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Pain Catastrophizing Is Associated With Health Indices in Musculoskeletal Pain: A Cross-Sectional Study in the Dutch Community

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Cross-sectional associations were examined between pain catastrophizing and several health indices in 1,164 people with musculoskeletal pain from a Dutch community sample. Health indices included in the present study were specialist consultation, use of medication, and absenteeism or work disability. The results demonstrate that for people with a current episode of musculoskeletal pain, pain catastrophizing, pain intensity, and the presence of multiple pain locations were significantly associated with specialist consultation, use of pain medication, and absenteeism or work disability. The authors conclude that the role of pain itself has perhaps been underestimated in recent models of chronic pain-related disability. Some clinical implications and suggestions for further research are given.

Key words: pain catastrophizing, musculoskeletal pain, health status

Epidemiological studies have shown that in general chronic pain presents a major public health problem, with estimates of its prevalence ranging from 4% to 40% (Andersson, 1994; Blyth et al., 2001; Bowsher, Rigge, & Sopp, 1991; Brattberg, Thorslund, & Wikman, 1989; Crook, Rideout, & Browne, 1984; Feuerstein, Papciak, & Hoon, 1987; Magni, Caldieron, Rigatti Luchini, & Merskey, 1990; Sternbach, 1986). An epidemiological study in the Netherlands (Picavet, Schouten, & Smit, 1996) concluded that the report of chronic low back pain in the Dutch population increases from 12% in the 20–29-year age bracket to 21.1% in the 50–59-year age bracket. More recently, it was found that more than 40% of the participants in an open Dutch population study reported having any form of chronic musculoskeletal pain (Picavet, van Gils, & Schouten, 2000).

The detrimental consequences of chronic pain in terms of impairment and disability have a large socioeconomic impact due to the high health care costs, loss of wages and productivity, and costs of disability benefits and compensation (Bowsher et al., 1991; Feuerstein et al., 1987; Latham & Davis, 1994; Sternbach, 1986; Turk, 1996; Turk, Meichenbaum, & Genest, 1983; van Tulder, Koes, & Bouter, 1995). This can be illustrated for the Netherlands by the following: In 1991, the total costs of back complaints were estimated at well over 9 billion guilders, which corresponds with 1.7% of the gross national product (van Tulder et al., 1995; van Tulder, van Breukelen, Koes, & Bouter, 1997). These costs can be divided in direct costs (health care, medical, and patient-related costs) and indirect costs (loss of productivity and absenteeism) and were estimated at almost 700 million guilders and 8.6 billion guilders, respectively. Remarkably, about 90% of the total costs for back complaints are indirect, whereas, normally, direct and indirect costs make up about 70% and 30% of total health care costs, respectively (Goossens & van Tulder, 2000). Cats-Baril and Frymoyer (1991) reported that a relatively small proportion of back pain patients accounts for most of the costs, namely, the proportion comprising individuals who are permanently disabled; that is, chronic back pain patients represent less than 10% of all back pain patients but nevertheless account for 85% of all costs associated with the illness, and they account for 90% of lost productivity.

From this perspective it is important to gain more insight into the factors that maintain a pain problem and thus contribute to these detrimental consequences. Furthermore, from a clinical point of view, more knowledge about these factors might be instrumental in the early detection of people who are at risk of their pain problem being maintained over time and thus may be at risk of making more use of health care services, of sick leave (absenteeism), or even of work disability.

Over the years, several cognitive–behavioral models have been developed in which fear and avoidance variables were put forward as crucial mechanisms by which acute pain develops into chronic pain (Lethem, Slade, Troup, & Bentley, 1983; Philips, 1987; Waddell, Newton, Henderson, & Somerville, 1993). More recently, a cognitively oriented model was pre-

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sented in which pain catastrophizing and pain-related fear are postulated as central mechanisms in the development of chronic pain problems (Vlaeyen, Kole Snijders, Boeren, & van Eek, 1995; Vlaeyen, Kole Snijders, Rotteveel, & Ruesink, 1995). In this model, *pain catastrophizing*, defined as an exaggerated negative orientation toward pain (Sullivan, Bishop, & Pivik, 1995), is conceptualized as a precursor of pain-related fear, more specifically, fear of movement or (re)injury. This in turn is held to promote avoidance behavior and hypervigilance to bodily sensations, followed by disuse, depression, and disability, thus maintaining the pain experiences and reinforcing fear reactions and avoidance behaviors (Asmundson, Norton, & Norton, 1999; Vlaeyen & Linton, 2000).

