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ORIGINAL ARTICLE

The coping flexibility questionnaire: development and initial validation in patients with chronic rheumatic diseases

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Abstract Coping flexibility may be beneficial for the adjustment in the context of a progressive and unpredictable course of chronic rheumatic diseases. The aim of this study was to develop and initially validate a self-report measure that assesses coping flexibility. Study participants were 147 outpatients with chronic rheumatic diseases (73% women, mean age 59 (range 20–79) years). Principal axis factoring analysis with oblique rotation was applied and internal consistency was determined. To investigate the initial validity of the coping flexibility questionnaire (COFLEX), hypothesised correlations with psychological and physical adjustment outcomes, pain, and coping strategies were examined. Factor analysis yielded a two-factor model of coping flexibility with acceptable internal consistency: *versatility*, the capability of switching between assimilative and accommodative coping strategies according to personal goals and situational demands ($\alpha = .88$) and *reflective coping*, the capability of generating and considering coping options, and appraising the suitability of a coping strategy in a given situation ($\alpha = .70$). *Versatility* was correlated with adaptive ways of coping and psychological adjustment, but not with physical adjustment and pain. *Reflective coping* was correlated with both adaptive and maladaptive ways of coping, but it was not correlated with adjustment outcomes. In conclusion, the current study suggests acceptable internal consistency of the COFLEX. Preliminary evidence of the validity of the *versatility* dimension is indicated, while the validity of *reflective coping* could not be firmly established. The associations of *versatility* with favourable adjustment to the disease warrant future confirmatory and validity research in larger samples of patients with chronic rheumatic diseases.

Keywords Coping flexibility · Rheumatic diseases · Psychometric properties · Psychological adjustment

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Introduction

The disease course of patients with rheumatic diseases is often unpredictable. Ideally, patients deploy a variety of coping strategies in the context of changing disease activity, symptoms and activity limitations. Inevitable consequences of the disease may be better accepted, whereas changeable consequences could be better dealt with. The ability to modify coping responses according to situational demands has been referred to as coping flexibility [1]. Experimental and cross-sectional studies have demonstrated positive associations of coping flexibility with psychological adjustment outcomes, and coping flexibility has been found to attenuate the negative impact of pain and disability on psychological well-being [2–5]. Although coping flexibility appears beneficial for adjustment [6], the construct has hardly been examined in the context of chronic disease.

Coping flexibility can be studied within the dynamic framework of the dual-process coping model, which defines two distinct but complementary coping processes: assimilative coping and accommodative coping [7]. Assimilative coping implies active attempts to alter an unsatisfactory situation in a way that fits personal goals and aspirations.

Accommodative coping involves flexible adjustment of personal goals and aspirations to current situational limitations to make the given situation appear less negative or more acceptable. In the initial stage of coping, assimilative tendencies are expected to dominate. Accommodative tendencies are activated when attempts to change the situation are perceived as ineffective. People who use both assimilative and accommodative ways of coping are assumed to adapt most adequately to changing circumstances.

Following the dual-process coping model and clinical experience in our multidisciplinary rehabilitation programmes, we conceptualised coping flexibility as the ability of the individual to use both assimilative and accommodative coping strategies to deal with stressors in different situations. Two distinct aspects were differentiated: *versatility* and *reflective coping*. *Versatility* is the capability of flexibly using both assimilative and accommodative coping strategies according to personal goals and situational constraints. *Reflective coping* is the capability of generating and considering coping options, and appraising the suitability of a coping strategy in a given situation. Various methods have been used to assess coping flexibility [3]. These methods—of which some are time-consuming—only partially reflect our conceptualisation of coping flexibility. Specifically, *reflective coping* has been largely disregarded. We developed a self-report measure that focused on two distinct aspects of coping flexibility: *versatility* and *reflective coping.*

The aim of our study was to develop the coping flexibility questionnaire (COFLEX), to determine its factor structure, internal consistency and initial validity in patients with inflammatory rheumatic diseases and osteoarthritis by examining the associations of *versatility* and *reflective coping* with psychological and physical adjustment outcomes, symptoms and coping strategies. We expected coping flexibility to be associated with favourable psychological outcomes, but not with physical functioning and pain [2–5]. Furthermore, we expected positive correlations between coping flexibility and both assimilative (e.g. problem-focused coping) and accommodative (e.g. illness acceptance) coping processes and negative correlations between coping flexibility and coping strategies that have been found to be less adaptive when habitually used (i.e. emotion-focused coping) [1, 8, 9].

