

## Factors accounting for psychosocial functioning in patients with low back pain

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**Abstract** Low back pain (LBP) is a chronic disorder which exerts a profound impact on various spheres of psychosocial functioning, including emotional distress, functional limitations and decrements in social contacts. The objective of this study was to investigate the associations between the indices of psychosocial functioning in patients with chronic LBP and a range of psychological factors. Specifically, the study aimed at exploring the relative participation of personality, social support, disease-related cognitive appraisals and coping styles in accounting for the differences in psychosocial functioning of patients with LBP. One-hundred-twenty patients with LBP took part in the study and completed a battery of psychological questionnaires: NEO–Five Factors Inventory, Ways of Coping Questionnaire, Disease-Related Social Support Scale, Disease-Related Appraisals Scale and Psychosocial Functioning Questionnaire (PFQ). The PFQ dimensions were used as dependent variables in a series of stepwise regression analysis models with the scores from other questionnaires entered as independent variables. A cognitive appraisal of the disease in terms of an obstacle was strongly related to all domains of functioning; however, other appraisals (threat, challenge, harm, profit and overall disease importance) were uniquely associated with particular domains of functioning. Deprivation of social support was a significant predictor of distress experienced in interpersonal context and of sense of being disabled. Among basic personality traits, agreeableness was negatively associated with distress in interpersonal context, and

conscientiousness was positively related to acceptance of life with the disease. Problem-focus coping was linked to higher acceptance of life with the disease. Among sociodemographic variables, older age and lower educational level were related to greater subjective feelings of being disabled. Pain severity was found unrelated to any of psychosocial functioning domains. Different aspects of psychosocial functioning are best accounted for by diverse patterns of psychological factors, which suggests involvement of different psychological mechanisms in development of LBP-related disability.

**Keywords** Personality · Coping · Cognitive appraisal · Social support · Psychosocial functioning · Low back pain

### Introduction

Low back pain (LBP) is a common chronic disease presenting as the pain affecting the lower part of the back with various underlying pathologies as its possible causes. Typically, the most evident consequences of the pain are limitations in mobility [15]. Many authors emphasize, however, that the effects of this disease cannot be confined only to motor dysfunctions since LBP exerts a profound negative impact also on the patients' psychological well-being [36].

In some cases (up to 10–47%), LBP is characterized by a chronic course, and treatment outcomes are not always satisfactory, which for many makes adjusting to living with LBP a challenge [23]. Increased rates of psychological disturbances were reported in previous studies as indices of difficulties in adjustment to LBP. For example, a significantly higher prevalence of depression, anxiety and somatoform disorders was demonstrated in patients with

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chronic LBP as compared to healthy controls [27]. In another study, patients with LBP were found to complain of sleep disturbances, sadness, anxiety and comorbid pains related to the parts of the body other than low back more frequently than control references [10]. Moreover, some authors posited that adjustment difficulties involving a combination of heightened anxiety, increased bodily awareness and depression may play an etiological role in maintaining pain symptoms in LBP [12, 40]. In line with these suggestions, psychological distress was demonstrated to negatively affect the efficacy of therapy for LBP [13]. Of note, the levels of psychopathology present before the patients developed LBP were found to be unrelated to later LBP-related disability [7].

Additionally, numerous studies have evidenced that LBP severely affects multiple domains of psychosocial functioning, including social relationships, self-esteem, mood and affect, social roles, family duties, life satisfaction and independence in satisfying one's own needs [33, 38]. It was shown that LBP alone, irrespective of other comorbidities, can debilitate various spheres of psychosocial functioning. In a study of patients with rheumatoid arthritis, those with co-occurring LBP were found to have significantly decreased scores on psychosocial functioning measures (including functional limitations, mood and quality of life) than subjects with rheumatoid arthritis but without LBP [22].

Several factors have been postulated to affect the scope and degree of decrements in psychosocial functioning in patients with LBP.

Among the clinical variables, physical pathology and pain severity were investigated, although the significance of these factors is still disputable. In a study by Gesztelyi and Bereczki [8], for example, pain severity was found to be unrelated to actual disability in patients with LBP, as opposed to patients with other pain syndromes. Physical pathology seems to be more closely associated with difficulties in psychosocial functioning, as it was shown to significantly contribute to LBP-related disability [35].

