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ORIGINAL ARTICLE

Active or Passive Pain Coping Strategies in Hip and Knee Osteoarthritis? Results of a National Survey of 4,719 Patients in a Primary Care Setting

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Objective. **To study pain coping strategies in patients with hip and knee osteoarthritis (OA), and to assess the psychometric qualities of the French version of the Pain Coping Inventory (PCI).**

Methods. **We conducted a national, cross-sectional survey in a primary care setting in France. A total of 1,811 general practitioners included 5,324 patients with hip and knee OA who completed several questionnaires, including the PCI, which assesses ability to cope with pain.**

Results. **The records of 4,719 (86.4%) patients were analyzed (knee 2,781; hip 1,553; hip and knee 385). Supporting the structure of the original questionnaire, we found that the 33 PCI questionnaire items could be grouped into 3 domains defining active coping strategies and 3 defining passive coping strategies. Acceptable convergent validity was found for the PCI (Cronbach's alpha coefficient for each domain >0.68). Coping strategy scores were significantly higher in patients with both knee and hip involvement (mean ± SD 2.3 ± 0.4) than for patients with OA at 1 site (mean ± SD 2.1 ± 0.4), and in women compared with men ($P < 0.001$). The use of passive pain coping strategies increased with OA duration, and was greater in older and overweight patients, in patients with no current physical activity or major impairment, in retired and nonworking patients, and in patients who were not married, and to a lesser extent in patients with higher pain intensity. Compared with previous data, patients with OA demonstrated lower active and higher passive strategies than patients with rheumatoid arthritis and other chronic painful conditions.**

Conclusion. **The PCI has good structural validity and is highly suitable for analyzing active and passive pain coping strategies in OA. In OA, active and passive coping strategies differ significantly as a function of age, body mass index, OA involvement, professional and marital status, sport activities, and OA duration, with pain intensity having a weaker effect.**

INTRODUCTION

Osteoarthritis (OA) generally causes significant chronic pain and disability, especially in the lower extermities. Cognitive and behavioral reactions to chronic pain may affect pain, functional capacity, and psychological functioning in patients with OA (1). These reactions to pain are commonly referred to as pain coping strategies and may be classified as general, passive, and active strategies. OA interferes with many domains, therefore, approaches to OA treatment are mostly multimodal, with increasing focus on pain coping strategies adapted to individual patients (2). Analyses of pain coping strategies in patients with OA are important for minimizing the impact of symptoms and establishing appropriate disease management, taking into account several factors, including age, sex, body mass index (BMI), and type of handicap (3).

Pain coping strategies have been extensively studied in many rheumatologic conditions, including rheumatoid arthritis (Vanderbilt Pain Management Inventory; VPMI [4]), low back pain (Pain Cognition List; PCL [5]), and fibromyalgia (6). Numerous studies have also dealt with pain coping strategies in patients with OA (2,3,7–9). Several pain coping scales are available for the assessment of chronic pain (Coping Strategies Questionnaire; CSQ [10], PCL [5], VPMI [4], Chronic Pain Coping Inventory [11],

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Vanderbilt Multidimensional Pain Coping Inventory [12]) and were developed for patients with specific subtypes of chronic pain. The Pain Coping Inventory (PCI), designed by Kraaimaat and Evers (13), has been validated in painful chronic conditions such as rheumatoid arthritis, cephalgia, and painful conditions of multiple origins. The PCI has not yet been validated for patients with OA of the hip or knee, but various aspects of the PCI have been shown to be valid in patients with OA of the hip or knee (14,15). This scale has also been used to study the relationship between pain coping strategies and pain in OA (15–17).

We chose to use this questionnaire because it is easy to administer and analyze. The PCI contains 33 questions, which can be pooled into 6 domains of cognitive and behavioral strategies for dealing with chronic pain: pain transformation, distraction, reducing demands, retreating, worrying, and resting. These domains can be grouped into active (transformation, distraction, reducing demands) and passive (retreating, worrying, resting) pain coping dimensions. The relationship between coping with chronic pain and physical and psychological adjustment has been studied in detail (18), but little is known about the relationship between pain coping strategies and pain in OA.

We explored pain coping strategies and studied the psychometric qualities of the French version of the PCI in patients with hip and knee OA.