Patients and methods

Participants

A heterogeneous sample of outpatients with inflammatory rheumatic diseases or osteoarthritis (OA) from the departments of rheumatology of the Sint Maartenskliniek Nijmegen and Woerden, the Netherlands were invited for this initial validation study of the COFLEX. The sample comprised 89 patients who had attended a multidisciplinary rehabilitation programme in 2008 and a random selection of 100 patients who had visited the outpatient clinic in January–March 2009. One hundred and seventy-five patients agreed to participate and received a set of questionnaires by postal mail. Eighty-four percent ($N = 147$) of the questionnaires were returned. Ethical approval from the local Medical Ethics Committee and written informed consent from all study participants were obtained.

Procedure

Scale development

The items of the COFLEX were generated by an expert team consisting of four health psychologists from our departments of rheumatology and three researchers with academic background in (clinical) psychology. On the basis of our conceptualisation of coping flexibility, items addressing the dimensions *versatility* and *reflective coping* were generated. While taking account of patients' comments ($n = 6$) on a draft version, an item pool of 22 positively worded items was compiled. A 4-point Likert scale with scoring alternatives ranging from 1 (*seldom*) to 4 (*almost always*) was chosen.

Factor structure and internal consistency

To test the factorability of our relatively small data set ($N = 147$), inter-item correlations of the 22 item-pool were inspected, and the significance level of Bartlett's test of sphericity and the Kaiser–Meyer–Olkin measure of sampling adequacy (KMO) were calculated. A significant KMO >.6 was considered acceptable [10, 11].

Explorative principal axis factor analyses with an oblique rotation (direct OBLIMIN) were conducted to examine the factorial validity of the COFLEX. A principal axis factoring analysis was chosen over principal components analysis because the primary goal was to detect underlying structure (latent variables) rather than to simply reduce the number of items [10, 11]. An oblique rotation was chosen, because it permits correlations among factors and provides a more accurate and realistic representation of how (dimensions of) constructs are likely to be related to one another [12].

Number of factors were determined by visual inspection of the scree plot, percentage of extracted variance (>5%), Eigenvalues >1 and factor interpretability. To select the most salient items for inclusion in the COFLEX, two criteria were used: first, only items with factor loadings >|0.45| (20% explained variance) were retained and second, items

Table 1 Hypothesised correlations between COFLEX dimensions and psychological and physical adjustment outcomes, pain and coping strategies in patients with rheumatic diseases with references to literature on which the hypotheses are based

Measures	Versatility	Reflective coping
Adjustment and pain		
Depressed mood (IRGL)	*Small to moderate negative correlation* [2, 27, 28, 33]	Small to moderate negative correlation [2, 27, 28, 33]
Anxiety (IRGL)	*Small to moderate negative correlation* [3]	Small to moderate negative correlation [3]
Physical functioning (AIMS2-SF)	*Small negative or zero correlation*	*Small negative or zero correlation*
Pain (AIMS2-SF)	*Small negative or zero correlation* [5]	*Small negative or zero correlation* [5]
Coping strategies		
Accommodative coping (FGA)	*Moderate positive correlation* [5, 7]	Moderate positive correlation [5, 7]
Assimilative coping (TGP)	*Moderate positive correlation* [5, 7]	Moderate positive correlation [5, 7]
Problem-focused coping (CISS-T)	*Moderate positive correlation* [1, 9]	*Moderate positive correlation* [1, 9]
Emotion-focused coping (CISS-E)	Moderate negative correlation [1, 9]	Small negative or zero correlation
Acceptance (ICQ)	*Moderate positive correlation* [21, 34]	Moderate positive correlation [21, 34]

IRGL impact of rheumatic diseases on general health and lifestyle questionnaire; *AIMS2-SF* arthritis impact measurement scale—short form, *FGA* flexible goal adjustment, *TGP* tenacious goal pursuit, *CISS-T* coping inventory for stressful situations—task-oriented coping scale, *CISS-E* coping inventory for stressful situations—emotion-oriented coping scale, *ICQ* illness cognition questionnaire

Hypotheses confirmed by the present study are depicted in italics

with cross-loadings on more than one factor within 0.45 of the primary loading were dropped because of inadequate discrimination [11]. Inter-item correlations and Cronbach's alpha coefficients were calculated to determine the internal consistency of the COFLEX.