Among psychological variables, cognitive factors such as pain fear- and avoidance beliefs, pain catastrophizing and appraisals of pain control were suggested to affect psychosocial functioning in patients with LBP [43]. The specific contribution of these factors, however, seems to be only moderate. In one study, the cognitive factors associated with pain perception (pain related fear and catastrophizing) added only 4–10% to the total explained variance in LBP-related disability or pain intensity [34]. It seems more plausible that pain-related beliefs contribute to vigilance to pain and, consequently, to greater perceived pain intensity [9] rather than directly to psychosocial functioning.

Several other psychological variables were suggested to influence psychosocial functioning in patients with LBP, including personality, coping, social support and disease-

related cognitive appraisals. Out of personality traits, neuroticism was demonstrated to constitute a vulnerability factor predisposing patients with LBP to greater pain fear, pain catastrophizing and higher pain severity [9]. In addition, patients with high neuroticism were found to exhibit greater emotional distress related to LBP [1]. Styles of coping with stress and perceived social support were found to be related to different profiles of psychosocial functioning of patients with LBP. The patients whose psychosocial functioning was characterized by high levels of disability, depression and pain reported more frequent use of passive/avoidant coping strategies and less satisfaction with social support. In contrast, the patients whose psychosocial functioning was characterized by low levels of disability, depression and pain reported less reliance on passive/avoidant coping strategies and more satisfaction with social support [21]. Cognitive appraisals of the disease have been implicated in the psychological literature as crucial for adjustment to chronic disease [37], although their relevance to psychosocial functioning in patients with LBP has not been extensively investigated. However, in one study, disease-related cognitive appraisals were shown to mediate the outcomes of an experimental pain situation resolution in patients with LBP [34].

There are different theoretical models attempting to explain the relationships between the level of psychosocial functioning in patients with a chronic disease and other clinical and psychological variables. One of these models is Lazarus and Folkman's transactional theory of stress [26]. According to this theory, a chronic disease, such as LBP, can be treated as a stressful situation since it undermines the normal life balance of an affected individual. The theory postulates that the quality of the resolution of the stressful situation depends on two stress-mediating processes: cognitive appraisal of the situation and coping strategies activated to manage the situation [6]. When coping with stress, the individual may additionally resort to certain resources: both internal (e.g., personality) and external (e.g., available social support). The final effectiveness of coping with stress can be assessed by the level of functioning in various domains (e.g., psychosocial functioning) [25].

In accordance with this theory, we consider LBP as a potentially chronically stressful situation. Based on the theory, we also assumed that the levels of psychosocial functioning in patients with LBP might be related to stress-mediating processes, such as cognitive appraisals of the disease and ways of coping with stress, as well as to internal (i.e., personality) and external (i.e., social support) resources available when coping with stress.

The objective of this study was to investigate the associations between psychosocial functioning in patients with LBP and a range of psychological factors, postulated by Lazarus and Folkman's theory as potentially affecting

adjustment to the disease. In particular, we undertook to assess the relative participation of personality traits, social support, disease-related cognitive appraisals and coping styles in accounting for the variance in various domains of psychosocial functioning of patients with LBP, as we hypothesized that diverse patterns of factors may be related to different spheres of psychosocial functioning. Additionally, we aimed at verifying if the associations between the psychological variables and psychosocial functioning remain significant when (1) sociodemographic variables and (2) the levels of reported pain will be included into the models.

## Participants and methods

### Participants

The study was carried out between May 2005 and January 2007. One hundred-twenty-five patients hospitalized during this period at the neurological ward due to LBP were approached and requested to take part in the study. The patients were recruited into the study and investigated during their stay at the ward. Out of the 125 patients approached, 5 refused to participate in the study because they were unwilling to fill in the questionnaires or could not read well without glasses, and 120 patients consented. The data of five patients were further excluded from the analyses since these patients did not satisfy the chronicity criterion (disease duration of more than 6 months). Thus, the final sample accepted for statistical analyses consisted of 115 patients. All patients were adults ( $\geq 18$  years of age) and had a confirmed medical diagnosis of LBP. They were hospitalized for detailed diagnostic purposes, due to worsening of their condition, due to unsatisfactory results of previously applied treatments or due to an acute recurrence of the pain. After complete description of the study, written informed consent was obtained from all participants. The design of the study was approved by the local Ethical Committee of the Institute of Psychology, John Paul II Catholic University of Lublin, Poland.