PATIENTS AND METHODS

Three thousand general practitioners (GPs) were selected to participate in this national, multicenter, observational study, resulting in a total of 2,000 selecting centers and 5,000 enrolled patients. These GPs were selected from a database listing all French GPs. Each GP was asked to include the first 3 patients age 50 years or older with hip or knee OA according to American College of Rheumatology criteria (19) seen by the GP from March to June 2004. Patients presenting with any of the following criteria were not enrolled: pain originating from another painful condition, neurologic disease affecting the lower extremities, other severe conditions with a potentially significant impact on daily life activities, and previous lower extremity amputations. The following demographic and clinical data were recorded: age, sex, weight, height, BMI, site of OA (knee, hip, both), and marital and professional status.

All patients were asked to complete several questionnaires. Pain coping strategies were assessed with the French version of the PCI. Pain intensity (average pain at rest and on movement during the last 24 hours, average pain for the last 8 days) was evaluated via an 11-point numerical pain scale. The French version (20) of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) physical function subscale (21), which assesses knee-related physical function over the last 48 hours, was used to assess physical function.

The project was approved by the Paris-Cochin Research Ethics Committee. Data were analyzed using SAS, version 8.2 software (SAS Institute, Cary, NC).

We analyzed pain coping strategies in patients with lower extremity OA, as assessed by the PCI. This approach made it possible to analyze the 6 pain coping dimensions defined by the PCI and to examine the types of pain coping strategies used (active and passive) and the effect of pain on those strategies. The first 3 domains of the PCI define active coping strategies (mean of 3 scores), whereas the last 3 domains define passive strategies (mean of 3 scores). We assessed the correlation between pain coping strategies and demographic and clinical variables using Spearman's rank correlation analyses. For each domain, analysis of covariance (ANCOVA) was performed, comparing the 2 sites of OA and adjusting for sex, BMI (continuous), age (continuous), duration (continuous), marital status (categorical, with 3 classifications: part of a couple, widowed, or separated/divorced), professional status (categorical, with 8 validated French social classifications), and sports activities (categorical, with 3 classifications: no activity, occasional, and regular activity).

We also assessed the structure of the PCI. We carried out principal components analysis (PCA) on the psychometric properties of the PCI to check their unidimensionality, the quality of separation of each item, and the linearity of each domain. PCA is a data set simplification technique in which the number of dimensions of a multidimensional data set is reduced for analysis. It was used to extract factors from the subscale scores of the PCI. Spearman's correlation coefficients were considered to be excellent (>0.91), good ($0.90-0.71$), moderate ($0.70-0.51$), fair ($0.50-0.31$), or poor (<0.31) (18). Independent factors were obtained with the varimax rotation method. Internal consistency was assessed by calculating Cronbach's alpha coefficient for each PCI domain.

RESULTS

Characteristics of the patients. Of the physicians contacted, 2,419 were enrolled in the study and 1,881 were active, contributing at least 1 patient to the study. This resulted in a participation rate of 75%. No significant demographic differences were identified between participating and nonparticipating physicians. The 1,811 active physicians included 5,324 patients, corresponding to a mean ± SD of 2.9 ± 0.2 patients per physician.

We analyzed data for 4,719 of the 5,324 patients included, which corresponded to 89% of the selected population (Table 1). We analyzed all patients for whom no major violation of the protocol was observed. The major violations observed in the excluded patients were age <50 years (321 patients excluded), no information about the site of OA (23 excluded), and hip or knee prosthesis (7 excluded).

The 4,719 patients included had a mean ± SD age of 67 ± 9 years, and 58% were women (Table 1). Mean ± SD BMI was 27.4 ± 4 kg/m^2. Most patients were living with a partner (69%), had been educated at the primary (47%) or secondary (35%) school level, and approximately half were retired. No sports activities were reported for 75% of the patients. OA most frequently affected only the knee (n = 2,781 [59%]) or hip (n = 1,553 [33%]), with both joints affected in only a small number of patients (n = 385). The mean ± SD duration of OA since diagnosis was

Table 1. Demographic and clinical characteristics of patients with hip or knee OA*