Initial validity

To examine the construct validity, associations between COFLEX dimensions and measures of psychological and physical adjustment outcomes, symptoms and coping strategies were determined. The validity of the COFLEX will be supported if 75% or more of the hypothesised associations (see Table 1) is confirmed [13]. The strength of the correlations is interpreted as small (r = |0.1–0.3|), moderate (r = |0.3–0.5|) or large (r = |0.5–1.0|) [14].

Measures

In addition to the initial item pool of the COFLEX, patients completed questionnaires to assess demographic data, diagnosis and disease duration (i.e. years since diagnosis), psychological and physical adjustment outcomes, symptoms and coping strategies.

Psychological adjustment outcomes

Depressed mood and Anxiety were assessed with the depressed mood and anxiety scales of the Impact of Rheumatic Diseases on General Health and Lifestyle questionnaire (IRGL) [15]. The 6-item depressed mood scale assesses various depressed mood states over the previous week on a 5-point Likert scale with scoring alternatives ranging from 0 (*not at all*) to 4 (*very much*). The 10-item anxiety scale assesses anxiety level in the last month on a 4-point Likert scale with scoring alternatives ranging from 1 (*almost never*) to 4 (*almost always*). In our study, the Cronbach's alpha values were .94 for depressed mood and .91 for anxiety.

Physical adjustment outcomes

Physical functioning was assessed with the Arthritis Impact Measurement Scale (AIMS2-SF). The 12-item Physical scale assesses the perceived functional disability on a 5-point Likert scale with scoring alternatives ranging from 1 (*every day*) to 5 (*never*). The AIMS2-SF has been demonstrated to be reliable, valid and sensitive to change across different rheumatic diseases [16–18]. In our study, the Cronbach's alpha was .88.

Symptoms

Pain was assessed with the AIMS2-SF Symptoms scale. This 3-item scale assesses the intensity and frequency of pain and morning stiffness on a 5-point Likert scale. In our study, the Cronbach's alpha was .83.

Coping strategies

Problem-focused and Emotion-focused coping were assessed with the Coping Inventory for Stressful Situations [19]. The CISS assesses coping strategies during stressful situations on a 5-point Likert scale with scoring alternatives ranging from 1 (*not at all*) to 5 (*very much*). It has shown

good psychometric properties across diverse settings [19, 20]. In our study, the Cronbach's alpha was .90 for both Problem-focused coping (CISS-T, 16 items) and Emotion-focused coping (CISS-E, 16 items).

Assimilative and accommodative modes of coping were assessed with the Tenacious Goal Pursuit (TGP) and Flexible Goal Adjustment (FGA) dispositional scales on a 5-point Likert scale [7]. Both scales consist of 15 items with scoring alternatives ranging from 0 (*fully disagree*) to 4 (*fully agree*). Tenacious Goal Pursuit (assimilative coping) assesses the tendency to persistently pursue goals even in the face of obstacles and under high risk of failure. Flexible Goal Adjustment (accommodative coping) assesses the tendency to positively reinterpret initially aversive situations and to disengage from blocked goals. The TGP and FGA have acceptable psychometric properties across healthy controls [7] and chronic pain patients [5]. In our study, Cronbach's alpha values were .74 for TGP and .77 for FGA.

Acceptance, recognising the need to adapt to a chronic disease while perceiving the ability to tolerate and manage its aversive consequences, was assessed with the 6-item Acceptance scale of the Illness Cognition Questionnaire (ICQ) [21] on a 4-point Likert Scale with scoring alternatives ranging from 1 (*not at all*) to 4 (*completely*). The ICQ has good psychometric properties across chronic diseases [21]. In our study, Cronbach's alpha was .91.

Statistical analyses

Distributions of the COFLEX-items and all study variables were examined. All COFLEX-items and variables were normally distributed, except for disease duration and depressed mood. Missing values of all study variables were less than 3%. Descriptive statistics were computed. Scale scores of the COFLEX were calculated by summation of the items for each dimension. Pearson's correlation coefficients or Spearman rank coefficients were computed to examine the association of COFLEX dimensions with demographic characteristics, psychological and physical adjustment outcomes, pain and coping strategies. All tests were 2-sided and the significance level was set at P-value < 0.05. The Statistical Package for the Social Sciences (SPSS), Windows version 14.0 was used.