The psychological examination was carried out individually with each patient by a qualified psychologist, and consisted of a brief structured interview concerning sociodemographic variables and a battery of psychological questionnaires. During the interview patients were inquired about age, educational status and marital status and requested to assess the pain intensity on six visual analog scales. These scales were extracted from Low Back Rating Scale and yield the total pain index with a theoretical range from 0 (no pain) to 60 (the worst imaginable pain) [28]. Information on clinical characteristics, including disease duration, number of hospitalizations, lateralization of the lesion, cause

of LBP and predominant character of the symptoms was obtained from the patients' medical charts. The causes of LBP included discopathy, degenerative changes, protruded nucleus pulposus and hernia. Sixty-five percent of the patients had irritative signs of the sciatica type, 35% presented predominantly deficiency signs (Table 1). Thirty-eight patients had also other non-neurological comorbidities.

### Psychological testing

*Psychosocial Functioning Questionnaire (PFQ)* for patients with LBP is a 44-item self-report instrument measuring various dimensions of psychosocial functioning

**Table 1** The sociodemographic characteristics of the participants

Sex [N (%)]	
Men	59 (51.3%)
Women	56 (48.7%)
Age	
Range (min–max)	26–60
Mean ( $\pm$ SD)	48.8 ( $\pm$ 7.83)
Education [N (%)]	
Elementary	20 (17.4%)
Occupational	39 (33.9%)
Secondary non-completed	9 (7.8%)
Secondary completed	27 (23.5%)
University non-completed	7 (6.1%)
University completed	13 (11.3%)
Marital status [N (%)]	
Married	92 (80.0%)
Divorced/separated	11 (9.6%)
Widowed	6 (5.2%)
Single	6 (5.2%)
Character of symptoms [N (%)]	
Irritative signs	75 (65.2%)
Deficiency signs	40 (34.8%)
Lesion lateralization [N (%)]	
Left	36 (31.3%)
Right	31 (27.0%)
Bilateral	48 (41.7%)
Cause of LBP [N (%)]	
Discopathy	34 (29.6%)
Degenerative changes	33 (28.7%)
Protruded nucleus pulposus	24 (20.9%)
Hernia	24 (20.9%)
Disease duration (years)	
Range (min–max)	0.6–34
Mean ( $\pm$ SD)	12.33 ( $\pm$ 8.61)
Pain severity	
Range (min–max)	12–60
Mean ( $\pm$ SD)	38.25 ( $\pm$ 11.58)

in patients with LBP. The questionnaire consists of five subscales: (1) distress in interpersonal context, (2) limitations in everyday functioning, (3) acceptance of life with the disease, (4) depressive complaints, and (5) sense of being disabled, extracted in factor analysis. Higher scores on the *Acceptance of life with disease* subscale indicate better functioning, whereas higher scores on the remaining subscales reflect more disabled functioning. In a validation study, reliability coefficients for the questionnaire were found high: internal consistency for the subscales ranged from 0.86 to 0.89, and test–retest correlations ranged from 0.80 to 0.90 [17].

*Disease-Related Social Support Scale* is a 13-item brief self-report questionnaire designed to measure aspects of social support as perceived by the patient over the period of the disease. The instrument was developed for the purpose of this study and consists of four subscales extracted in factor analysis: (1) experience of care (eigenvalue = 3.21), (2) deprivation of support (eigenvalue = 1.69), (3) satisfaction with treatment (eigenvalue = 1.37) and (4) social interactions (eigenvalue = 1.88). The four extracted factors explained together 62.7% of the variance in the test.

The two questions constituting the *Satisfaction with treatment* factor had originally been included into this instrument, as we had conceptualized that they might be indicative of support from medical staff. Later psychometric analyses showed, however, that this factor was greatly independent of the three remaining factors (inter-correlations ranging from  $-0.05$  to  $0.21$ ), and most probably only weakly related to social support (the correlation coefficient with the total score of the scale  $r = 0.33$ ). Therefore, we decided to exclude this factor from further analyses in this study.

After exclusion of the *Satisfaction with treatment* factor, the resulting Cronbach's alpha reliability coefficient for the whole scale was 0.78. The correlations between the three remaining factors and the global score of the scale were 0.81 for *Experience of care*,  $-0.78$  for *Deprivation of support* and 0.64 for *Social contacts* [24].

*Ways of Coping Questionnaire* was developed to measure problem-focused and emotion-focused strategies of coping with stress [5]. The Polish version of the questionnaire consists of 13 subscales measuring various coping strategies, with reliability coefficients for the subscales ranging from 0.50 to 0.82 [32]. In this study, we performed factor analysis on these 13 scales and obtained four higher-order factors corresponding to four coping styles: (1) reinterpretation, (2) avoidance, (3) problem-focused coping and (4) coping through support. These extracted factors accounted for 71.5% of the variance in the test.