	Knee OA	Hip OA	Hip and knee OA	Whole sample
Patients	2,781 (58.9)	1,553 (32.9)	385 (8.2)	4,719 (100)
Age, mean ± SD years	66.7 ± 9.1	67.4 ± 8.7	70.2 ± 9.2	67.2 ± 9.0
Male	1,126 (40.5)	720 (46.5)	133 (34.7)	1,979 (42.0)
Weight, mean ± SD kg	76.9 ± 13.1	74.6 ± 12.7	77.0 ± 13.7	76.1 ± 13.1
Height, mean ± SD cm	166.6 ± 8.2	167.2 ± 8.1	165.5 ± 8.6	166.7 ± 8.2
BMI, mean ± SD kg/m^2	27.7 ± 4.4	26.6 ± 3.9	28.1 ± 4.6	27.4 ± 4.3
OA duration, mean ± SD years	5.9 ± 5.0	5.4 ± 4.8	5.9 ± 5.0	5.7 ± 4.9
Pain, mean ± SD				
Pain at rest	4.1 ± 2.2	4.1 ± 2.2	4.6 ± 2.1	4.1 ± 2.2
Pain on movement	5.9 ± 1.8	5.9 ± 1.8	6.3 ± 1.8	5.9 ± 1.8
Pain over the last 8 days	5.0 ± 1.7	5.1 ± 1.7	5.5 ± 1.6	5.1 ± 1.7
Marital status				
Couple	1,902 (68.7)	1,082 (70.1)	236 (61.5)	3,220 (68.6)
Divorced	161 (5.8)	92 (6.0)	21 (5.5)	274 (5.8)
Widowed	660 (23.8)	347 (22.5)	120 (31.3)	1,127 (24.0)
Single	47 (1.7)	22 (1.4)	7 (1.8)	76 (1.6)
Professional status				
Higher education	333 (12.1)	202 (13.2)	43 (11.3)	578 (12.4)
Craftsman	95 (3.4)	60 (3.9)	7 (1.8)	162 (3.5)
Workman	219 (7.9)	102 (6.6)	26 (6.8)	347 (7.4)
Employee	262 (9.5)	143 (9.3)	28 (7.3)	433 (9.2)
Farmer	100 (3.6)	65 (4.2)	16 (4.2)	181 (3.9)
Shopkeeper	108 (3.9)	60 (3.9)	8 (2.1)	176 (3.8)
Company director	32 (1.2)	15 (1.0)	4 (1.0)	51 (1.1)
Executive	83 (3.0)	55 (3.6)	13 (3.4)	151 (3.2)
Senior executive	59 (2.1)	37 (2.4)	5 (1.3)	101 (2.2)
Self-employed	87 (3.1)	43 (2.8)	8 (2.1)	138 (2.9)
Intermediate professions	34 (1.2)	17 (1.1)	6 (1.6)	57 (1.2)
Retired	1,303 (47.1)	746 (48.5)	206 (53.6)	2,255 (48.1)
Unemployed (seeking work)	16 (0.6)	5 (0.3)	1 (0.3)	22 (0.5)
Without profession	369 (13.3)	189 (12.3)	56 (14.6)	614 (13.1)
Physical activity				
None	1,859 (74.9)	1,002 (72.1)	279 (80.9)	3,140 (74.5)
Occasional	467 (18.8)	313 (22.5)	48 (13.9)	828 (19.6)
Current	155 (6.2)	75 (5.4)	18 (5.2)	248 (5.9)
Impairment, mean ± SD				
No. of days per month disturbed by OA	18.1 ± 9.2	18.5 ± 9.4	18.7 ± 9.5	18.2 ± 9.3
WOMAC function	46.6 ± 18.1	50.6 ± 16.9	56.4 ± 17.2	48.7 ± 17.9

* Values are the number (percentage) unless otherwise indicated. OA = osteoarthritis; BMI = body mass index; WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index.

5.7 ± 4.9 years at the time of the study. On average, OA had a significant impact on daily life on 18.2 ± 9.3 days per month. Mean ± SD pain intensity was 4.1 ± 2.2 at rest, 5.9 ± 1.8 on movement, and 5.1 ± 1.7 over an 8-day period. For each of these 3 pain measurements, the values obtained were similar in patients with knee and hip OA, but were significantly higher ($P > 0.01$) in patients in whom both joints were affected (4.6 ± 2.1, 6.3 ± 1.8, and 5.5 ± 1.6, respectively).

Structure of the PCI. We carried out PCA on the data set for the 33 PCI items. We identified 6 factors: a first factor (items 9, 10, 11, 12, 13, 14, and 32) similar to the retreating domain of the PCI (6 of 7 items), a second factor (items 17, 24, 25, 26, 27, 28, 29, and 31) similar to the worrying domain of the PCI (8 of 9 items), a third factor (items 1, 5, 6, 7, 8, and 33) similar to the resting domain (5 of 5 items), a fourth domain (items 19, 20, 21, and 22) similar to the distraction domain (4 of 5 items), a fifth factor (items 15, 16, 18, and 30) identical to the pain transformation domain, and a sixth factor (items 2, 3, and 4) identical to the reducing demands domain of the PCI (Table 2). Cronbach's alpha statistics were calculated for each PCI domain and all alpha coefficients were well within the acceptable range (between 0.68 and 0.74). These analyses indicate that the structure of the PCI is valid for patients with OA of the hip and/or knee.