Results

Participants

Table 2 displays the demographic and disease-related characteristics of the study sample. The mean age of the patients was 59 years (SD = 12, range = 20–79 years), and the majority of patients was women (73%) and married (72%). Median disease duration was 7 years with an interquartile range (IQR) of 2–14 years. One hundred and four patients (71%) were diagnosed with inflammatory rheumatic diseases [i.e., rheumatoid arthritis (n = 90), psoriatic arthritis (n = 4), ankylosing spondylitis (n = 4), spondylarthropathies (n = 3), oligoarthritis (n = 1), juvenile idiopathic arthritis (n = 1) and Lyme arthritis (n = 1)], and 43 patients (29%) were diagnosed with OA by a consulting rheumatologist.

Table 2 Characteristics of the patient sample (N = 147)

Demographic characteristics	
Age (years), mean (SD)	59 (12)
Gender (female), *n* (%)	107 (73)
Marital status, *n* (%)	
Single	19 (13)
Married	105 (72)
Divorced	7 (5)
Widowed	15 (10)
Education level, *n* (%)	
<7 years	23 (16)
7–12 years	65 (45)
>12 years	57 (39)
Disease-related characteristics	
Diagnosis, *n* (%)	
Rheumatoid arthritis	90 (61)
Other inflammatory rheumatic diseases	14 (10)
Osteoarthritis	43 (29)
Disease duration (years), median (IQR)	7 (2–14)
Duration of symptoms (years), median (IQR)	12 (5–21)
Adjustment and pain	
Depressed Mood (IRGL, range 0–24), median (IQR)	3.0 (1–6)
Anxiety (IRGL, range 10–40), mean (SD)	18.7 (5.9)
Physical functioning (AIMS2-SF, range 0–10), mean (SD)	2.3 (1.7)
Pain (AIMS2-SF, range 0–10), mean (SD)	5.3 (2.6)
Coping strategies, mean (SD)	
Accommodative coping (FGA, range 0–60)	36.8 (6.5)
Assimilative coping (TGP, range 0–60)	32.7 (6.9)
Problem-focused coping (CISS-T, range 16–80)	52.8 (9.4)
Emotion-focused coping (CISS-E, range 16–80)	35.7 (11.2)
Acceptance (ICQ, range 6–24)	17.2 (4.2)

IQR interquartile range, *IRGL* impact of rheumatic diseases on general health and lifestyle questionnaire, *AIMS2-SF* arthritis impact measurement scale—short form, *FGA* flexible goal adjustment, *TGP* tenacious goal pursuit, *CISS-T* coping inventory for stressful situations—task-oriented coping scale, *CISS-E* coping inventory for stressful situations—emotion-oriented coping scale, *ICQ* illness cognition questionnaire

Factor structure and internal consistency

Initial analysis of the 22 item-pool showed that the Bartlett's test of sphericity was significant ($X^2 = 1697.71$, $df = 231$, $P < 0.001$) and the KMO score was .90, indicating the appropriateness of conducting a factor analysis. Inter-item correlations ranged from .05 to .73, thus indicating no problems with multicollinearity [11].

The scree plot of Eigenvalues, the percentage of extracted variance and the number of Eigenvalues >1 indicated a two-factor solution. Factor 1 with an Eigenvalue of 8.80 explained 40%, and factor 2 with an Eigenvalue of 1.34 explained 6% of the common variance.

The pattern matrix revealed nine items with cross-loadings within the 0.45 criterion on both factors. These items were dropped because of inadequate discrimination. Item 2 loaded on a factor inconsistent with its a priori construct assignment, but was retained because of the item's relevance to the concept of coping flexibility.

The factors were labelled according to the a priori constructs as *versatility* and *reflective coping*, comprising 9 items (Factor I) and 4 items (Factor II), respectively. *Versatility* and *reflective coping* were moderately correlated ($r = .44$). Inter-item correlations ranged from .28 to .73 for *versatility* and from .29 to .55 for *reflective coping*. Table 3 displays the rotated pattern matrix for the initial 22 items of the COFLEX and Cronbach's alpha, mean, standard deviation and range for the two COFLEX dimensions. In the Appendix, the item descriptions and scoring method of the COFLEX are displayed.

