Exploring differences in pain beliefs within and between a large nonclinical (workplace) population and a clinical (chronic low back pain) population using the pain beliefs questionnaire

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Exploring Differences in Pain Beliefs Within and Between a Large Nonclinical (Workplace) Population and a Clinical (Chronic Low Back Pain) Population Using the Pain Beliefs Questionnaire

Andrew J. Baird, Roger A. Haslam

Background. Beliefs, cognitions, and behaviors relating to pain can be associated with a range of negative outcomes. In patients, certain beliefs are associated with increased levels of pain and related disability. There are few data, however, showing the extent to which beliefs of patients differ from those of the general population.

Objective. This study explored pain beliefs in a large nonclinical population and a chronic low back pain (CLBP) sample using the Pain Beliefs Questionnaire (PBQ) to identify differences in scores and factor structures between and within the samples.

Design. This was a cross-sectional study.

Methods. The samples comprised patients attending a rehabilitation program and respondents to a workplace survey. Pain beliefs were assessed using the PBQ, which incorporates 2 scales: organic and psychological. Exploratory factor analysis was used to explore variations in factor structure within and between samples. The relationship between the 2 scales also was examined.

Results. Patients reported higher organic scores and lower psychological scores than the nonclinical sample. Within the nonclinical sample, those who reported frequent pain scored higher on the organic scale than those who did not. Factor analysis showed variations in relation to the presence of pain. The relationship between scales was stronger in those not reporting frequent pain.

Limitations. This was a cross-sectional study; therefore, no causal inferences can be made.

Conclusions. Patients experiencing CLBP adopt a more biomedical perspective on pain than nonpatients. The presence of pain is also associated with increased biomedical thinking in a nonclinical sample. However, the impact is not only on the strength of beliefs, but also on the relationship between elements of belief and the underlying belief structure.
C hronic low back pain (CLBP) remains a major health problem; it has a huge societal cost and is a major source of sickness absence. It has been described as a “20th-century medical disaster” and is perhaps one of the greatest examples of the failure of biomedical approaches. The problem, therefore, is now viewed from a biopsychosocial perspective, with psychosocial factors fundamental in both assessment and treatment or management. Key to understanding the psychosocial influence is the consideration of an individual’s beliefs, cognitions, and behaviors. Researchers are increasingly looking at the impact of these issues on pain and associated disability.

Addressing patients’ pain beliefs, cognitions, and associated behaviors is a major issue in pain management, particularly in chronic pain. These factors have been associated with level of activity interference, the amount of pain experienced, the severity of pain experienced, and levels of associated depression. Two of the most important constructs in this area, which are driven by beliefs and which influence subsequent cognition and behavior, are fear and catastrophizing. These overlapping constructs have an impact on vigilance to pain, which, in turn, also can lead to increases in reports of pain severity. Ultimately, pain-related fear is more disabling than pain itself, as fear motivates avoidance behaviors. In turn, avoidance behavior affects activities of daily living and has a role in the transition from acute to chronic pain. One of the key elements of fear is fear of further injury or reinjury, which can be a major barrier to recovery.

Addressing problematic beliefs and related cognitions and behaviors, however, can bring improvement in function. Modern back pain management programs tend to be built around the proven effectiveness of cognitive-behavioral approaches and exercise. The program in question explicitly addresses pain beliefs with participants, particularly the erroneous notion that “hurt=harm” and “more hurt=more harm.” Addressing these organic pain beliefs has been shown to be associated with improvements in function following a rehabilitation program.

It would be wrong, however, to think that beliefs are only an issue for patients. Beliefs of medical professionals can influence the treatment approaches offered and may lead to conflicts with patients. Many practitioners still have views reflective of a relatively biomedical model, and although few practitioners would now recommend bed rest, many are still not following guidelines in relation to activity, particularly in relation to return to work. Furthermore, the understanding of pain by a patient’s partner or caregiver also may play a part in the relationship between those with pain and those who interact with them. The interaction between patient and caregiver can affect levels of catastrophizing and conflict between the respective perceptions may lead to increased caregiver strain.