Pain coping strategies in patients with hip and knee OA. Pain coping strategies were assessed with the PCI. We analyzed all 33 items and 6 domains of the PCI, with scores ranging from 1 (almost never) to 4 (very often) (Table 2).

The scores obtained for the 6 PCI domains ranged from 1.7 to 2.4, close to the previous norm obtained by Kraaimaat and Evers (13) (Table 3). For active pain coping strategies, the mean ± SD scores of the 4,719 OA patients were 1.9 ± 0.6 for pain transformation, 1.9 ± 0.6 for distraction,

Table 2. Pain Coping Inventory (PCI) scores and principal components analysis of PCI (33 items) in 4,598 patients

PCI item	Mean ± SD score (range 0–4)	Rotated factor pattern					
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
PCI 1: I stop my activities	2.3 ± 0.8	0.14	0.31	0.62*	−0.11	−0.03	0.03
PCI 2: I continue my activities, but with less effort	2.5 ± 0.7	−0.01	0.09	0.08	0.09	0.07	0.83*
PCI 3: I continue my activities, but at a slower pace	2.5 ± 0.7	0.01	0.11	0.15	0.05	0.09	0.86*
PCI 4: I continue my activities, but with less precision	2.2 ± 0.9	0.23	0.16	0.27	−0.05	0.09	0.65*
PCI 5: I confine myself to simple activities	2.5 ± 0.9	0.15	0.22	0.70*	−0.02	0.05	0.25
PCI 6: I take care that I don't have to exert myself physically	2.6 ± 0.9	0.08	0.24	0.75*	−0.01	−0.01	0.14
PCI 7: I take rest by sitting or lying down	2.5 ± 0.9	0.20	0.17	0.74*	0.12	−0.04	0.09
PCI 8: I take on a comfortable body posture	2.6 ± 0.8	0.17	0.11	0.68*	0.27	0.01	0.08
PCI 9: I take a bath or shower	1.8 ± 0.8	0.53*	0.01	0.05	0.31	0.13	0.08
PCI 10: I take care that I don't get upset	1.7 ± 0.8	0.76*	0.15	0.15	0.09	0.07	0.04
PCI 11: I retreat into a restful environment	1.8 ± 0.8	0.75*	0.12	0.30	0.13	0.05	0.01
PCI 12: I take care that I am not bothered by annoying sounds	1.6 ± 0.8	0.82*	0.13	0.20	0.09	0.07	0.01
PCI 13: I take care that I am not bothered by the light	1.4 ± 0.7	0.80*	0.11	0.09	0.09	0.13	0.05
PCI 14: I take care of what I eat or drink	1.9 ± 0.9	0.47*	0.11	0.06	0.21	0.19	0.05
PCI 15: I pretend the pain is not present	2.1 ± 0.8	0.05	−0.04	−0.05	0.08	0.85*	0.08
PCI 16: I pretend the pain does not concern my body	1.8 ± 0.8	0.19	0.00	−0.05	0.08	0.84*	0.09
PCI 17: I focus on the pain all the time	1.7 ± 0.8	0.49*	0.43*	0.16	−0.06	0.12	0.02
PCI 18: I imagine the pain to be less violent than it really is	1.9 ± 0.8	0.23	0.15	0.06	0.26	0.63*	0.05
PCI 19: I think of pleasant things or events	2.0 ± 0.8	0.28	0.10	0.09	0.53*	0.43*	0.03
PCI 20: I distract myself by undertaking a physical activity	1.6 ± 0.8	0.32	−0.04	−0.30	0.43*	0.27	0.07
PCI 21: I distract myself by reading, listening to music, watching a TV program or similar	2.2 ± 0.9	0.15	0.00	0.11	0.81*	0.05	0.01
PCI 22: I do something I find pleasant	2.2 ± 0.8	0.11	0.03	0.04	0.84*	0.15	0.03
PCI 23: I self-administer other physical stimuli	1.6 ± 0.8	0.44*	0.23	−0.08	0.25	0.22	0.10
PCI 24: I think of all the things that I haven't been able to do because I am in pain	2.0 ± 0.9	0.21	0.59*	0.13	0.15	0.07	0.09
PCI 25: I start worrying	2.4 ± 0.9	0.08	0.80*	0.24	0.02	−0.03	0.09
PCI 26: I wonder about the cause of the pain	2.3 ± 0.9	0.10	0.81*	0.19	0.02	−0.03	0.08
PCI 27: I think that the pain will worsen	2.7 ± 0.9	−0.07	0.76*	0.20	0.03	−0.02	0.07
PCI 28: I think of moments when I was not in pain	1.9 ± 0.8	0.33	0.42*	0.04	0.22	0.18	0.12
PCI 29: I think I will go mad with pain	1.5 ± 0.8	0.48*	0.55*	0.14	−0.10	0.09	0.04
PCI 30: I remember other people's difficulties	1.9 ± 0.8	0.29	0.29	0.05	0.26	0.31	0.05
PCI 31: I think that others do not understand what it means to be in such pain	2.1 ± 0.9	0.25	0.60*	0.18	−0.02	0.11	0.06
PCI 32: I separate myself from others	1.7 ± 0.8	0.53*	0.44*	0.24	−0.04	0.01	0.02
PCI 33: When I am outdoors I try to return home as soon as possible	2.1 ± 0.8	0.24	0.44*	0.47*	−0.01	0.00	0.05