There is a growing body of evidence linking pain catastrophizing to pain-related fear and disability, psychological distress, depression, and pain intensity (Crombez, Eccleston, Baeyens, & Eelen, 1998; Crombez, Vlaeyen, Heuts, & Lysens, 1999; Flor, Behle, & Birbaumer, 1993; Geisser, Robinson, Keefe, & Weiner, 1994; Hill, 1993; Hill, Niven, & Knussen, 1995; Keefe, Brown, Wallston, & Caldwell, 1989; Main & Waddell, 1991; Martin, Bradley, Alexander, & Alarcon, 1996; Severeijns, Vlaeyen, van den Hout, & Weber, 2001; Sullivan et al., 1995; Sullivan, Rouse, Bishop, & Johnston, 1997; Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998; Wells, 1994). Also, some prospective studies suggest that fear-avoidance beliefs and pain catastrophizing are precursors of pain-related disability rather than consequences (Burton, Tillotson, Main, & Hollis, 1995; Klenerman et al., 1995; Linton, Buer, Vlaeyen, & Hellsing, 2000; Linton & Hallden, 1998). Overall, the results of these studies are consistent with the fear-avoidance model developed by Vlaeyen, Kole Snijders, Boeren, and van Eek (1995), which suggests that pain catastrophizing and fear of movement or (re)injury foster the development of chronic pain problems.

The vast majority of studies on the relationship between pain catastrophizing and pain-related variables used selected samples such as patients from an outpatient treatment center or clinical patients. This may have biased the results of these studies because in patient samples relatively high base rates of both physical and mental pathology are to be expected. Therefore, to examine the association between pain catastrophizing and health status on the basis of data from an open adult population sample would greatly support the external validity of earlier findings and of the cognitive model outlined above. The aim of the present study was to examine the relationship between pain catastrophizing and several health indices in an open Dutch population sample. Cross-sectional associations were examined. More specifically, the research question of this study was, Do people who catastrophize about their pain have a higher incidence of specialist consultation for their pain complaints, of using pain medication, and of absenteeism because of their pain complaints or being disabled from work because of their pain?

Method

Participants and Procedure

Baseline data of the Dutch population-based Musculoskeletal Complaints and Consequences Cohort Study (DMC_3-study; Picavet et al., 2000) were analyzed. The DMC_3-study was a nationwide survey of the prevalence and course of musculoskeletal complaints, carried out by the National Institute of Public Health and the Environment, Bilthoven, the Netherlands, in collaboration with Statistics Netherlands. A questionnaire was sent to a random sample of 8,000 individuals living in the Netherlands ages 25 and over, stratified by 10-year age groups and genders. The random sample was taken from the population register of 1998. A total of 3,664 persons returned the questionnaire. Because of missing Pain Catastrophizing Scale (PCS) items for some respondents, only the data of 2,789 participants were available for the present study. Of these, 1,247 (44.7%) were men (mean age = 51.4 years, *SD* = 14.6, range = 25.0–78.6) and 1,542 (55.3%) were women (mean age = 49.2 years, *SD* = 14.3, range = 25.0–78.7). Of the 2,789 participants, 406 (14.6%) were unmarried, 2,050 (73.5%) were married, 134 (4.8%) were widowed, and 199 (7.1%) were divorced. The highest completed level of education was as follows: 427 participants (15.3%) completed elementary school, 612 participants (21.9%) completed technical and vocational training for 12–16-year-olds, 405 participants (14.5%) completed school for lower general secondary education, 465 participants (16.7%) completed technical and vocational training for 16–18-year-olds, 228 participants (8.2%) completed high school, 471 participants (16.9%) completed technical and vocational training for people age 18 and older, and 155 participants (5.6%) completed university. Data on the highest completed level of education were missing for 26 participants (1.0%).