*NEO-Five Factor Inventory* was used to measure five basic personality dimensions: (1) neuroticism, (2) extroversion, (3) openness, (4) agreeableness and (5)

conscientiousness. It is a world-known, commonly applied, reliable and valid personality inventory [3].

*Disease-Related Appraisals Scale* is a self-report measure of six modes of cognitive appraisals attributable to one's own disease: *Threat, Profit, Obstacle/loss, Challenge, Harm, Value*. The appraisals are conceptualized as individual meanings the patients can attribute to their disease. The questionnaire contains also one control subscale, *Importance*, measuring the overall significance of the disease, as perceived by the patient. The scale was originally developed to operationalize the concept of cognitive appraisal of the stressful situation postulated by Lazarus and Folkman, however, with specificity to disease-related stress. The development study was conducted on the population of patients with various diseases, and since then the scale has been validated in several clinical populations, including patients with psoriasis, systemic sclerosis, cardiovascular disease, infertility, asthma and type I diabetes, mostly as a part of doctorate or master's degree projects carried out in our Department. The reliability coefficients for particular subscales, evaluated in a validation study in patients with different diseases, ranged from 0.64 to 0.87. The theoretical validity of the questionnaire was confirmed by factor analysis and its scores shown to be independent of the social desirability variable [16]. The English translation of this scale is included in the appendix to this article.

#### Statistical analyses

Descriptive statistics are presented as mean ( $M$ ) and standard deviations ( $SD$ ) or frequencies ( $N$ ) and percentages (%). A series of stepwise regression analyses were conducted. In each analysis, the scores on one of the PFQ subscales were entered as dependent variables and the scores on personality, coping, cognitive appraisal and social support measures as independent variables. A second series of stepwise regression analyses were carried out, with age, gender and educational level entered into the models as a separate block before the psychological variables, to control for the effects of sociodemographic factors. In a third series of stepwise regression analyses, pain severity was added as an independent variable, in a block following sociodemographic variables and preceding psychological variables. Results were considered statistically significant at the level of  $P < 0.05$

## Results

#### Patients' characteristics

The final sample consisted of 56 women and 59 men, with the mean age of 48.8 years. The mean duration of the

disease for the whole group was 12.33 years. The patients hospitalized due to LBP for the first time constituted 33% of the sample, 46.1% were hospitalized for the second, third or fourth time, and for 20.9% this was more than the fourth hospitalization. The participants' detailed characteristics on a range of psychosocial and clinical variables are presented in Table 1.

Psychological factors explaining psychosocial functioning

Tables 2, 3, 4, 5 and 6 present the results of stepwise regression analyses conducted for each domain of psychosocial functioning with psychological variables entered as independent variables. The caption of each table contains the summary statistics obtained for the final model including only those independent variables which reached the significance level of  $P < 0.05$ .

As we hypothesized, all four groups of psychological variables postulated by Lazarus and Folkman's theory (cognitive appraisals, coping styles, personality traits and social support) were found to be associated with aspects of psychosocial functioning in patients with LBP.

*Distress in interpersonal context* was found to be related to all four groups of psychological variables: disease appraisals of obstacle and harm, deprivation of social support, avoidance coping and negatively to the personality trait of agreeableness.

Higher scores on *Limitations in everyday functioning* were found to be associated with certain cognitive appraisals (appraising LBP in terms of obstacle, threat and attributing greater overall importance to it) and with avoidance coping. No associations of this domain were found with respect to social support and personality resources.

Higher scores on *Acceptance of life with the disease* were most strongly related to problem focused coping, to appraising one's own disease as a challenge but not as an obstacle, and to the personality trait of conscientiousness. No associations of this domain were observed with social support.

**Table 2** Factors accounting for distress in interpersonal context

Independent variables	B	95% CI for B	$\beta$	$R^2$ change	t	P
Obstacle	0.42	±0.15	0.42	0.40	5.55	0.000
Avoidance coping	0.39	±0.28	0.20	0.12	2.78	0.007
Harm	0.24	±0.16	0.23	0.05	2.97	0.004
Deprivation of support	0.34	±0.28	0.16	0.03	2.44	0.016
Agreeableness	-0.05	±0.05	-0.15	0.02	-2.28	0.025

$R = 0.79$ ,  $R^2 = 0.63$ , corrected  $R^2 = 0.61$ ,  $F(1,107) = 5.18$ ,  $P = 0.025$

Higher *Depressive complaints* were found to be more closely related to disease-related appraisals: obstacle and profit, and to attributing greater overall importance to the disease. *Depressive complaints* were also associated with higher avoidance coping, but unrelated to social support or personality.