* Values >0.4.

and 2.4 ± 0.6 for reducing demands. The scores for passive pain coping were 1.7 ± 0.6 for retreating, 2.0 ± 0.6 for worrying, and 2.5 ± 0.7 for resting. The highest scores were obtained for the reducing demands and resting domains. These 2 domains corresponded to those in which patients developed the most highly adapted strategies for coping with pain (i.e., maintenance of current activity while limiting pain intensity). There were no significant differences between groups of active and passive strategies (mean ± SD scores of 2.1 ± 0.4 and 2.1 ± 0.5, respectively)

Table 3. Differences between mean ± SD pain coping scores assessed by the PCI subscales in patients with hip OA, patients with knee OA, and patients with OA at both sites*

	OA coping scores from current study					Reference values from ref. 13†		
	P	Knee OA (n = 2,781)	Hip OA (n = 1,553)	Knee and hip OA (n = 385)	Total (n = 4,719)	*P*	Rheumatoid arthritis (n = 627)	Chronic pain (n = 104)
Active PCI subscale	NS	2.1 ± 0.4	2.1 ± 0.4	2.2 ± 0.5	2.1 ± 0.4	< 0.05	2.2	2.0
Factor 1: pain transformation	NS	1.9 ± 0.6	1.9 ± 0.6	1.9 ± 0.6	1.9 ± 0.6	< 0.01	2.3 ± 0.7	2.1 ± 0.6
Factor 2: distraction	NS	1.9 ± 0.6	2.0 ± 0.6	2.0 ± 0.6	1.9 ± 0.6	< 0.01	2.3 ± 0.6	2.2 ± 0.6
Factor 3: reducing demands	< 0.05	2.4 ± 0.6	2.4 ± 0.6	2.6 ± 0.6	2.4 ± 0.6	< 0.01	2.1 ± 0.7	1.8 ± 0.6
Passive PCI subscale	< 0.01	2.1 ± 0.5	2.1 ± 0.5	2.3 ± 0.6	2.1 ± 0.5	< 0.05	1.9	1.8
Factor 4: retreating	NS	1.7 ± 0.6	1.7 ± 0.6	1.9 ± 0.6	1.7 ± 0.6	NS	1.7 ± 0.5	1.6 ± 0.6
Factor 5: worrying	NS	2.0 ± 0.6	2.0 ± 0.6	2.2 ± 0.6	2.0 ± 0.6	< 0.01	1.8 ± 0.5	1.6 ± 0.6
Factor 6: resting	< 0.001	2.5 ± 0.6	2.5 ± 0.6	2.8 ± 0.6	2.5 ± 0.7	NS	2.4 ± 0.6	2.4 ± 0.6

* Values are the mean ± SD unless otherwise indicated. PCI = Pain Coping Inventory; OA = osteoarthritis; NS = not significant.
† Scores of patients from the reference study published by Kraaimaat and Evers (13) are indicated for indirect comparison.

for the whole population: passive and active strategies were used with equal frequency.