Measures

Survey questionnaire. The survey questionnaire consisted of a 28-page full-color booklet containing general and sociodemographic questions and health-related questions. The health-related questions referred to five different anatomical regions: (a) neck, shoulder, or higher part of the back; (b) elbow or wrist and hand; (c) lower part of the back; (d) hip or knee; and (e) ankle or foot. Pages of five different colors corresponded to each anatomical region. Every colored area started with a screening question asking the participants if they had experienced pain during the past 12 months in the anatomical region concerned (e.g., "During the last 12 months, did you experience pain in the neck, shoulders, or higher part of the back?"). Participants who screen positively on this question were asked to complete all following questions concerning that particular anatomical region. These questions focused on the anatomical site or sites within every anatomical region in which the participants experienced pain ("Where did you experience pain?"), whether the pain still existed at the time of inquiry ("Do you still have this complaint currently?"), pain duration ("How long have you had this complaint?"), and current pain intensity ("If you have to express this pain on a scale ranging from 1 to 10, how bad is it then?"). Current pain intensity was measured with a numerical rating scale ranging from 1 (*some pain*) to 10 (*worst pain possible*).

Pain ratings were available for every single specific location within a particular anatomical region. Because they could endorse pain in more than one specific location, (e.g., screen positives for the first anatomical region—the neck–shoulder–higher part of the back—could report pain in the neck, pain in the shoulder, as well as pain in the higher part of the back), some participants had more than one pain rating for a particular anatomical region. In those cases we used the highest pain rating within that anatomical region as the pain intensity measure for that participant's anatomical region. For every anatomical region, screen positives also had to indicate whether they currently used pain medication or had used pain medication during the past 12 months, whether they had contacted one or more specialists for their pain complaints during the past 12 months, whether they had been on sick leave because of their pain during the past 12 months, and whether they were receiving disability assistance because of their pain. The questions about specialist consultation, absenteeism, and

work disability were dichotomized (no = 0, yes = 1).[1] Furthermore, the data of a standardized questionnaire that was included in the survey questionnaire was analyzed in the present study: the Dutch version of the PCS. This is discussed in more detail below.

Pain catastrophizing. The Dutch version (Crombez & Vlaeyen, 1996) of the PCS (Sullivan et al., 1995) was used. This is a 13-item scale in which participants are asked indicate the degree to which they experience thoughts or feelings during pain that are characterized by catastrophizing on a 5-point scale, ranging from 0 (*not at all*) to 4 (*always*). The total score can range from 0 to 52. Examples of PCS items are (when I'm in pain) "I keep thinking about how much it hurts" or "I wonder whether something serious might happen." The PCS does not have a specific time frame. Psychometric properties of the Dutch version of the PCS are adequate: It has good temporal stability (Pearson's $r = .92$; Crombez et al., 1999) and a high internal consistency (Crombez et al., 1998; Severeijns, Vlaeyen, van den Hout, & Picavet, 2002). Indications for the validity of the Dutch version of the PCS were found as well (Crombez et al., 1999; Vlaeyen, Geurts, Kole Snijders, & Schuerman, 1990).

Statistical Analysis

Logistic hierarchical regression analyses were performed to evaluate the associations between the PCS and several health indices. The PCS total scores deviated from normality and were skewed (skewness = 1.29, SE = 0.46). To make the solution of the regression analyses more stable and to increase power, we performed a square root transformation. The transformed PCS scores were then entered as independent variables in the regression analyses.

Three subgroups could be distinguished on the basis of whether participants experienced pain: (a) those without pain, neither at the time of inquiry nor in the year preceding the inquiry (i.e., the group without pain, $n = 670$; 24%); (b) those without pain at the time of inquiry but with pain in the year preceding the inquiry (i.e., the group with recent pain, $n = 494$; 17.7%); and (c) those with both pain in the year preceding the inquiry and at the time of inquiry (i.e., the group with current pain, $n = 1{,}625$; 58.3%). The group with neither current pain nor pain during the previous 12 months was left out of consideration in the subsequent regression analyses. The group with recent pain was considered relevant because the questions about specialist consultation, use of medication, absenteeism, and work disability explicitly referred to the whole period of 12 months before the inquiry (or longer, in case of work disability).

Therefore, we performed separate regression analyses for both the group with current pain and the group with recent pain. The analyses for the group with current pain were adjusted for age, gender, pain intensity, chronicity, and the number of pain regions endorsed. The analyses for the group with recent pain were adjusted for age, gender, and the number of pain regions endorsed. People generally develop more health problems with increasing age. The relation of gender to pain is not unequivocal and yields diverse results in different studies (see, e.g., Edwards, Augustson, & Fillingim, 2000; Severeijns et al., 2001; Sullivan, Tripp, & Santor, 2000). Nevertheless, we wanted to control the possible influence of gender on the results. Similarly, we reasoned that participants with more intense pain or with chronic pain complaints might have a higher incidence of visiting a specialist, of using medication, and of absenteeism or being disabled because of their pain complaints. Finally, participants could endorse pain in one or more of five anatomical regions. We reasoned that the number of pain regions endorsed might be positively associated with the health indices and therefore created a new variable: the number of pain regions endorsed, ranging from zero to five. The control variables were entered in the first step of the regression analyses. The transformed PCS total score was entered in Step 2 as the independent variable. The health indices served as the dependent variables in the separate regression analyses.