Table 3 Factor loadings, Eigenvalues, percentage of explained variance, Cronbach's alpha, mean (SD) and range for the two factors of the COFLEX in patients with rheumatic diseases ($N = 147$)

Items		Factor loadings	
Item pool	Retained items	Factor I versatility	Factor II reflective coping
1	1	**.80**	−.16
2	2	**.73**	−.02
3	3	**.60**	.07
4	4	**.59**	.12
5		.47	.32
6		.50	.32
7	5	.06	**.50**
8		.38	.40
9		.52	.32
10	6	**.76**	−.07
11		.31	.40
12	7	**.67**	−.03
13		.57	.24
14	8	−.03	**.61**
15	9	**.79**	−.17
16	10	−.08	**.75**
17		.51	.33
18		.18	.38
19	11	−.04	**.70**
20	12	**.62**	.02
21		.61	.26
22	13	**.79**	−.05
Eigenvalue		8.80	1.34
Percentage of variance		40%	6%
Cronbach's alpha		.88	.70
Mean (SD)		23.2 (4.8)	10.2 (2.3)
Range		13–36	4–16

Rotated pattern matrix for the COFLEX: Principal axis factoring with direct Oblimin rotation. Items with loadings highlighted in bold are retained in the COFLEX

Demographic characteristics

Gender, age, rheumatic diagnosis (inflammatory rheumatic diseases or OA) and disease duration were not significantly correlated with the COFLEX scales. Education was correlated with *versatility* ($\rho = .23$, $P = .005$) and with *reflective coping* ($\rho = .20$, $P = .02$). Higher *versatility* and *reflective coping* scores were found for patients with more years of education.

Initial validity

Table 4 displays the correlations of the COFLEX dimensions *versatility* and *reflective coping* with psychological and physical adjustment outcomes, pain and coping strategies. *Versatility* was negatively correlated with depressed mood ($P = .02$) and anxiety ($P < .001$); no significant correlations with physical functioning and pain were found. *Reflective coping* was not significantly correlated with the psychological and physical adjustment outcomes or pain.

Versatility was moderately positively correlated with accommodative (flexible goal adjustment, $P < .001$) and assimilative modes (tenacious goal pursuit, $P < .001$) of coping, problem-focused coping ($P < .001$) and (illness) acceptance ($P < .001$), and weakly negatively correlated with emotion-focused coping ($P < .001$). *Reflective coping* was moderately positively correlated with problem-focused coping ($P < .001$), weakly positive correlated with emotion-focused coping ($P = .04$) and negatively correlated with assimilative coping ($P = .04$). No other significant correlations were found. After controlling for education level, the magnitude of the correlations of *versatility* and *reflective coping* with adjustment outcomes, pain and coping strategies did not change significantly (data not shown).

For *versatility*, most predicted correlations (8 out of 9) were significant and in the expected direction and magnitude.

Table 4 Correlations of COFLEX dimensions with psychological and physical adjustment outcomes, pain and coping strategies in patients with rheumatic diseases

Measures	Versatility	Reflective coping
	r	*r*
Adjustment and pain		
Depressed mood (IRGL)	−0.19*	0.12
Anxiety (IRGL)	−0.29**	0.15
Physical functioning (AIMS2-SF)	−0.10	−0.08
Pain (AIMS2-SF)	0.07	−0.06
Coping strategies		
Accommodative coping (FGA)	0.48**	0.03
Assimilative coping (TGP)	0.36**	−0.17*
Problem-focused coping (CISS-T)	0.39**	0.41**
Emotion-focused coping (CISS-E)	−0.29**	0.17*
Acceptance (ICQ)	0.34**	−0.08

IRGL impact of rheumatic diseases on general health and lifestyle questionnaire, *AIMS2-SF* arthritis impact measurement scale—short form, *FGA* flexible goal adjustment, *TGP* tenacious goal pursuit, *CISS-T* coping inventory for stressful situations—task-oriented coping scale, *CISS-E* coping inventory for stressful situations—emotion-oriented coping scale, *ICQ* illness cognition questionnaire

* $P < 0.05$, ** $P < 0.01$

For *reflective coping*, 3 out of 9 correlations were significant and in the expected direction and magnitude.

Discussion

This study examined the psychometric properties and initial validity of a newly developed self-report measure to assess coping flexibility (COFLEX) in patients with inflammatory rheumatic diseases or osteoarthritis. A two-factor model of coping flexibility (*versatility* and *reflective coping*) was found. The COFLEX demonstrated acceptable internal consistency and preliminary evidence for the validity of the questionnaire was indicated.

