



# An activity pacing scale for the chronic pain coping inventory: development in a sample of patients with fibromyalgia syndrome

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Received 30 March 1999; received in revised form 27 April 2000; accepted 6 June 2000

## Abstract

Patients with fibromyalgia syndrome (FS) experience a decreased ability to participate in both vocational and avocational activities. Although many treatment programs advocate activity pacing techniques, ‘pacing’ is a poorly understood concept for which there are no available measures. The present study describes a brief six-item pacing scale that can be administered as part of the Chronic Pain Coping Inventory (CPCI). Preliminary data indicate that this scale is a valid, reliable index of the pacing construct that is associated with physical impairment in patients with FS and is unrelated to simple task persistence. © 2001 International Association for the Study of Pain. Published by Elsevier Science B.V. All rights reserved.

*Keywords:* Fibromyalgia; Chronic pain; Coping; Pacing; Chronic Pain Coping Inventory

## 1. Introduction

Fibromyalgia syndrome (FS) is a chronic rheumatological disorder of unknown etiology that affects between 2 and 4% of the general population (Wolfe et al., 1995). Current treatment typically focuses on symptom reduction through medical management and/or self-management approaches often within the context of multidisciplinary pain management programs (Nielson et al., 1997). Activity pacing has been a primary component of such programs since their inception (Fey and Fordyce, 1983), and is currently considered to be a key requirement for both increased activity tolerance and adaptive pain management (Gil et al., 1988; Hanson and Gerber, 1990).

The Chronic Pain Coping Inventory (CPCI), developed by Jensen et al. (1995) provides clinicians with a measure of the frequency with which patients use coping strategies which are both encouraged (exercise/stretching, relaxation, task persistence) and discouraged (guarding, resting, asking for assistance) by multidisciplinary treatment programs. Use of such a measure allows for investigation of: (1) maintenance of adaptive coping strategies post-treatment; (2) the relationship between use of adaptive coping strategies and

functioning; and (3) the relationship between adaptive coping strategies and treatment outcome. Unfortunately, like other extant measures of pain coping, the CPCI in its current form does not assess pacing. As a result, there is no research to date examining the contribution of pacing to adjustment among patients with chronic pain. The primary purpose of the current study was to develop, and provide an initial evaluation of, a scale to measure pacing which could be administered as part of the CPCI.

## 2. Methods

### 2.1. Participants

Patients included in this study met the American College of Rheumatology criteria for the diagnosis of FS (Wolfe et al., 1990). They were seen on two occasions once prior to and once at admission to a multidisciplinary treatment program. In the present sample, 117 patients were consecutively evaluated but seven were excluded due to missing data for a total of 110. Their average age was 45.3 years (SD 8.4, range 20–61) with 98 (89.1%) females and 12 (10.9%) males. Eighty-three (75.5%) were living with a significant other (including children). The mean duration of pain was 80.6 months (SD 72.8).

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## 2.2. Measures

The CPCI (Jensen et al., 1995) is a 65-item questionnaire that measures 11 pain coping dimensions including six illness-focused responses (guarding, resting, asking for assistance, opioid medication use, NSAID use, sedative-hypnotic use), four wellness-focused responses (relaxation, task persistence, exercise/stretch, coping self-statements) and one involving support from others (seeking social support). In the present study the single item asking about medication use was not included because of the controversy surrounding the use of medications for chronic musculoskeletal pain (Jonasson et al., 1998; Moulin et al., 1996).

A set of items was developed that described, based upon clinical observations, what patients do when they pace their activities appropriately. These items were written to include behaviors such as going slower, taking breaks, maintaining a steady pace and breaking tasks into manageable pieces. Although the concept of pacing often includes the notion of increased activity tolerance (Gil et al., 1988) we view this as a consequence of pacing rather than as part of the construct itself. Thus our items simply reflect efforts to modulate rate of activity. These items were also written in a manner that would differentiate them from the Task Persistence scale of the CPCI that measures patients' reports of their tendency to continue activities while ignoring their pain. A total of six items were written (see Appendix A).