Results

Descriptives and General Information

The mean PCS total score for the sample as a whole was 10.04. The mean PCS total scores for the subgroups without pain, with recent pain, and with current pain were 7.82, 8.81, and 11.33, respectively. A one-way analysis of variance showed that these means significantly differed from each other, $F(2, 2786) = 40.6$, $p < .01$. Post hoc multiple (Tamhane's T2) comparisons revealed that the group with current pain significantly differed from the other two subgroups. Of the group with current pain ($n = 1{,}625$), 1,319 participants (81.2%) suffered from chronic pain (i.e., pain with a duration of more than 3 months), and 225 participants (13.8%) suffered from acute or subacute pain (with a duration of less than 3 months). Both groups did not differ on the level of catastrophizing, $t(1542) = 1.26$, $p = .21$, two-tailed. Data on chronicity were missing for 81 participants (5%).

As we mentioned previously, participants could endorse pain in one or more of five different anatomical regions: pain in the neck, shoulder, or higher part of the back; pain in the elbow, hand, or wrist; low back pain; pain in the hip or knee; and pain in the ankle or foot. Of those with current pain and with recent pain combined ($n = 2{,}119$), 821 participants (38.7%) reported pain in one anatomical region, 673 participants (31.8%) reported pain in two anatomical regions, 384 participants (18.1%) reported pain in three anatomical regions, 165 participants (7.8%) reported pain in four anatomical regions, and 76 participants (3.6%) reported pain in all five anatomical regions during the past 12 months. This means that there was considerable overlap among the different pain subcategories, with 1,298 participants (61.2%) reporting pain in more than one anatomical region.

In the present study we considered four health indices: specialist consultation, use of pain medication, absenteeism, and work disability. Of all participants who reported pain during the past 12 months (those with current pain and with recent pain combined), 646 (30.5%) had consulted a specialist for their pain, 608 (28.7%) used medication for their pain, 431 (20.3%) had been on sick leave because of their pain, and 158 (7.4%) were receiving disability assistance because of their pain complaints. As expected, there was some overlap among the different health indices as well. We decided to combine the health indices of absenteeism and work disability into a new composite variable, "absenteeism or work disability." The reason for doing this was that the number of participants who were receiving disability assistance was relatively small (158), composing not more than 7.4% of all the participants who reported pain during the past 12 months (including those with current and with recent pain). Furthermore, in the Netherlands

[1] In answering the question about specialist consultation, participants had to indicate when they had consulted a specialist for their complaints. If they had consulted a specialist, they had to select one or more of eight possibilities reflecting the specific specialty. Because we wanted to know whether they had consulted a specialist but were not interested in what specific specialty area they sought consultation, we dichotomized this variable. Furthermore, the variables absenteeism and work disability were combined into a composite variable, "absenteeism or work disability" (see the *Descriptives and General Information* section). To do this, these variables had to be dichotomized as well.

people are only declared work disabled (receiving disability assistance) after having been on sick leave for at least 1 year.

In Table 1 a correlation matrix is presented of all the nonstrictly categorical variables of interest in the present study. As can be seen in the table, there were significant and positive correlations between catastrophizing and pain intensity, between catastrophizing and the number of pain regions endorsed (in the group with current pain only), and between the number of pain regions endorsed and pain intensity. Also, there were significant and positive associations between catastrophizing, the number of pain regions endorsed, pain intensity and the health indices. The correlations between catastrophizing, the number of pain regions endorsed, and the health indices were higher in the group with current pain than in the group with recent pain. Finally, Table 1 shows that the health indices were significantly and moderately interrelated, with phi-coefficients ranging from .32 to .39 in the group with current pain and with phi-coefficients ranging from .15 to .32 in the group with recent pain.