The COFLEX includes two dimensions of coping flexibility that we considered important for patients with rheumatic diseases faced with an often progressive, unpredictable disease trajectory: *versatility* and *reflective coping*. Motivated by the dual-process coping model [7], *versatility* was conceptualised as the ability to flexibly use both assimilative and accommodative ways of coping in accordance with situational demands. The items of *versatility* reflect the person's confidence in having a variety of coping resources to adapt to changing circumstances and being able to use these coping behaviours flexibly. *Reflective coping* was conceptualised as the ability of generating and considering coping options, and appraising the suitability of a coping strategy in a given situation. Our explorative principal axis factoring analysis suggested that the content validity of *reflective coping* was partially confirmed. A limited subset of the original items of *reflective coping* was included in the second coping flexibility factor. The retained items of *reflective coping* represent the person's contemplation, that is, reflective pondering over available coping options. Patients scoring high on *reflective coping* may be more or less stuck in contemplation without proactively trying out different coping options to deal with the changing circumstances of their disease. One item (item 2) from the initial *reflective coping* items loaded on the *versatility* factor indicates the close interrelationship between *versatility* and *reflective coping*. Both COFLEX dimensions are secondary appraisal processes [22]: the individual evaluates the available coping options to deal adequately with the challenging situation. Whereas the content validity of *versatility* was supported by the factor analysis, the empirical factor solution did not fit the intended conceptualisation of *reflective coping*.

The factor loadings ($\geq .50$) and internal consistency of the two COFLEX dimensions ($.70 < \alpha < .90$) justify their use for research purposes [23]. *Versatility* and *reflective coping* were not associated with patients' age, gender, diagnosis or disease duration. In agreement with other studies indicating better coping abilities in patients with higher education [24–26], small correlations of education level with *versatility* and *reflective coping* were found. The moderate association between the scales ($r = .44$) indicates that the two conceptually distinct dimensions of coping flexibility are interrelated. This suggests that *versatility* and *reflective coping* could be considered lower-order factors of the higher-order construct coping flexibility [12].

The present study demonstrated preliminary evidence of construct validity of the COFLEX. Support for the validity of *versatility* was demonstrated: 89% of the hypothesised associations was confirmed. As expected, *versatility* was associated with all coping strategies: accommodative coping, assimilative coping, problem-focused coping, low emotion-focused coping and acceptance. These correlations provide support for the idea that *versatility* implies patients' concurrent use of both assimilative and accommodative ways of coping [7]. The adaptive role of *versatility* was further demonstrated by its association with psychological adjustment outcomes. As suggested by previous studies [3, 5, 27, 28], *versatility* was associated with lower levels of psychological distress, while no association with physical adjustment outcomes and pain were found. Thus, overall the observed concurrent correlations confirm that *versatility* is associated with adaptive ways of coping and favourable psychological wellbeing, which suggests the potential clinical relevance of the construct. With respect to predictive validity, future prospective research is necessary to examine

the surplus value of the dynamic *versatility* construct of the COFLEX over the static classic coping constructs. Another key question in prospective research is whether *versatility* is particularly adaptive when individuals are faced with inflammatory flare-ups and remissions and with fluctuations in pain and disability.

Of the hypothesised correlations of *reflective coping* with measures of coping, adjustment outcomes and pain, 33% was confirmed. In agreement with previous research [29], *reflective coping* was positively associated with problem-focused coping. Contrary to *versatility*, *reflective coping* was positively associated with emotion-focused coping, negatively with assimilative coping and not with acceptance or psychological distress. In the present study, the validity of our *reflective coping* factor in the studied population of patients with chronic rheumatic diseases could not be demonstrated.

Coping flexibility has been assessed with a card sorting method [4, 30], counts of coping strategies [28, 31], standard deviation scores of coping strategies across situations [27] and diary methods [3, 32]. These assessment methods—of which some are time-consuming—mostly comprise the *versatility* concept, but largely disregard our conceptualisation of *reflective coping*. The COFLEX is a trait-like measure of coping. It would be valuable to examine whether high scores on coping flexibility can predict more dynamic, state-like measures of coping in response to illness-related stressors such as pain and fatigue.

