruence, K, between 0.92 and 0.98).
2. A "wide" level of communality (i.e. communalities range between 0.2 and 0.8).

CPAQ-8 has a variables-to-factors ratio of 8/2 i.e. 4. Based on criteria (1) and (2) above, in addition to the calculated variables-to-factors ratio, the minimum necessary sample size for CPAQ-8 seems to be approximately 90 respondents'.[55] In addition to the minimum sample size tables generated by Mundfrom and Shaw,[55] we also tested CPAQ-20 and CPAQ-8 with the SEM-tool PLSPM provided by XlStat. The core of the PLSPM estimation method (i.e. ordinary least squares) is known to be remarkably stable even at low sample sizes.[56] PLSPM generated factor loadings that were close to identical with the loadings present in Table 3. Based on our assessment of minimum sample size for CPAQ-8 and the PLSPM test of CPAQ-20 and CPAQ-8, we believe that our conclusions are trustworthy.

Further studies are necessary to support the validity and reliability of the CPAQ-20 and CPAQ-8 in Norway in other patient samples. Gender aspects of acceptance of pain should also be explored in future studies. A larger sample is needed to confirm the different subscales of CPAQ-20 and CPAQ-8 by confirmatory factor-analysis. Experimental and longitudinal designs are recommended to discover how patients' acceptance of chronic pain changes over time. However, the sample in the current study has been followed in a randomised controlled trial with four additional measurement points over a year revealing significant changes over time.[33,34] No test–retest study is performed. The CPAQ-8 should also be tested out as a separate questionnaire in new samples and not, as here, merely be drawn from all the 20 items.

Conclusion and implication for rehabilitation practice

Results from this study demonstrate that the Norwegian versions of CPAQ-20 and CPAQ-8 have acceptable levels of internal consistency, construct validity and sensitivity. Furthermore, the measure seems to capture aspects of acceptance in patients with chronic pain. Further validation with regard to test-retest reliability and other groups with CWP is necessary. A larger sample is also needed to confirm the structure of the CPAQ-8 found in this study.

These are the first standardised assessment tools that can be used in systematic examination of patient's acceptance of chronic pain in Norway. Both CPAQ-20 and CPAQ-8 can be used, but CPAQ-8 seems to be the preferred scale due to both fewer items and the psychometric properties of the items.

Disclosure statement

No conflict of interests to declare.

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References

[1] Breivik H, Collett B, Ventafridda V, et al. Survey of chronic pain in Europe: prevalence, impact on daily life, and treatment. Eur J Pain. 2006;10:287–333.
[2] Rustoen T, Wahl AK, Hanestad BR, et al. Prevalence and characteristics of chronic pain in the general Norwegian population. Eur J Pain. 2004;8:555–565.
[3] McCracken LM. Psychological effects of chronic pain: an overview. In: Wilson PR, Watson PJ, Haythornthwaite JA, et al., editors. Clinical pain management: chronic pain. London: Hodder Arnold; 2008. p. 169–177.
[4] Ihlebæk C, Lærum E. Plager flest, koster mest og får minst. (Ailments most, costs the most and recieves the least). Tidsskr nor Legeforen. 2010;130:2106.
[5] McCracken LM, Morley S. The psychological flexibility model: a basis for integration and progress in psychological approaches to chronic pain management. J Pain. 2014;15:221–234.
[6] Fordyce WE. Behavioral methods for chronic pain and illness. St. Louis (MO): CV Mosby; 1976.
[7] Turk DC, Burwinkle TM. Clinical outcomes, cost-effectiveness, and the role of psychology in treatments for chronic pain sufferers. Prof Psychol Res Pract. 2005;36:602.
[8] Hofmann SG, Asnaani A, Vonk IJ, et al. The efficacy of cognitive behavioral therapy: a review of meta-analyses. Cogn Ther Res. 2012;36:427–440.
[9] Eccleston C, Williams A, Morley S. Psychological therapies for the management of chronic pain (excluding headache) in adults. Cochrane Database Syst Rev. 2009;2: CD007407.
[10] Crombez G, Eccleston C, Van Damme S, et al. Fear-avoidance model of chronic pain: the next generation. Clin J Pain. 2012;28:475–483.
[11] Dahl J, Wilson KG, Luciano C, et al. Acceptance and commitment therapy for chronic pain. Reno (NV): Context Press; 2005.
[12] McCracken LM. Contextual cognitive-behavioral therapy for chronic pain. Seattle: IASP Press 2005.
[13] McCracken LM, Vowles KE. Acceptance and commitment therapy and mindfulness for chronic pain: model, process, and progress. Am Psychol. 2014;69:178.
[14] McCracken LM. Learning to live with the pain: acceptance of pain predicts adjustment in persons with chronic pain. Pain. 1998;74:21–27.
[15] Viane I, Crombez G, Eccleston C, et al. Acceptance of pain is an independent predictor of mental well-being in patients with chronic pain: empirical evidence and reappraisal. Pain. 2003;106:65–72.
[16] McCracken LM, Eccleston C. A prospective study of acceptance of pain and patient functioning with chronic pain. Pain. 2005;118:164–169.
[17] McCracken LM, Vowles KE, Eccleston C. Acceptance of chronic pain: component analysis and a revised assessment method. Pain. 2004;107:159–166.
[18] Keogh E, McCracken LM, Eccleston C. Do men and women differ in their response to interdisciplinary chronic pain management? Pain. 2005;114:37–46.