Catastrophizing and Health Indices

The results of the logistic hierarchical regression analyses are shown in Tables 2 and 3, along with odds ratios (ORs) and 95% confidence intervals. The ORs indicate the relative amount by which the odds for having contacted a specialist, using or having used pain medication, or having been on sick leave or receiving disability assistance increase (OR $>$ 1.00) or decrease (OR $<$ 1.00) when the value of pain catastrophizing is increased by 1 unit. Because we performed a square root transformation on the PCS total score, a 1-unit increase in the transformed PCS score was equivalent to about a 7-point increase in the regular PCS score.

With respect to the group with current pain, the results in Table 2 indicate that participants with current pain who experienced more intense pain, whose pain was chronic, who endorsed more pain regions, and who catastrophized more about their pain had a higher incidence of having contacted a specialist for their complaints (although the OR for age was significant, it was only 1.01). Furthermore, the results indicate that participants with current pain who experienced more intense pain, who endorsed more pain regions, and who catastrophized more about their pain had a higher incidence of using or having used pain medication for their complaints (the OR for age was significant indeed, yet was only 1.01). Finally, the results indicate that participants with current pain who experienced more intense pain, endorsed more pain regions, and catastrophized more about their pain had a higher incidence of absenteeism or work disability.

For participants with recent pain Table 3 shows that no significant associations between catastrophizing about pain and any of the health indices were found, although the ORs for use of medication and absenteeism or work disability approached the level of significance (ps = .06 and .07, respectively). It should be noted that the sample size of the group with recent pain was quite smaller than the sample size of the group with current pain, which reduced power and consequently affected significance level. With respect to the covariates, significant associations between the number of pain regions endorsed and specialist consultation and the use of medication were found. This means that participants with recent pain who endorsed more pain regions had a higher incidence of having contacted a specialist and of using or having used pain

Table 1
Correlation Matrix of All the Nonstrictly Categorical Variables of Interest for All Participants With Current Pain (CP; n = 1,625) and for All Participants With Recent Pain (RP; n = 494)

Variable	8		7		6		5[a]		4[b]		3		2		1	
	CP	RP	CP	RP	CP	RP	CP	RP	CP	RP	CP	RP	CP	RP	CP	RP
1. No. of pain regions endorsed	.24***	.09	.25***	.13*	.23***	.11*	.20**		.38**		.17**	−.02	.07**	−.02	—	
2. Age	.06	.04	.10***	.11*	.08**	.20***	.16**		.09**		.02	−.02	—			
3. Catastrophizing	.22***	.09	.22***	.08	.20***	.05	.03		.31**		—					
4. Pain intensity[b]	.35***		.38***		.30***		.11**		—							
5. Chronicity[a]	.07*		.09***		.13***		—									
6. Specialist consultation	.39***	.26***	.32***	.15**	—											
7. Use of medication	.37***	.32***	—													
8. Absenteeism or work disability	—															

Note. Pearson correlations were used for associations between continuous variables (age, catastrophizing, pain intensity, number of pain regions endorsed); point-biserial correlations were used for associations between continuous and dichotomous variables (chronicity, specialist consultation, use of medication, absenteeism or work disability); and phi-coefficients were used for associations between dichotomous variables.
[a] The variable chronicity was a constant across all participants with RP (none of the participants with RP were classified as having CP); consequently, no measures of association could be calculated. [b] For participants with RP, no pain intensity data were available.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2
Results of the Logistic Hierarchical Regression Analyses for the Group With Current Pain, With Catastrophizing as the Independent Variable and With the Health Indices as Dependent Variables

		Health indices					
		Specialist consultation (N = 1,395)		Use of medication (N = 1,417)		Absenteeism or work disability (N = 972)	
Step	Variable	OR	95% CI	OR	95% CI	OR	95% CI
1	Age	1.01	0.99, 1.02	1.01**	1.00, 1.02	1.00	0.99, 1.01
	Gender	1.19	0.94, 1.52	1.25	0.97, 1.61	0.84	0.63, 1.11
	Pain intensity	1.26***	1.19, 1.33	1.41***	1.33, 1.50	1.37***	1.28, 1.46
	Chronicity	1.86**	1.24, 2.77	1.25	0.83, 1.87	1.05	0.69, 1.59
	No. of pain regions endorsed	1.29***	1.16, 1.44	1.32***	1.17, 1.48	1.32***	1.15, 1.51
2	Age	1.01*	1.00, 1.02	1.01**	1.00, 1.02	1.00	0.99, 1.01
	Gender	1.18	0.93, 1.51	1.24	0.96, 1.61	0.83	0.62, 1.10
	Pain intensity	1.22***	1.15, 1.29	1.37***	1.29, 1.46	1.33***	1.25, 1.43
	Chronicity	1.90**	1.27, 2.84	1.28	0.85, 1.92	1.07	0.70, 1.62
	No. of pain regions endorsed	1.28***	1.14, 1.43	1.29***	1.15, 1.46	1.28***	1.11, 1.47
	Catastrophizing	1.20***	1.11, 1.30	1.20***	1.10, 1.31	1.19***	1.08, 1.31