Finally, higher *Sense of being disabled* was associated with the disease appraisals of obstacle and harm, and with deprivation of social support. This sphere of psychosocial functioning was found unrelated to coping styles or personality traits.

Controlling for sociodemographic variables

An analogous series of stepwise regression analyses was conducted with an insertion of sociodemographic variables of age, gender and educational status before the psychological variables in the regression model. None of the sociodemographic variables were found statistically significant in accounting for *Distress in interpersonal context*, *Limitations in everyday functioning*, *Acceptance of life with the disease* or *Depressive complaints*, whereas the psychological variables remained significant as previously. However, in addition to the previously found cognitive appraisal of obstacle, and avoidance coping, two sociodemographic variables were observed to be statistically significant predictors of *Sense of being disabled*: older age ( $\beta = 0.14$ ,  $t = 2.12$ ,  $P = 0.036$ ) and lower educational levels ( $\beta = -0.20$ ,  $t = -2.97$ ,  $P = 0.004$ ).

**Table 3** Factors accounting for limitations in everyday functioning

Independent variables	B	95% CI for B	$\beta$	$R^2$ change	t	P
Obstacle	0.70	±0.20	0.70	0.44	6.88	0.000
Importance	0.24	±0.17	0.24	0.03	2.91	0.004
Threat	-0.28	±0.22	-0.28	0.02	-2.58	0.011
Avoidance coping	0.33	±0.29	0.17	0.02	2.28	0.025

$R = 0.72$ ,  $R^2 = 0.52$ , corrected  $R^2 = 0.50$ ,  $F(1,108) = 5.20$ ,  $P = 0.025$

**Table 4** Factors accounting for acceptance of life with the disease

Independent variables	B	95% CI for B	$\beta$	$R^2$ change	t	P
Problem-focused coping	0.56	±0.33	0.27	0.20	3.42	0.001
Obstacle	-0.39	±0.15	-0.38	0.13	-5.08	0.000
Challenge	0.24	±0.16	0.23	0.06	3.00	0.003
Conscientiousness	0.08	±0.06	0.22	0.04	2.75	0.007

$R = 0.66$ ,  $R^2 = 0.43$ , corrected  $R^2 = 0.41$ ,  $F(1,108) = 7.56$ ,  $P = 0.007$

**Table 5** Factors accounting for depressive complaints

Independent variables	<i>B</i>	95% CI for <i>B</i>	$\beta$	$R^2$ change	<i>t</i>	<i>P</i>
Obstacle	0.43	±0.15	0.42	0.43	5.94	0.000
Avoidance coping	0.60	±0.26	0.30	0.12	4.47	0.000
Importance	0.25	±0.15	0.24	0.03	3.30	0.001
Profit	0.13	±0.12	0.13	0.02	2.10	0.038

$R = 0.78$ ,  $R^2 = 0.60$ , corrected  $R^2 = 0.59$ ,  $F(1,108) = 4.42$ ,  $P = 0.038$

**Table 6** Factors accounting for sense of being disabled

Independent variables	<i>B</i>	95% CI for <i>B</i>	$\beta$	$R^2$ change	<i>t</i>	<i>P</i>
Obstacle	0.52	±0.17	0.52	0.44	6.25	0.000
Harm	0.22	±0.17	0.21	0.04	2.54	0.013
Deprivation of support	0.32	±0.29	0.15	0.02	2.16	0.033

$R = 0.78$ ,  $R^2 = 0.60$ , corrected  $R^2 = 0.59$ ,  $F(1,108) = 4.42$ ,  $P = 0.038$

### Controlling for pain severity

An analogous series of regression analyses was conducted with an insertion of pain severity in addition to the previously introduced psychological and sociodemographic variables. Pain severity was introduced into regression models in a separate block following sociodemographic variables and preceding psychological variables. Introduction of pain severity into the model did not cause statistically significant changes in the patterns of psychological predictors of psychosocial functioning, and pain severity itself did not prove statistically significant in predicting any of the analyzed domains of psychosocial functioning. Only in the case of *Limitations in everyday functioning*, did pain severity show a moderate trend toward significance ( $\beta = 0.12$ ,  $t = 1.72$ ,  $P = 0.089$ ).

Table 7 summarizes the patterns of psychological and sociodemographic variables statistically significantly explaining variances in various domains of psychosocial functioning, as observed in this study.