[19] Hayes SC, Strosahl KD, Wilson KG. Acceptance and commitment therapy: an experiential approach to behavior change. New York: Guilford Press; 1999.
[20] Geiser DS. A comparison of acceptance-focussed and control-focused psychological treatments in a chronic pain treatment center. Reno (NV): University of Nevada; 1992.
[21] Reneman MF, Dijkstra A, Geertzen JH, et al. Psychometric properties of chronic pain acceptance questionnaires: a systematic review. Eur J Pain. 2010;14:457–465.
[22] Nilges P, Koster B, Schmidt CO. [Pain acceptance – concept and validation of a German version of the chronic pain acceptance questionnaire]. Schmerz. 2007;21:57–58.
[23] Ning MC, Ming TWC, Mae JYC, et al. Validation of the chronic pain acceptance questionnaire (CPAQ) in Cantonese-speaking Chinese patients. J Pain. 2008;9:823–832.
[24] Rodero B, Garcia-Campayo J, Casanueva B, et al. Validation of the Spanish version of the Chronic Pain Acceptance Questionnaire (CPAQ) for the assessment of acceptance in fibromyalgia. Health Qual Life Outcomes. 2010;8:37.
[25] Wicksell RK, Olsson GL, Melin L. The Chronic Pain Acceptance Questionnaire (CPAQ)-further validation including a confirmatory factor analysis and a comparison with the Tampa Scale of Kinesiophobia. Eur J Pain. 2009;13:760–768.
[26] Fish RA, McGuire B, Hogan M, et al. Validation of the Chronic Pain Acceptance Questionnaire (CPAQ) in an Internet sample and development and preliminary validation of the CPAQ-8. Pain. 2010;149:435–443.
[27] Fish RA, Hogan MJ, Morrison TG, et al. Willing and able: a closer look at pain willingness and activity engagement on the Chronic Pain Acceptance Questionnaire (CPAQ-8). J Pain. 2013;14:233–245.
[28] Rovner GS, Årestedt K, Gerdle B, et al. Psychometric properties of the 8-item Chronic Pain Acceptance Questionnaire (CPAQ-8) in a Swedish chronic pain cohort. J Rehabil Med. 2014;46:73–80.
[29] Baranoff J, Hanrahan SJ, Kapur D, et al. Validation of the Chronic Pain Acceptance Questionnaire-8 in an Australian pain clinic sample. Int J Behav Med. 2014;21:177–185.
[30] Mokkink LB, Terwee CB, Patrick DL, et al. The COSMIN checklist manual. Amsterdam: VU University Medical Centre; 2009.
[31] Mokkink LB, Terwee CB, Knol DL, et al. Protocol of the COSMIN study: COnsensus-based Standards for the selection of health Measurement INstruments. BMC Med Res Methodol. 2006;6:2.
[32] Jöreskog KG, Sörbom D. LISREL 8: structural equation modeling with the SIMPLIS command language. Skokie (IL): Scientific Software International; 1993.
[33] Kristjansdottir OB, Fors EA, Eide E, et al. A smartphone-based intervention with diaries and therapist-feedback to reduce catastrophizing and increase functioning in women with chronic widespread pain: randomized controlled trial. J Med Internet Res. 2013;15:e5.
[34] Kristjansdottir OB, Fors EA, Eide E, et al. A smartphone-based intervention with diaries and therapist feedback to reduce catastrophizing and increase functioning in women with chronic widespread pain. Part 2: 11-month follow-up results of a randomized trial. J Med Internet Res. 2013;15:e72.
[35] Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. J Clin Epidemiol. 1993;46:1417–1432.