Note. All analyses were adjusted for age, gender, pain intensity, chronicity, and number of pain regions endorsed. The number of cases (*N*s) across the three health indices are not the same, mainly because not all the health indices were applicable to all participants, which resulted in missing user values. Also, there might be missing system values for one or more of the other variables in the model. Cases with one or more missing values on any of the variables in the model were automatically excluded from the analyses. OR = odds ratio; CI = confidence interval.
* $p < .05$. ** $p < .01$. *** $p < .001$.

medication for their complaints. Also, a significant association between gender and the use of medication was found, indicating that women with recent pain had a higher incidence of using or having used pain medication. (Indeed, significant associations were found between age and specialist consultation and use of medication, yet the ORs, 1.04 and 1.03, respectively, were barely higher than 1.00.)

Because the first series of regression analyses demonstrated a unique effect of catastrophizing on the health indices for the group with current pain as a whole, even when adjusting for age, gender, pain intensity, chronicity, and the number of pain regions endorsed, we decided to examine the five pain subcategories separately. Separate logistic regression analyses were performed for each of the five pain subcategories with current pain. The results of these analyses are shown in Table 4.

As can be seen in Table 4, significant effects were found across the five different pain subcategories with current pain. The results shown in the table might imply that there are some differences between the five pain subcategories with respect to the relationship between catastrophizing and the health indices. However, because the different pain subcategories do not comprise independent samples, no direct statistical comparisons can be made. Therefore, we performed a post hoc logistic regression analysis, in which we examined whether the relationship between catastrophizing and

Table 3
Results of the Logistic Hierarchical Regression Analyses for the Group With Recent Pain, With Catastrophizing as the Independent Variable and With the Health Indices as Dependent Variables

		Health indices					
		Specialist consultation (N = 454)		Use of medication (N = 480)		Absenteeism or work disability (N = 316)	
Step	Variable	OR	95% CI	OR	95% CI	OR	95% CI
1	Age	1.04***	1.02, 0.06	1.03**	1.01, 1.05	1.01	0.99, 1.91
	Gender	0.68	0.40, 1.17	2.01**	1.18, 3.41	1.00	0.60, 1.66
	No. of pain regions endorsed	1.63**	1.14, 2.34	1.55*	1.11, 2.18	1.35	0.95, 1.91
2	Age	1.04***	1.02, 1.06	1.03**	1.01, 1.05	1.01	0.99, 1.03
	Gender	0.65	0.38, 1.12	1.89*	1.12, 3.27	0.96	0.58, 1.61
	No. of pain regions endorsed	1.66**	1.15, 2.38	1.59**	1.11, 2.20	1.37	0.93, 1.88
	Catastrophizing	1.15	0.95, 1.39	1.19	0.99, 1.43	1.19	0.97, 1.42

Note. All analyses were adjusted for age, gender, and number of pain regions endorsed. The number of cases (*N*s) across the three health indices are not the same, mainly because not all the health indices were applicable to all participants, which resulted in missing user values. Also, there might be missing system values for one or more of the other variables in the model. Cases with one or more missing values on any of the variables in the model were automatically excluded from the analyses. OR = odds ratio; CI = confidence interval.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4
Summary of the Logistic Hierarchical Regression Analyses With Catastrophizing as the Independent Variable and the Health Indices as Dependent Variables

	Health indices								
	Specialist consultation			Use of medication			Absenteeism or work disability		
Pain subcategory	OR	95% CI	*N*	OR	95% CI	*N*	OR	95% CI	*N*
Neck–shoulder–higher part of back	1.14*	1.02, 1.28	700	1.20**	1.07, 1.35	731	1.15	0.97, 1.36	395
Elbow–wrist–hand	1.15	0.98, 1.35	373	1.16	0.97, 1.39	393	1.40**	1.09, 1.78	202
Low back	1.26***	1.11, 1.43	679	1.26***	1.11, 1.43	681	1.33***	1.14, 1.55	428
Hip–knee	1.31**	1.12, 1.53	431	1.53**	1.28, 1.81	459	1.37*	1.06, 1.76	225
Ankle–foot	1.11	0.90, 1.36	212	1.26	0.99, 1.59	219	1.11	0.79, 1.56	99