ANCOVA for PCI domains and site of OA demonstrated a significant difference according to site of OA for 3 scores: 2 pain coping domains (reducing demands [$P = 0.0369$] and resting [$P = 0.0042$]) and total passive coping strategies ($P = 0.0106$) (Table 3). All 3 of these scores were significantly higher in patients with OA of both the knee and the hip than in patients with OA at only 1 site. The total passive pain coping score was significantly higher in patients with knee OA than in patients with hip OA following adjustment for sex, BMI, and OA duration. ANCOVA for PCI domains and demographic characteristics revealed significant differences between the sexes: women had significantly higher scores in 5 of the 6 domains (pain transformation [$P = 0.017$], reducing demands [$P < 0.0001$], retreating [$P < 0.0001$], worrying [$P < 0.0001$], and resting [$P < 0.0001$]), and for both active ($P = 0.003$) and passive ($P < 0.0001$) strategies (Table 4). Therefore, women made more extensive use of pain coping strategies, both active and passive, than men when faced with pain. The scores for the 3 domains of passive coping increased significantly with OA duration. In conclusion, the use of passive pain coping strategies increased significantly with age, BMI, and OA duration and differed between the sexes (greater use of such strategies in women).

Marital status, professional status, sports activities, and OA duration may also influence pain coping strategies in patients with lower extremity OA (Table 4). Four of the 6 domains of the PCI were influenced by marital status: reducing demands scores were particularly high in widowed patients, and the scores for the 3 passive pain coping domains were significantly lower in married patients than in unmarried patients. Professional status was also an important factor, but analyses were explorative. Two of the 3 active pain coping domains were significantly affected by professional status: distraction scores were lower in workmen, craftsmen, farmers, retired patients, unemployed patients, and nonworking patients; reducing demands scores were lower in unemployed patients. The scores for the 3 passive pain coping domains also depended on professional status: retreating and resting domain scores were significantly higher in retired, unemployed, and nonworking patients; worrying scores were significantly higher in self-employed patients and managers. Thus, active pain coping strategy scores were significantly lower in unemployed patients, and passive pain coping scores were significantly higher in retired, unemployed, and nonworking patients. Sports activities were associated with differences in all 6 domains of the PCI: active pain coping scores were higher in patients currently practicing sports activities, whereas passive pain coping scores were significantly lower in these patients.

We also analyzed the correlation between functional assessment score (WOMAC), pain measurements, and each domain of the PCI (Table 5). The correlation between each of the PCI domains and the WOMAC functional subscale score was poor. A good correlation between coping strategies and functional impairment was found for only 2 domains, worrying ($r = 0.527$) and resting ($r = 0.622$), with more passive coping strategies used in patients with more severe impairment. A weaker correlation (between $r = 0.2$ and $r = 0.4$) was found between the 3 pain intensity scores (pain at rest, on movement, and during the last 8 days) and passive pain coping scores (mostly worrying and resting, less for retreating); there was no correlation between active pain coping strategies and pain intensity.

DISCUSSION

We analyzed 4,719 OA patients consulting French GPs (2.9 patients per GP), uniformly distributed throughout mainland France. The demographic characteristics of the participating GPs were similar to those of French GPs in general, validating our sample. This study provides original data on pain coping strategies in patients with lower extremity OA and validates the PCI for analysis of pain coping strategies in this disease.

The pain generated by OA leads to a decrease in physical function, disability, and poor quality of life, and has a major impact on functioning (22). As in many chronic diseases, patients use several coping strategies to adapt to the intensity of pain. The OA patients studied here dem-

Table 4. Demographic and clinical factors affecting the 6 Pain Coping Inventory dimensions (analysis of covariance)*