In addition to the CPCI, the participants in this study also completed the Centre for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977), the Fibromyalgia Impact Questionnaire (FIQ) (Burckhardt et al., 1991), the West Haven–Yale Multidimensional Pain Inventory (WHYMPI) (Kerns et al., 1985) and the Marlowe–Crowne Social Desirability Scale (MCSDS) (Crowne and Marlowe, 1960). The present study used only the CES-D and PI scale of FIQ as criterion variables in order to evaluate the predictive validity of the new CPCI pacing scale. These scales were chosen as indices of the psychological and physical disability components of chronic pain. The criterion variables were limited to these two in order to reduce the experiment-wise error rate.

## 2.3. Procedure

All participants completed the questionnaires on the day of admission to the Rheumatology Day Care Program at London Health Sciences Centre, a tertiary care hospital affiliated with the University of Western Ontario. Of the 110 subjects who had complete data at admission, 96 also had pre-admission data available for the CPCI and MCSDS. This subgroup was used to evaluate (1) test–retest reliability of the CPCI scales (including pacing) and to (2) examine the impact of a socially desirable response style as measured by the MCSDS. The test–retest interval was the time subjects spent waiting for admission to the program after their initial assessment ( $M = 12.60$  weeks,  $SD 8.13$  weeks).

## 3. Results

### 3.1. Item analyses: pacing scale

Moderately large (0.55–0.74) inter-item correlations were obtained suggesting that each pacing scale item is measuring a similar but not identical domain. Item-total correlations ranged from 0.71 to 0.79 indicating good scale homogeneity. Generally, items with correlations less than 0.20 should be discarded (Kline, 1986) and hence all six items were retained. Cronbach's alpha (Cronbach, 1951) was 0.91 indicating a high level of scale stability. Calculating alpha with each item removed indicated no degradation in alpha suggesting that all items should be retained and contribute to scale reliability. In order to evaluate the impact of social desirability on individual items, Differential Reliability Indices (DRIs) (Jackson, 1970) were calculated using the MCSDS. DRIs were 0.79 (item 7), 0.85 (item 18), 0.79 (item 34), 0.86 (item 45), 0.85 (item 58) and 0.79 (item 67). These indices suggest that social desirability had relatively little impact on item responses and does not jeopardize the validity of the pacing scale.

Table 1 presents the correlation coefficients between the individual pacing items and the pacing scale total score as well as correlations with the other CPCI scales. The correlations between each item and the pacing scale total score

Table 1  
Correlations between pacing scale items and CPCI scale scores<sup>a</sup>

Pacing item	CPCI scales								
	Guard	Rest	Assist	Relax	Persist	Pace	Exercise	Cope	Support
Item 7	0.15	0.34*	0.24	0.44*	−0.06	0.79*	0.44*	0.38*	0.38*
Item 18	0.06	0.20	0.23	0.50*	0.08	0.85*	0.53*	0.42*	0.39*
Item 34	−0.03	0.18	0.21	0.43*	0.10	0.82*	0.48*	0.36*	0.34*
Item 45	0.07	0.24	0.21	0.41*	0.06	0.86*	0.51*	0.30*	0.33*
Item 58	0.06	0.26	0.18	0.44*	0.15	0.85*	0.51*	0.31*	0.33*
Item 67	−0.09	0.18	0.20	0.29	0.13	0.79*	0.39*	0.32*	0.33*

<sup>a</sup> \* $P < 0.001$ .