It follows, therefore, that interventions to address pain beliefs in relation to LBP can be targeted at individual, group, and population levels. Buchbinder and colleagues showed that a mass media campaign designed to alter beliefs about back pain, influence medical management, and reduce disability and costs of compensation could change beliefs and behaviors of both the population at large and general practitioners. Other studies, however, have not shown such success. Results of research from Norway suggest that a media campaign failed to change the beliefs of health care providers. Although beliefs changed within the general population, the changes did not affect sickness behavior. Similarly, the “Working Backs Scotland” campaign showed improvements in apparent beliefs, but no corresponding change in sickness absence or benefit awards. Therefore, although it may be logical to try to address pain beliefs at the population level, media campaigns will not necessarily achieve the desired change. Even if a change can be produced, it may not result in a corresponding change in health outcomes.

A better understanding of pain beliefs both within patients and the broader population, therefore, is needed. Research has tended to focus on clinical samples when considering the impact of beliefs, cognitions, and related behaviors on health outcomes; however, those underlying beliefs have not been considered in the context of broader population beliefs. For example, although catastrophizing may be considered maladaptive, it is not clear to what extent the beliefs and cognitions that underpin such responses are “abnormal.” This study used the Pain Beliefs Questionnaire (PBQ) to explore pain beliefs for 3 main reasons: (1) it is worded in such a way as to be applicable to both clinical and nonclinical samples, (2) it has been used successfully in research relating to chronic musculoskeletal pain, and (3) it is short enough to be incorporated into questionnaires utilizing other measures without significant disruption.

Method
In order to consider how the beliefs of patients with CLBP may differ from those of the general population, this article explores the nature and strength of pain beliefs in both nonclinical (n=2,924) and CLBP (n=631) samples, utilizing the same instrument: the PBQ. The noncli-
The study considered the PBQ scores, factor structure, and factor relationships within the respective samples and subsamples. Sex and age differences are not considered at this point, but will be reported in a subsequent article. The study utilized a cross-sectional design.

**Samples**

The CLBP sample comprised 631 patients attending assessment at the Nottingham Back Team rehabilitation program (located in the East Midlands of England). It is a multidisciplinary back pain management program delivered over a 7-week period with a half-day session each week delivered in a community setting (ie, utilizing facilities at leisure centers rather than bringing participants to a hospital site). The sessions are based on a cognitive-behavioral approach and incorporate exercise. Physical therapists, occupational therapists, and nurses collaboratively deliver the sessions with support from a clinical psychologist. Patients completed the PBQ as part of a battery of measures used within the initial assessment process. All patients attending the sessions during the research period consented for their data to be used anonymously for the purposes of this research, but not all questionnaires were usable. Approximately 3% of the questionnaire booklets were not completed to a useful level; the primary reason for this finding was reported as time pressures.

The nonclinical sample consisted of 2,924 respondents to a voluntary and anonymous health survey within a large multisite organization with a wide variety of job roles. This workplace sample represents a response rate of approximately 50%.

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pain is a result of damage to the tissues of the body</td>
<td>Organic</td>
</tr>
<tr>
<td>2. Physical exercise makes pain worse</td>
<td>Organic</td>
</tr>
<tr>
<td>3. It is impossible to do much for oneself to relieve pain</td>
<td>Organic</td>
</tr>
<tr>
<td>4. Being anxious makes pain worse</td>
<td>Psychological</td>
</tr>
<tr>
<td>5. Experiencing pain is a sign that something is wrong with the body</td>
<td>Organic</td>
</tr>
<tr>
<td>6. When relaxed, pain is easier to cope with</td>
<td>Psychological</td>
</tr>
<tr>
<td>7. Being in pain prevents you from enjoying hobbies and social activities</td>
<td>Organic</td>
</tr>
<tr>
<td>8. The amount of pain is related to the amount of damage</td>
<td>Organic</td>
</tr>
<tr>
<td>9. Thinking about pain makes it worse</td>
<td>Psychological</td>
</tr>
<tr>
<td>10. It is impossible to control pain on your own</td>
<td>Organic</td>
</tr>
<tr>
<td>11. Pain is a sign of illness</td>
<td>Organic</td>
</tr>
<tr>
<td>12. Feeling depressed makes pain seem worse</td>
<td>Psychological</td>
</tr>
</tbody>
</table>

The health survey asked about the frequency of a range of common symptoms and a pain subgroup was identified that reported some form of musculoskeletal pain (in the back, neck, arms, or legs) either “all of the time” or “most of the time” (n=642). This subsample is hereafter referred to as the “frequent pain subsample.”