Dimension	*P*	r†	F‡
Pain transformation			
Sex	0.0050		5.59
Age	0.6722	0.00975	
BMI	0.1448	−0.019	
Duration	0.2244	−0.025	
Marital status	0.4896		0.81
Professional status	0.6965		0.76
Sports activities	0.0003		8.02
Distraction			
Sex	0.1215		1.94
Age	0.4407	−0.00583	
BMI	< 0.0001	−0.075	
Duration	0.2127	−0.016	
Marital status	0.0191		3.32
Professional status	< 0.0001		7.06
Sports activities	< 0.0001		58.87
Reducing demands			
Sex	< 0.0001		28.63
Age	< 0.0001	0.12962	
BMI	0.3832	−0.013	
Duration	< 0.0001	0.098	
Marital status	< 0.0001		14.92
Professional status	0.0003		3.07
Sports activities	0.0001		9.21
€			
Sex	< 0.0001		49.17
Age	< 0.0001	0.14001	
BMI	0.0332	0.046	
Duration	< 0.0001	0.107	
Marital status	< 0.0001		23.15
Professional status	< 0.0001		3.32
Sports activities	< 0.0001		12.05
Worrying			
Sex	< 0.0001		42.44
Age	< 0.0001	0.08067	
BMI	< 0.0001	0.086	
Duration	< 0.0001	0.082	
Marital status	< 0.0001		15.10
Professional status	< 0.0001		3.43
Sports activities	< 0.0001		36.32
Resting			
Sex	< 0.0001		78.30
Age	< 0.0001	0.29061	
BMI	< 0.0001	0.135	
Duration	< 0.0001	0.222	
Marital status	< 0.0001		51.19
Professional status	< 0.0001		18.58
Sports activities	< 0.0001		106.75
Active pain coping strategies			
Sex	0.0003		8.85
Age	0.3217	0.06349	
BMI	0.1707	−0.035	
Duration	0.0023	0.051	
Marital status	0.0309		2.96
Professional status	0.2240		1.28
Sports activities	< 0.0001		10.11
Passive pain coping strategies			
Sex	< 0.0001		81.17
Age	< 0.0001	0.21093	
BMI	< 0.0001	0.10916	
Duration	< 0.0001	0.16902	
Marital status	< 0.0001		40.66
Professional status	< 0.0001		9.62
Sports activities	< 0.0001		63.00

* Each domain was tested by analysis of covariance (adjustment for age, body mass index [BMI], duration) or analysis of variance (adjustment for sex).
† Correlation coefficient for quantitative data.
‡ Correlation coefficient for qualitative data.

onstrated lower active pain coping strategies and much higher passive pain coping scores than patients with rheumatoid arthritis and those with chronic pain (Table 3), as described in the article by Kraaimaat and Evers (13). Two active pain coping strategies (pain transformation and distraction) were more important in patients with rheumatoid arthritis versus those with OA and other pain patients. On the contrary, one active pain coping strategy (reducing demands: maintenance of usual activities with limitation of intensity) was more important in OA patients than in rheumatoid arthritis patients and other pain patients. Two passive pain coping strategies (worrying and resting: limitation of activities) were more important in OA compared with rheumatoid arthritis and other pain conditions. This finding suggests that degenerative joint disease (OA) leads to more passive pain coping strategies than do inflammatory joint diseases (rheumatoid arthritis). This is probably related to the fact that pain in OA is increased by motion, although pain in rheumatoid arthritis, which mostly occurs in the morning, is usually relieved by movement, after a period of stiffness.

The site of OA was found to have a significant effect on coping strategies: scores for the reducing demands and resting domains and the total score for passive coping strategies were significantly higher in patients with OA affecting both knees and hips than in patients in whom only one of these sites was affected. We also found that passive pain coping score was significantly higher in patients with knee OA than in patients with hip OA following adjustment for sex, BMI, and OA duration. These differences in pain coping strategies may be associated with differences in functional consequences, consistent with the results reported by Allen et al (23). Some studies have found differences in pain coping strategies between patients with hip and knee OA. Steultjens et al (15) demonstrated that the use of passive coping strategies predicted a higher level of disability in patients with knee OA and that active coping style predicted a high level of pain intensity. They also showed that resting was a prospective determinant of disability for knee OA, but not for hip OA. We showed that sports activities played a positive role in coping with pain for all PCI dimensions, with patients using active coping strategies being more likely to exercise. It remains unclear whether the more active coping strategies of patients who participate in regular sports activities are a cause or a consequence, but other studies have already suggested that there is a link between coping and physical tasks (24).

Pain coping scores for all domains and types of coping were higher in women than in men, with the exception of the distraction domain. This suggests that women use a more diverse range of strategies than men when faced with pain due to OA. This may be associated with the higher reported pain intensity scores for women than for men, but may also be due to the greater impact on function, as assessed by the WOMAC, in women than in men (mean ± SD WOMAC score 51.6 ± 17.2 versus 44.4 ± 18.1; $P < 0.0001$). Several other studies have already demonstrated differences in the coping strategies developed by men and women in the face of persistent pain (25–29). Women are more likely than men to use emotion-focused coping strategies when dealing with OA pain (25), and this is partic-

Table 5. Correlations (Spearman's rank correlation coefficient) between each of the 6 Pain Coping Inventory dimensions, WOMAC functional score (17 items), and 3 types of pain assessment (pain at rest, on movement, and mean pain over the last 8 days)*