Note. All analyses were adjusted for gender, age, the number of pain regions endorsed, pain intensity, and chronicity and were limited to participants who currently reported pain. OR = odds ratio; CI = confidence interval.
* $p < .05$. ** $p < .01$. *** $p < .001$.

the health indices was moderated by the specific type of pain problem (i.e., each of the five different pain regions). In Step 1 of the analysis the covariates (age, gender, pain intensity, and chronicity), catastrophizing, and the newly created variable *pain location* were entered. Before performing the analyses we specified the variable pain location as categorical so that it would be automatically dummy coded by the SPSS computer program. In the second step, the interaction term *Catastrophizing* × *Pain Location* was added. The analysis was limited to participants with current pain who had endorsed only a single pain region. However, the results revealed that none of the interaction terms reached significance, which indicates that for participants with current pain in only one anatomical region, the association between catastrophizing and the health indices was not moderated by the specific type of pain.

Furthermore, the data demonstrate (independent from the table) that, across the different pain subcategories particularly, participants who experienced more pain had a higher incidence of specialist consultation, use of medication, and absenteeism or work disability (14 of 15 ORs were significant, varying from 1.21 to 1.61).

Discussion

Our primary objective was to determine whether there was a relationship between catastrophizing and several health indices in a Dutch adult community sample. This relationship was confirmed for people who were currently experiencing musculoskeletal pain but not for people with a recent history of musculoskeletal pain who were not currently experiencing pain. Also, people with current pain reported significantly higher PCS scores than people with a recent history of pain or people with no pain at all. Apparently, the presence of pain is a prerequisite for pain catastrophizing to become manifest. In this respect, catastrophizing about pain might be considered a latent trait factor that can be activated by the presence of pain. Furthermore, pain intensity might function as a moderator variable. However, post hoc analyses in which this pain intensity moderator effect was tested (i.e., the PCS × Pain Intensity interaction) did not yield a significant effect. Besides the predictive value of pain catastrophizing, pain intensity and the presence of multiple pain locations independently predicted health outcomes. This could imply that the role of pain and pain intensity has been rather underestimated in recent models of chronic pain-related disability such as the fear-avoidance model (Vlaeyen, Kole Snijders, Boeren, & van Eek, 1995; Vlaeyen, Kole Snijders, Rotteveel, & Ruesink, 1995). Clearly, further research is necessary.

Looking more closely at the results in Table 4 suggests that the associations between pain catastrophizing and the health indices examined could perhaps be moderated by the specific type of pain. Unfortunately, because of the overlap between the five pain subgroups this hypothesis could not be statistically tested directly. When the analyses were limited to participants with "pure" pain, that is, with current pain in only one anatomical region, however, no statistical evidence for a pain location moderator effect was found. It should be noted though that the present study also demonstrates that in the general community, people with pain in only a single anatomical region are in the minority and that the presence of multiple pain problems is probably the more natural situation. A more definite answer could come from a study in which this moderation effect is examined in a clinical sample of people with one or more pain complaints who are classified into different pain subgroups on the basis of their primary pain complaint (e.g., determined by reason for referral).

The PCS score distribution demonstrated that overall the level of pain catastrophizing in the Dutch population was quite low, with a mean PCS total score for the sample as a whole of 10.04. This is closely in line with a study by Osman et al. (2000), who found a mean PCS total score of 13.87 in an adult community sample as compared with a mean total scale score of 22.25 for a pain outpatient sample. This implies that people in the general community are probably quite different from clinical samples, at least as far as the level of pain catastrophizing is concerned. It is likely that the low PCS scores in this community sample were of influence on the associations between pain catastrophizing and the health indices and that in a clinical sample these associations would be even more pronounced. Replication of this study with clinical samples should yield the necessary information. Nevertheless, the fact that despite these generally low PCS scores significant associations between catastrophizing and the health indices were found makes the results even more meaningful.