The cross-sectional design of our study might be considered a limitation or a first step of research that needs further validation in prospective investigations such as diary studies. Another procedure choice that is specific to our study is that the development and item selection of the COFLEX questionnaire was guided by theory and done by experts and researchers using feedback from patients instead of using qualitative techniques to let the patients yield items. Finally, response set bias cannot be ruled out because we chose for positive wording of COFLEX-items to avoid the ambiguity of negatively worded items. We have demonstrated some aspects of reliability and validity of the COFLEX among a heterogeneous sample of outpatients with inflammatory rheumatic diseases or osteoarthritis. Given the small sample size of this study, important steps in the next stage of psychometric testing of the COFLEX are cross-validation in a larger cohort of rheumatic diseases employing repeated measures and confirmatory analyses. Finally, it is important to verify its potential clinical usefulness by examining the criterion validity and sensitivity to change of the COFLEX in psychological interventions aimed at improving coping flexibility in patients with poor adjustment to rheumatic conditions.

The current study suggests acceptable internal consistency of the COFLEX and preliminary evidence of the validity of the *versatility* dimension, while the validity of *reflective coping* could not be firmly established. The associations of *versatility* with favourable adjustment to the disease warrant future confirmatory and validity research in larger samples of patients with chronic rheumatic diseases.

Appendix: The coping flexibility questionnaire (COFLEX)

Explanation

People may be faced with changes in their lives: difficult or stressful situations and wishes or goals which cannot be realised as they would prefer. How people cope with these changes differs from one individual to the other. Below you will find statements of how individuals cope with these changes and deal with difficulties. Please indicate to which extent these statements apply to you by ticking the first answer that comes to mind.

When confronted with an important problem

	Seldom or never	Sometimes	Often	Almost always
1. I can easily change my approach if necessary	☐	☐	☐	☐
2. I think of different options when a solution is not successful	☐	☐	☐	☐
3. I immediately change my approach if a certain approach fails	☐	☐	☐	☐
4. I adjust my strategy as soon as I notice that my approach fails	☐	☐	☐	☐
5. I think about the effort it will to take to achieve a certain goal	☐	☐	☐	☐
6. I have enough strategies to deal with the problem	☐	☐	☐	☐
7. I am flexible in my approach towards a problem	☐	☐	☐	☐
8. I question myself what is really important to me	☐	☐	☐	☐
9. I have enough different options to quickly solve a problem	☐	☐	☐	☐
10. I usually take some time to think about what I am going to do	☐	☐	☐	☐
11. I question myself whether my approach to the problem is the best solution	☐	☐	☐	☐
12. I find it is a challenge to adapt to changing circumstances	☐	☐	☐	☐
13. I easily think of a different approach that suits the changing situation	☐	☐	☐	☐

Scoring of COFLEX dimensions: *Versatility* = sum score of items 1, 2, 3, 4, 6, 7, 9, 12 and 13. Missing item scores are replaced with the mean of the other items; when more than two items are missing, the versatility score is invalid. *Reflective coping* = sum score of items 5, 8, 10 and 11. A single missing item score is replaced with the mean of the other items; when more than 1 item is missing, the reflective coping score is invalid