	Active pain coping dimensions			Passive pain coping dimensions		
	Pain transformation	**Distraction**	**Reducing demands**	**Retreating**	**Worrying**	**Resting**
WOMAC function score						
r	0.12031	0.10193	0.34332	0.42540	0.52793	0.62245
P	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pain at rest						
r	0.05790	0.08112	0.16280	0.24984	0.31826	0.30472
P	0.0006	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pain on movement						
r	0.01477	0.00865	0.22543	0.18541	0.32866	0.38853
P	0.3789	0.6065	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Mean pain over the last 8 days						
r	0.03845	0.04034	0.22877	0.25168	0.38620	0.39816
P	0.0219	0.0162	< 0.0001	< 0.0001	< 0.0001	< 0.0001

* Passive pain coping strategies are correlated with functional impairment. Passive pain coping strategies (mostly worrying and resting, less for retreating) are also weakly correlated with osteoarthritis pain intensity, unlike active pain coping strategies. WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index.

ularly true for pain catastrophizing (27). Our study demonstrated that women developed more pain coping strategies than men in all domains, including physical domains, and both active and passive pain coping strategies. Pain coping scores were higher in older patients (>70 years), although all of the patients selected for this study were over the age of 50 years to ensure that the OA patient sample was as uniform as possible. Pain coping scores were also higher in obese patients (BMI >40 kg/m^2), who had higher pain intensity scores; these patients adopted mostly passive coping strategies.

We also found that married patients had lower passive coping scores than other patients. This is consistent with previous studies showing that spouses play a very important role in coping with OA (30), as in many other chronic conditions.

PCA was carried out for all 33 items of the PCI. We identified 6 distinct factors with compositions very similar to the 6 dimensions of the PCI. Various inventories for measuring pain coping strategies have been developed, and the PCI is an easily administered questionnaire designed to assess cognitive and behavioral pain coping strategies in patients with various types of pain. The PCI was generated from existing inventories (10,31) and from behavioral interviews with patients referred to a pain clinic, based on 114 initial items. The selection of nonredundant items and simultaneous component analysis led to the development of a 33-item inventory with 6 factors corresponding to the 6 domains, encompassing behavioral (B) and cognitive (C) pain coping strategies: pain transformation (C), distraction (C/B), reducing demands (C/B), retreating (B), worrying (C), and resting (B). The PCI has been validated for the assessment of pain coping strategies in patients with rheumatoid arthritis, fibromyalgia, chronic headaches, and in pain clinic patients (13). PCA identified the same 6 factors, grouping the same items in OA patients. Similar to Kraaimaat and Evers (13), we found that passive strategies, such as worrying and resting, were significantly associated with severe disability. Worrying was conceptualized as the cognitive aspect of pain-related anxiety. It is closely related to the so-called catastrophizing scales in other pain coping questionnaires (CSQ, PCL) (32). Future studies should investigate whether passive pain coping strategies predict poor outcomes, as reported for these other scales. Finally, we consider the PCI scales to be sensitive enough to identify groups of patients with OA using different pain coping strategies. Generally, as suggested by Kraaimaat and Evers (13), the PCI seems to be particularly suitable for studies and comparisons of pain coping strategies in many chronic pain situations, including lower extremity OA.

This study demonstrates that pain coping strategies in OA are globally well balanced between active and passive strategies and are not related to pain intensity. Women tend to make wider use of all types of pain coping strategies. Demographic and clinical factors may influence pain coping strategies, which tend to be more passive in older patients, in patients with both hip and knee involvement, and in patients with higher BMI, longer duration of OA, or greater functional impairment. Furthermore, certain personal characteristics, such as professional status, marital status, and sports activities, may also influence pain coping strategies. Comparisons with norm groups of other chronic pain patients suggest that OA patients demonstrate more passive strategies than patients with rheumatoid arthritis. This study also demonstrates that the PCI questionnaire is a valid tool for analyzing pain coping strategies in OA patients. Its use may make it possible to improve OA management, integrating pain coping strategies specifically adapted to age, sex, BMI, site of OA, OA duration, and functional impairment.

AUTHOR CONTRIBUTIONS

Dr. Perrot had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study design. Perrot, Poiraudeau, Rannou.
Acquisition of data. Perrot.
Analysis and interpretation of data. Perrot, Poiraudeau, Rannou.
Manuscript preparation. Perrot, Poiraudeau, Bertin, Sichere, Serrie, Rannou.
Statistical analysis. Kabir.

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