Table 2  
Zero-order correlations between CPCI scales and adjustment measures<sup>a</sup>

CPCI scale	CES-D	FIQ-PI
Guarding	0.29*	0.06
Resting	-0.11	0.05
Assistance	-0.07	0.09
Relaxation	-0.16	0.19
Task persistence	0.04	-0.23
Pacing	-0.37**	-0.18
Exercise/stretch	-0.29*	0.06
Coping statements	-0.21	-0.06
Social support	-0.17	0.06

<sup>a</sup> \* $P < 0.005$ ; \*\* $P < 0.001$ .

were considerably higher than the correlations between the items and any of the other CPCI scale scores. The items were moderately correlated with some of the other CPCI scales. These results suggest that in terms of discriminant validity all items should be retained and that although the pacing items comprise an appropriately homogeneous scale, these items are also related to other coping behaviors.

### 3.2. Scale analysis

Test–retest reliabilities for the CPCI scales were moderate and consistent with the lengthy interval between test administrations. They were as follows: guarding, 0.56; resting, 0.53; asking for assistance, 0.58; relaxation, 0.63; task persistence, 0.47; pacing, 0.60; exercise/stretch, 0.78; seeking social support, 0.69; coping self-statements, 0.66 ( $P < 0.001$  for all). These results indicate that the CPCI scales, including the pacing scale, demonstrate an acceptable level of reliability over an extended period of time when administered in a clinical context.

Table 2 illustrates the zero-order correlations between the CPCI scales and the two adjustment measures, the CES-D and the FIQ-PI. As can be seen, only three of the coping scales (guarding, exercise/stretching and pacing) were significantly ( $P < 0.005$ ) related to depressive symptoms, and none of the scales were significantly associated with physical impairment as measured by the scale of the FIQ-PI.

### 3.3. Hierarchical regression

In order to determine whether the pacing scale contributes significantly to the prediction of patient functioning over and above the other CPCI scales, two sets of hierarchical

multiple regression analysis were conducted, using CES-D and FIQ-PI scores as separate criterion variables in these analyses. For both analyses, sex and age were entered at the first step, WHYMPI-PS was added at the second step of the analysis because pain severity likely influences both coping and patient functioning (and hence could contribute to a spuriously strong association between these variables), CPCI scores (except the pacing scale) were added at the third step, and the pacing scale was entered at the last step. Table 3 illustrates the results of the regression using the CES-D. As can be seen age and sex did not significantly predict CES-D scores. This was also evident in the zero-order correlations, which were  $-0.03$  and  $-0.13$ , respectively. Pain severity, on the other hand significantly predicted CES-D scores, as did the CPCI scales. In the final step when the pacing scale was added, the relationship between pacing and depression, controlling for sex, age, pain severity and other coping measures was non-significant although a trend was apparent ( $P = 0.08$ ) i.e., the pacing scale produced a marginal improvement in the predictive value of this set of variables.

A somewhat different picture emerged when the FIQ-PI was used as the criterion variable (see Table 4). Although the CPCI (excluding the pacing scale) did not add to the strength of the prediction equation, the addition of the pacing scale significantly improved prediction of FIQ-PI scores. Thus, the pacing scale appears to predict physical impairment independent of sex, age, pain severity and other CPCI scales. The standardized beta coefficients for the variables in the final regression equation are shown in Table 5 and indicate that pacing, relaxation and pain severity were the strongest predictors of physical impairment.

## 4. Discussion

The data presented here provide initial support for the reliability of a pacing scale as a useful addition to the CPCI. The pacing scale appears to have very good internal consistency and discriminant validity. It is relatively unaffected by the response bias of social desirability and, in the context of this study, test–retest coefficients for the pacing scale (as well as the other CPCI scales) were of moderate magnitude. Shorter test–retest intervals can be expected to produce considerable higher reliability coefficients (Jensen et al., 1995). In addition, the pre-admission to admission interval used to evaluate test–retest reliability included

Table 3  
Regression with CES-D as criterion variable

Model	$R^2$	$R^2$ change	$F$ change	d.f.	Significant $F$ change
Sex, age	0.02	0.02	0.93	2, 107	NS
Sex, age, pain severity	0.15	0.13	16.71	1, 106	0.0001
Sex, age, pain severity, CPCI	0.31	0.16	2.76	8, 98	0.01
Sex, age, pain severity, CPCI, pacing scale	0.33	0.02	3.18	1, 97	0.08