References

1. Folkman S, Moskowitz JT (2004) Coping: pitfalls and promise. Annu Rev Psychol 55:745–774
2. Bonanno GA, Papa A, Lalande K, Westphal M, Coifman K (2004) The importance of being flexible: the ability to both enhance and suppress emotional expression predicts long-term adjustment. Psychol Sci 15:482–487
3. Cheng C (2001) Assessing coping flexibility in real-life and laboratory settings: a multimethod approach. J Pers Soc Psychol 80:814–833
4. Lester N, Smart L, Baum A (1994) Measuring coping flexibility. Psychol Health 9:409–424
5. Schmitz U, Saile H, Nilges P (1996) Coping with chronic pain: flexible goal adjustment as an interactive buffer against pain-related distress. Pain 67:41–51
6. Zeidner M, Saklofske D (1996) Adaptive and maladaptive coping. In: Zeidner M, Endler NS (eds) Handbook of coping: theory, research, applications. Wiley, New York, pp 505–531
7. Brandstädter J, Renner G (1990) Tenacious goal pursuit and flexible goal adjustment: explication and age-related analysis of assimilative and accommodative strategies of coping. Psychol Aging 5:58–67
8. Lazarus RS (1993) Coping theory and research: past, present, and future. Psychosom Med 55:234–247
9. Stanton AL, Revenson TA, Tennen H (2007) Health psychology: psychological adjustment to chronic disease. Ann Rev Psychol 58:565–592
10. Pett MA, Lackey NR, Sullivan JJ (2003) Making sense of factor analysis: the use of factor analysis for instrument development in health care research. Sage Publications, Thousand Oaks
11. Tabachnick BG, Fidell LS (2007) Using multivariate statistics. Allyn and Bacon, Boston
12. Fabrigar LR, Wegener DT, MacCallum RC, Strahan EJ (1999) Evaluating the use of exploratory factor analysis in psychological research. Psychol Methods 4:272–299
13. Terwee CB, Bot SD, de Boer MR et al (2007) Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol 60:34–42
14. Cohen J (1992) A power primer. Psychol Bull 112:155–159
15. Huiskes CJAE, Kraaimaat FW, Bijlsma JWJ (1990) Handleiding bij de zelfbeoordelingsvragenlijst Invloed van Reuma op Gezondheid en Leefwijze: de IRGL [Manual of the self-report questionnaire impact of rheumatic diseases on general health and lifestyle: The IRGL]. Swets & Zeitlinger, Lisse
16. Ren XS, Kazis L, Meenan RF (1999) Short-form arthritis impact measurement scales 2: tests of reliability and validity among patients with osteoarthritis. Arthritis Care Res (Hoboken) 12:163–171
17. Taal E, Rasker JJ, Riemsma RP (2003) Psychometric properties of a Dutch short form of the arthritis impact measurement scales 2 (Dutch-AIMS2-SF). Rheumatology (Oxford) 42:427–434
18. Taal E, Rasker JJ, Riemsma RP (2004) Sensitivity to change of AIMS2 and AIMS2-SF components in comparison to M-HAQ and VAS-pain. Ann Rheum Dis 63:1655–1658
19. Endler NS, Parker JDA, De Ridder DTD, Van Heck GL (2004) Coping inventory for stressful situations: CISS handleiding. Swets Test Publishers
20. McWilliams LA, Cox BJ, Enns MW (2003) Use of the coping inventory for stressful situations in a clinically depressed sample: factor structure, personality correlates, and prediction of distress. J Clin Psychol 59:423–437
21. Evers AW, Kraaimaat FW, van LW, Jongen PJ, Jacobs JW, Bijlsma JW (2001) Beyond unfavorable thinking: the illness cognition questionnaire for chronic diseases. J Consult Clin Psychol 69:1026–1036
22. Lazarus RS (2001) Emotion and adaptation. Oxford University Press, New York
23. Streiner DL, Norman GR (2008) Health measurement scales: a practical guide to their development and use. Oxford University Press, Oxford
24. Cano A, Mayo A, Ventimiglia M (2006) Coping, pain severity, interference, and disability: the potential mediating and moderating roles of race and education. J Pain 7:459–468
25. Ouwehand C, de Ridder DT, Bensing JM (2009) Who can afford to look to the future? The relationship between socioeconomic status and proactive coping. Eur J Public Health 19:412–417

26. Roth RS, Geisser ME (2002) Educational achievement and chronic pain disability: mediating role of pain-related cognitions. Clin J Pain 18:286–296
27. Fresco DM, Williams NL, Nugent NR (2006) Flexibility and negative affect: examining the associations of explanatory flexibility and coping flexibility to each other and to depression and anxiety. Cognit Ther Res 30:201–210
28. Roussi P, Krikeli V, Hatzidimitriou C, Koutri I (2007) Patterns of coping, flexibility in coping and psychological distress in women diagnosed with breast cancer. Cognit Ther Res 31:97–109
29. Greenglass ER (2002) Proactive coping. In: Frydenberg E (ed) Beyond coping: meeting goals, vision, and challenges. Oxford University Press, London, pp 37–62
30. Schwartz CE, Peng CK, Lester N, Daltroy LH, Goldberger AL (1998) Self-reported coping behavior in health and disease: assessment with a card sort game. Behav Med 24:41–44
31. Haythornthwaite JA, Menefee LA, Heinberg LJ, Clark MR (1998) Pain coping strategies predict perceived control over pain. Pain 77:33–39
32. Cheng C (2003) Cognitive and motivational processes underlying coping flexibility: a dual-process model. J Pers Soc Psychol 84:425–438
33. Blalock SJ, DeVellis BM, Holt K, Hahn PM (1993) Coping with rheumatoid arthritis: is one problem the same as another? Health Educ Q 20:119–132
34. Keefe FJ, Rumble ME, Scipio CD, Giordano LA, Perri LM (2004) Psychological aspects of persistent pain: current state of the science. J Pain 5:195–211