## Discussion

The questionnaire we implemented to measure psychosocial functioning in patients with LBP contains five subscales, extracted through factor analysis, covering five different domains of functioning [17]. This is in contrast to most other studies in which outcomes in psychosocial functioning of patients with LBP were typically measured by a single disability index. We had assumed that particular domains of psychosocial functioning may be relatively

independent from each other. In consequence, the functional status of patients with LBP in each of the domains may be related to different factors, and their decrements may involve diverse mechanisms.

Generally, the findings of this study seem to support this hypothesis. For each domain of psychosocial functioning different patterns of factors were found to be significant in regression analysis models.

Disease-related cognitive appraisals seemed to be the strongest predictors of psychosocial functioning in all measured domains. Out of all independent variables, appraising the disease in the category of obstacle was the only one which was found to significantly account for all functioning domains. It is of note, however, that other modes of disease-related appraisals were specifically associated with particular spheres of psychosocial functioning, with harm contributing to interpersonal distress and greater sense of disability, threat to functional limitations, challenge to better acceptance, profit to depressive complaints, and overall importance of the disease to everyday limitations and depressive complaints. It follows from this that appraising one's own disease in terms of obstacle may be a universal factor contributing to decrements in all spheres of psychosocial functioning whereas other disease-related appraisals are more domain-specific.

In contrast, personality traits were found to be only weakly related to psychosocial functioning, except for agreeableness whose low levels were a significant predictor of distress in interpersonal context, and conscientiousness which predicted better acceptance of life with the disease. The role of agreeableness in mediating the behavior of an individual in interpersonal relationships has already been evidenced in studies from various populations, showing that individuals who score low on this trait tend to overtly express their angry emotions whereas those with higher agreeableness are calmer, more cooperative, more skilled in solving interpersonal conflicts and, when coping with stress, they are more eager to seek social support [4, 18]. Some studies in other chronically ill patients showed that agreeableness interacted with social support in affecting depressive symptomatology. Greater social support among those high in agreeableness was associated with a decrease in depressive symptoms over time, whereas no such effect was observed for individuals low in agreeableness [14]. It is therefore interesting to see that in our patients with LBP, those experiencing more disease-related negative emotions in interpersonal context are also less agreeable and at the same time feel deprived of social support.

Conscientiousness has also been implicated as a personality resource which may prove positive when coping with stress, including disease-related stress. People with higher levels of conscientiousness were shown to prefer thoughtful, task-oriented strategies of coping with stress, showed more

**Table 7** Psychological and sociodemographic factors accounting for various domains of psychosocial functioning—summary

	Distress in interpersonal context	Limitations in everyday functioning	Acceptance of life with the disease	Depressive complaints	Sense of being disabled
Cognitive appraisals of the disease	Obstacle ↑ Harm ↑	Obstacle ↑ Threat ↑ Importance ↑	Obstacle ↓ Challenge ↑	Obstacle ↑ Profit ↑ Importance ↑	Obstacle ↑ Harm ↑
Social support	Deprivation of support ↑	–	–	–	Deprivation of support ↑
Coping styles	Avoidance coping ↑	Avoidance coping ↑	Problem focused coping ↑	Avoidance coping ↑	–
Personality traits	Agreeableness ↓	–	Conscientiousness ↑	–	–
Sociodemographic variables	–	–	–	–	Age ↑ Education level ↓
Pain severity	–	Pain ↑ (trend)	–	–	–

↑ Indicates an increase in the independent variable is accompanied by an increase in the dependent variable

↓ Indicates an increase in the independent variable is accompanied by a decrease in the dependent variable

endurance when coping with stress and reported greater personal growth following resolution of stressful situations. They also coped with stress usually more effectively than those low in conscientiousness [4, 11]. In studies on clinical populations, patients with higher conscientiousness showed better adaptation to the disease through higher compliance with medical recommendations and through practicing pro-health behaviors [31, 42]. The association we found in our study between this personality trait and acceptance of life with the disease supports the findings from previous studies suggesting a positive role of this trait in coping with disease-related stress. In our patients with LBP, higher conscientiousness was a predictor of better psychosocial functioning, and it seems also important that it co-occurred with such other predictors as problem-focused coping and appraising LBP as a challenge but not as an obstacle. The co-occurrence of these predictors may suggest that conscientiousness is an internal personality resource activating the most adaptive modes of appraising LBP and most effective strategies of coping with its stress.