[36] Sullivan MJL, Bishop SR, Pivik J. The pain catastrophizing scale: development and validation. Psychol Assess. 1995;7:524–532.
[37] Osman A, Barrios FX, Kopper BA, et al. Factor structure, reliability, and validity of the pain catastrophizing scale. J Behav Med. 1997;20:589–605.
[38] Goldberg DP, Gater R, Sartorius N, et al. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. Psychol Med. 1997;27:191–197.
[39] Burckhardt CS, Clark SR, Bennett RM. The fibromyalgia impact questionnaire: development and validation. J Rheumatol. 1991;18:728–733.
[40] Saris-Baglama R, Dewey C, Chisholm G, et al. Quality metric outcomes scoring software 4.5. User's guide. Lincoln (RI): Quality Metric Incorporated; 2011.
[41] IBM SPSS Statistics for Windows, Version 22.0. Armonk (NY): IBM Corporation; 2013.
[42] Kline RB. Principles and practice of structural equation modeling. New York: The Guilford Press; 2014.
[43] DeVellis RF. Scale development: theory and applications, vol. 26. Thousand Oaks (CA): Sage publications; 2012.
[44] Boudreau M-C, Gefen D, Straub DW. Validation in information systems research: a state-of-the-art assessment. MIS Q. 2001;25:1–16.
[45] Vowles KE, McCracken LM, McLeod C, et al. Processes of change in treatment for chronic pain: The contributions of pain, acceptance and catastrophizing. Eur J Pain. 2007; 11:779–789.
[46] Vowles KE, McCracken LM, Eccleston C. Patient functioning and catastrophizing in chronic pain: the mediating effects of acceptance. Health Psychol. 2008;27:S136–S143.
[47] Lauwerier E, Caes L, Van Damme S, et al. Acceptance questionnaires in patients with chronic pain: a content analysis. J Pain. 2015;16:306–317.
[48] Nicholas MK, Asghari A. Investigating acceptance in adjustment to chronic pain: Is acceptance broader than we thought? Pain. 2006;124:269–279.
[49] Gauthier LR, Rodin G, Zimmermann C, et al. Acceptance of pain: a study in patients with advanced cancer. Pain. 2009;143:147–154.
[50] Rodero B, García-Campayo J, Casanueva B, et al. Validation of the Spanish version of the Chronic Pain Acceptance Questionnaire (CPAQ) for the assessment of acceptance in fibromyalgia. Health Qual Life Outcomes. 2010;8:1.
[51] Buhrman M, Skoglund A, Husell J, et al. Guided internet-delivered acceptance and commitment therapy for chronic pain patients: a randomized controlled trial. Behaviour Research and Therapy 2013;51:307–315.
[52] Vowles KE, McCracken LM, O'Brien JZ. Acceptance and values-based action in chronic pain: a three-year follow-up analysis of treatment effectiveness and process. Behav Res Ther. 2011;49:748–755.
[53] Arrindell WA, Van der Ende J. An empirical test of the utility of the observations-to-variables ratio in factor and components analysis. Appl Psychol Measur. 1985;9: 165–178.
[54] MacCallum RC, Widaman KF, Zhang S, et al. Sample size in factor analysis. Psychol Methods. 1999;4:84.
[55] Mundfrom DJ, Shaw DG, Ke TL. Minimum sample size recommendations for conducting factor analyses. Int J Test. 2005;5:159–168.
[56] Gefen D, Straub DW, Rigdon EE. An update and extension to SEM guidelines for admnistrative and social science research. Manag Informat Syst Q. 2011;35:iii–xiv.