Taken together, the results of the logistic regression analyses may have some clinical implications for those currently experiencing a pain episode. First, for people with a current episode of musculoskeletal pain, catastrophizing about pain was associated with a higher incidence of visiting a specialist, of using medication, and of absenteeism or work disability even when adjusting for pain intensity, chronicity, and the number of pain regions endorsed. This may indicate that the PCS can be a useful instrument in identifying those at risk. However, replication of these associations in a prospective design should provide more definite support of the usefulness of the PCS in screening people with current musculoskeletal pain.

Second, reducing the level of pain catastrophizing in those at risk (i.e., those who currently are experiencing a pain episode and catastrophize about their pain) might lead to less health care consumption, less absenteeism, and perhaps even reversibility of work disability, which in turn might lead to a considerable reduction in health care costs. Reducing the level of pain catastrophizing could be achieved by presenting at-risk and affected individuals with a cognitive–behavioral therapy program in which, for example, the rationale of the fear-avoidance model of Vlaeyen, Kole Snijders, Rotteveel, and Ruesink (1995) is explained in detail, irrational beliefs about pain are challenged, and behavior experiments are carried out. In this respect, preliminary evidence exists that such a specific and tailored cognitive–behavioral intervention is highly effective (Vlaeyen, de Jong, Geilen, Heuts, & van Breukelen, 2001). Future studies should yield more information on these matters.

Finally, some critical remarks have to be made concerning the generalizability of the results of the present study. First, in the current literature on catastrophizing there has been discussion on whether catastrophizing is to be considered a separate construct or is confounded with depression (Sullivan & D'Eon, 1990). If the latter is the case, the results of the present study would perhaps be explained better in terms of the participants' level of depression. However, no measure of depression was used in the present study, which can be considered a conceptual and methodological limitation. Without repeating the whole debate, we limit ourselves to the comment that although catastrophizing and depression are related, there are convincing arguments coming from several studies to consider catastrophizing as a separate construct (Geisser, Robinson, & Henson, 1994; Geisser, Robinson, Keefe, & Weiner, 1994; Haaga, 1992; Keefe et al., 1989; Keefe et al., 2000; Sullivan et al., 1995, 1998; Sullivan, Rodgers, & Kirsch, 2001; Turner, Jensen, & Romano, 2000). A similar line of reasoning concerns the disposition of neuroticism or negative affect, of which a number of authors feel that catastrophizing is a part (for an overview of this discussion, see Turner & Aaron, 2001). Nevertheless, as with depression, several studies have shown that although related with negative affect, catastrophizing has incremental value as a predictor of several pain-related outcome variables over negative affect (Affleck, Tennen, Urrows, & Higgins, 1992; Drossman et al., 2000; Martin et al., 1996; Sullivan et al., 1995). Thus, although no measure of negative affect was used in the present study, it seems unlikely that it would account for all the results found.

Second, although the results of the regression analyses suggest that pain catastrophizing contributes to more health care consumption and absenteeism or work disability, no causal attributions can be made because the study design is cross-sectional. Finding similar results in a prospective design would certainly enhance the validity of these conclusions.

Third, the vast majority of participants who currently reported pain suffered from chronic pain (81.2%). Although we argued at the beginning of this article that it is likely that catastrophizing precedes and contributes to chronic pain, one might also argue that catastrophizing stems from chronic pain. The cross-sectional nature of this study does not allow a definitive judgment on this matter. Nevertheless, the results of the present study might provide a clue. If catastrophizing stems from chronic pain, one would expect higher levels of catastrophizing for participants with chronic pain as compared with those with acute or subacute pain. However, in the present study no differences in the level of catastrophizing were found between these two groups.

Fourth, all the measures used in this study are self-report measures or single retrospective questions, which are subject to several kinds of bias. Future studies should also include other and, if possible, more objective measures such as ratings by clinicians or behavioral measures.

Fifth, a mail-out methodology was used in the present study to gather the data, which does not permit control over the way participants complete the questionnaire. This might have influenced the results. Furthermore, although the sample was quite large (2,789), the actual response rate was 46% (the questionnaire was sent to 8,000 people), and an additional 10% of the data could not be used because of missing PCS items. This means that selection bias cannot be excluded.

Notwithstanding these limitations, to our knowledge, the present study is the first to demonstrate in a large community sample that people with a current episode of musculoskeletal pain who catastrophize about pain have a higher incidence of specialist consultation, use of pain medication, and absenteeism or work disability. The same holds for people with current pain who experience more intense pain and for people with current pain who have multiple pain complaints.

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