Our findings did not confirm, however, the role of neuroticism in determining adjustment to living with LBP, reported in earlier studies [1, 9]. Since the method of regression analysis reduces redundancy between the independent variables, it is probable that the putative effect of neuroticism on psychosocial functioning domains was eliminated in our study due to its overlapping variance shared with other variables. For example, strong associations of neuroticism were reported with emotion-focused non-adaptive coping strategies, such as avoidance, in various populations [4], and in a clinical population, neuroticism was found to be strongly correlated with both emotion-focused coping and severity of depressive symptomatology [30], all of which may be indicative of a considerable common variance shared by these constructs. In this context,

it is of note that depressive complaints in our patients were significantly related to emotion-focused avoidance coping, but neuroticism did not reach significance level in the regression analysis for these dependent variables, probably due to its redundancy with this coping style. It is of interest that previous studies reported that the use of passive and avoidant coping strategies was found to be unspecific for the group of patients with LBP as a whole; it was, however, very characteristic of those patients with LBP who presented with comorbid depression [41].

Problem-focused coping was another coping style we found associated with psychosocial functioning of patients with LBP. However, this coping style contributed significantly only to higher acceptance of living with LBP. Using this coping style can be therefore regarded as a marker of good adjustment in LBP, especially in terms of a balanced attitude toward the disease (acceptance but not giving-up). It is worth noticing that acceptance of life with LBP was significantly predicted also by a cognitive appraisal of challenge. Studies in other populations showed that this appraisal mode was associated with varied and predominantly problem-focused coping strategies and also with better adaptational outcomes [16, 29]. Since numerous authors posed that different modes of cognitive appraisals trigger diverse coping behaviors [2, 19, 29], it may be assumed that appraising LBP in terms of challenge leads to more constructive and effective coping behaviors with resultant better adjustment.

Social support was postulated to be predictive of better psychological adjustment in patients with LBP in previous studies [21]. In our study we found a similar pattern, that is, the deprivation of social support being significantly related to negative outcomes, such as distress in interpersonal context and depressive symptoms. The associations between perceived low social support and depression have been reported in patients with various chronic conditions [20],

including patients with LBP [39]. Our findings, therefore, confirm the role of deprivation of social support in development of depressive complaints in patients with LBP.

It is of note, however, that functioning in the domains of distress in interpersonal context and depressive symptoms was predicted by deprivation of social support rather than positive experience of social support (experience of care and social contacts). This may have resulted from redundancy of these constructs, but may also indicate that perceptions of a lack of versus abundant social support play slightly different roles in regulating functioning outcomes. If this were so, positively perceived social support might be viewed as playing a protective role, buffering negative effects of disease-related stress, whereas deprivation of social support as a factor actively contributing to disease-related decrements in functioning. These speculations, however, require further investigations, including verification of whether they are LBP-specific or universal.

The sociodemographic variables we entered into the second series of regression analyses (age, gender and educational status) turned out to be unrelated to most of the domains of psychosocial functioning, with an exception for age and educational level which were found to be statistically significant predictors of the sense of being disabled, beside the previously observed significance of psychological variables. None or weak relationships between sociodemographic characteristics and LBP-related disability were reported by other authors [43]. However, our findings and those from some other studies [36] suggest that older individuals might require more attention as they may be at a greater risk for developing subjective feelings of being disabled. On the other hand, higher educational status might be a protective factor diminishing the sense of LBP-related disability. These associations, however, require further confirmation in other studies and elucidation of the mechanisms underlying them.

In the third series of regression analyses, we introduced pain severity in addition to other variables. We inserted it in a separate block, thus somewhat preventing exclusion of this variables in case of redundancy with other variables or in case of its statistical insignificance for predicting the dependent variables. This allowed us to assess the specific contribution of pain severity to models explaining psychosocial functioning. We found, however, that pain severity was non-significant in accounting for any of the psychosocial functioning domains, whereas other variables remained statistically significant as previously. A slight trend toward significance was observed for pain severity only when accounting for limitations in everyday functioning ( $P = 0.089$ ). These findings provide evidence that pain severity apparently contributes a little to psychosocial functioning in patients with LBP in contrast to psychological variables which together accounted for significant

amounts of variance in psychosocial functioning domains (cf. the values of  $R^2$  for each model in Tables 2, 3, 4, 5 and 6). This lack of the relationship between pain severity and psychosocial functioning seems to be a contra-intuitive finding; however similar results were also occasionally reported by other authors [8].