Table 4  
Regression with FIQ-PI as criterion variable

Model	$R^2$	$R^2$ change	$F$ change	d.f.	Significant $F$ change
Sex, age	0.01	0.01	0.78	2, 107	NS
Sex, age, pain severity	0.09	0.08	9.35	1, 106	0.005
Sex, age, pain severity, CPCI	0.19	0.10	1.49	8, 98	NS
Sex, age, pain severity, CPCI, pacing scale	0.23	0.04	5.26	1, 97	0.02

preparatory pre-admission feedback. Under these conditions, scales are less likely to remain stable from the first to the second testing. Additional test–retest data are required to clarify the test-retest reliability of the pacing scale. The relationship between the pacing scale and the criterion measures suggests that this scale is more strongly related to the psychological component of chronic pain (CES-D) than the physical impairment component (FIQ-PI). When this relationship was examined more closely, such that the effects of sex, age and pain severity were partially out, a different picture emerged. The pacing scale did not significantly augment the ability of the other CPCI scales to predict depressed mood (i.e. the CES-D). However, when the same analysis was repeated using the FIQ-PI as the criterion measure in the regression analysis, the CPCI scales (excluding pacing) did not predict patients' ratings of physical impairment independent of sex, age and pain severity. In contrast, the pacing scale *alone* was a significant predictor of physical impairment after controlling for sex, age, pain severity and the other CPCI scales. This finding provides support for the notion that the extent to which patients pace their activities is related to their overall level of physical impairment. Nonetheless, the modest increase in variance accounted for by the pacing scale beyond that related to other CPCI scales suggests that pacing may play a relatively small role in patient functioning before multidisciplinary treatment. However, it remains possible that pacing will play a more substantial role after patients are taught this skill. These data and the modest correlations with the CES-D, raise the question of clinical vs. statistical signifi-

cance. Additional research will be necessary to clarify the clinical meaningfulness of these relationships.

It was also noteworthy that the pacing scale was essentially uncorrelated with the task persistence scale of the CPCI indicating that they measure quite different constructs. Thus it appears that patients' perceptions of pacing their activities are quite different than those related to persisting at a task and have different relationships to adjustment as measured by depressed mood and physical impairment.

It is hoped that this pacing scale will assist in clarifying the largely unexplored relationships among activity pacing, treatment outcomes and adjustment to chronic pain. Future research should examine validity and reliability of this scale in patients with chronic pain conditions other than FS and its sensitivity to change as a result of activity pacing interventions.

#### Appendix A. Pacing scale items

- Item 7: I was able to do more by just going a little slower and giving myself occasional breaks.
- Item 18: I focussed on going 'slow and steady' instead of on my pain.
- Item 34: I broke up tasks into manageable pieces so I could still get a lot done despite pain.
- Item 45: I went 'slow and steady' to help distract myself from my pain.
- Item 58: I paced my activities by going 'slow but steady'.
- Item 67: By going at a reasonable pace (not too fast or slow) pain had less effect on what I was doing.

Table 5  
Standardized  $\beta$  coefficients for variables predicting physical impairment<sup>a</sup>

Variable	Standardized $\beta$	$t$
Age	-0.02	-0.16
Sex	0.11	1.17
WHYMPI-pain severity	0.23	2.32*
CPCI-guarding	-0.05	-0.44
CPCI-resting	0.04	0.36
CPCI-assistance	0.04	0.36
CPCI-relaxation	0.31	2.36*
CPCI-task persistence	-0.17	-1.74
CPCI-stretch/exercise	0.01	0.06
CPCI-coping statements	-0.09	-0.77
CPCI-social support	0.09	0.72
Pacing scale	-0.28	-2.29*

<sup>a</sup> \* $P < 0.02$ .

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