Our study has certain limitations. First, the cross-sectional design makes it difficult to draw ultimate conclusions about the actual directions of the associations we have found. It should be realized that the associations between the impact of LBP, psychosocial functioning, social support, personality, coping and appraisals of the disease are most probably dynamic and bidirectional. Our findings should be therefore viewed as a simplified approximation to the real directions of influence between these variables, rather than as a definite pattern. Second, the statistical method of data analysis we have chosen to apply (i.e., standard stepwise regression analysis) is to a certain degree based on an arbitrary choice. We have decided on this method as it seems to provide the most robust evaluation of the final regression models. It must be noted, however, that slightly different results might be obtained if another regression method had been used (e.g., backward or forward regression method). The difference might potentially concern the variables with the weakest predictive values. Additionally, apart from the regression analyses we have carried out, other inspiring statistical analyses would also be possible. For instance, the moderator test analyses could answer whether psychological factors, such as particular personality traits or coping styles, moderate the association between pain severity and psychosocial functioning. Such analyses could provide a potential direction for future research explaining personality mechanisms of psychosocial functioning in patients with LBP.

## Conclusions

The findings of our study demonstrated that decrements in various domains of functioning of patients with LBP were related to diverse psychological factors. Cognitive disease-related appraisals, coping styles, social support and personality showed different patterns and degrees of contribution to explanation of functioning in various domains. This suggests that different psychological mechanisms may be involved and probably different intervention strategies may be required with regard to various aspects of psychosocial functioning in patients with LBP. It also seems that the psychological variables may be the most important ones in predicting psychosocial functioning of patients with LBP, with a small contribution of sociodemographic variables (age and educational status), whereas pain severity may be unrelated to actual psychosocial functioning.



With reference to clinical practice, our findings emphasize that psychosocial functioning in patients with LBP should be considered and evaluated as a multifaceted rather than a single-dimension phenomenon. A psychological evaluation of patients with LBP on personality, social support available for them, their coping styles and disease-related appraisals may help explain why some patients demonstrate significant decrements in their psychosocial functioning even with objectively mild pain symptoms. On the other hand, as a result of such an evaluation, highly individualized programs of psychosocial

intervention (psychological counseling, psychotherapy, psychoeducation) can be provided, targeted specifically at particular maladaptive variables predicting low psychosocial functioning.

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**Appendix**

**DISEASE-RELATED APPRAISALS SCALE**

Name ..... Age..... Date .....

*This questionnaire contains statements reflecting various ways in which people can perceive their disease. Please, read each of these statements carefully and, by putting an X in an appropriate column, indicate how well this statement describes YOUR perception of your disease. There are no ‘right’ or ‘wrong’ answers. Any answer you give is good if only it is true, that is, in accordance with what you think and feel.*

<b>MY DISEASE FOR ME IS:</b>	<b>Yes</b>	<b>Rather yes</b>	<b>Uncertain</b>	<b>Rather no</b>	<b>No</b>
1. something that increases my anxiety					
2. the situation enabling my close ones to show more care for me					
3. the loss of hopes for fulfillment of my personal life projects					
4. the enemy whom I try to fight against					
5. a consequence of a malicious lot					
6. a factor facilitating my internal growth					
7. something that is hard to accept					
8. something that threatens me					
9. an opportunity to have a rest from my everyday duties					
10. an obstacle in carrying out my hobbies					
11. something that forces me to be more active in life					
12. a punishment for some guilt for which I am not responsible					
13. something that helps me to find meaning in life					
14. the situation which destroys my internal balance					
15. the situation causing fear that my health my worsen further					
16. an opportunity to experience kindness from other people					
17. a loss of my previous physical condition					
18. a situation which I must face up to					
19. an injustice that occurred to me					
20. an experience that makes me feel closer to God					

	Yes	Rather yes	Uncertain	Rather no	No
21. a situation of minor importance to me					
22. something that arises my fears about the future					
23. an opportunity to forget about my other problems					
24. a factor making my relationships with others more difficult					
25. the mobilization of my psychic forces					
26. bad luck that happened to me					
27. an opportunity to deepen my humanity					
28. nothing of major significance					
29. a threat that I may lose my health or life					
30. something that releases me from my previously fulfilled duties					
31. the necessity to resign from the things I used to like doing					
32. a life challenge I try to stand up to					
33. a harm that occurred to me					
34. an experience in which I can find deeper meaning					
35. an episode of little importance in my life					
36. a threat to my present life situation					
37. a source of certain benefits					
38. a limitation in my normal family or occupational life					
39. a motivation to face up to life's hardships					
40. a senseless suffering					
41. an experience which helps me to discover the value of life					
42. a fear that I may become a burden for others					
43. something that allows securing my material situation					
44. a loss of my independence					
45. unhappiness which I have not deserved					
46. a fear that I may become useless					
47. a loss of my contacts with other people					

NOTE: This is not a valid adaptation of this questionnaire in English but rather a simple translation.

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