**Questionnaires**

The PBQ was developed as part of a Medical Research Council-funded project within which an initial 20-item questionnaire was reduced to 12 items representing 2 scales: organic (8 items) and psychological (4 items). This questionnaire has the advantage of being worded such that it is not necessary for a respondent to be in pain or suffering to have a particular condition to complete it (ie, it is condition independent). The questionnaire has been used successfully with chronic back pain populations. For the purpose of this study, the original 6-point (“always” to “never”) response scale was changed to a 5-point scale to ensure better compatibility with the 36-Item Short-Form Health Survey (SF-36) questionnaire it was being used with in the nonclinical sample. The 5 items were “all of the time,” “most of the time,” “some of the time,” “a little of the time,” and “none of the time.” In their study of patients experiencing CLBP, Walsh and Radcliffe also described the utilization of a 5-point scale. The PBQ subscales are scored by taking the sum of the item scores for the organic and psychological scales, respectively. The items and related scales for the PBQ are shown in Table 1.

For the chronic pain sample, the PBQ was included within a revised assessment questionnaire booklet. For the nonclinical sample, the PBQ was used within a questionnaire, which featured the SF-36, together with questions on the frequency of common symptoms, as well as a range of demographic factors and lifestyle issues (eg, smoking behavior).

The SF-36 is one of the most widely used health and quality-of-life measures. Its 36 items measure 8 multi-item scales: physical functioning, role limitation due to physical problems, bodily pain, general health, vitality, social functioning, role limitation due to emotional problems, and mental health. Version 2 of the SF-36 was designed to facilitate norm-based scoring for all scales.
Raw scores are first transformed into scores of 0 to 100 before being further transformed to t scores where the mean is fixed as 50 (the population norm) and the standard deviation is 10. This transformation allows a given sample population to be compared with the norms for that population, thereby providing an illustration of how representative the sample population is.

Data Analysis
The degree to which the nonclinical sample could be said to be representative of the United Kingdom population was assessed by generating t scores for each of the 8 SF-36 scales using United Kingdom normative data produced by Jenkinson et al in 1999. As is the case with many health scales, the scores on the 2 pain beliefs scales are not normally distributed. Although it is not uncommon for studies addressing such variables to describe analysis with parametric statistics, it has been argued that nonparametric tests should be used, as the distributions tend to be skewed. In reality, the use of parametric tests is unlikely to produce misleading results, provided samples are not small. When distributions are skewed, however, nonparametric methods can provide greater statistical power than parametric equivalents. For this reason, between-groups differences were assessed using the nonparametric Mann-Whitney U test. Effect sizes were calculated as Cohen’s d, utilizing pooled standard deviation.

The factor structure of the PBQ was assessed using principal factor analysis (principal axis factoring within SPSS version 16 [SPSS Inc, Chicago, Illinois]), as this is the most appropriate method when multivariate normality cannot be assumed. The covariance matrix was used because it avoids the standardization of attributes with its associated form of sampling error; standardization is unnecessary in this case, as all variables are measured on an identical scale. The covariance matrix also is most appropriate when comparing factor structures between samples. An oblique rotation was used as described by Edwards et al, as oblique rotations are typically more appropriate than orthogonal rotations when evaluating psychological constructs. In this case, direct oblimin rotation was selected. Given the potential problems inherent in both of the most commonly used determinants of the number of factors to extract—eigenvalues and scree plots—multiple factor analyses were run with the number of factors to retain, set manually. The resultant tables were then considered to identify best fit with the data (eg, item loadings >.3), no or few cross-loadings, and no factors with fewer than 3 items. Factor loadings less than .32 were ignored. There appears to be a lack of clear guidance on variable selection—Comrey and Lee produced a rating system that suggests that loadings in excess of .71 are excellent, .63 are very good, .55 are good, .45 are fair, and .32 are poor, but the logic for these ratings is based on orthogonal rotation and does not translate simply to oblique rotations. For simplicity, therefore, within this article, loadings above .6 will be considered strong and those below .4 (the cutoff used by Edwards et al) will be considered weak.

An initial analysis of the combined data set (CLBP and nonclinical) was used to determine possible factor structures, which were then examined within nonclinical and CLBP samples. Two subsamples of the nonclinical sample were also considered: those who reported frequent musculoskeletal pain and those who did not. Internal consistencies for the PBQ scales were calculated using Cronbach alpha.

Ethics
Ethical approval for the clinical aspect of the study was provided through the Nottingham Back Team via National Health Service processes. Participants received both written and verbal explanation during their assessment before informed consent was sought for their data to be used for the purposes of this research. Ethical approval for the workplace sample followed Loughborough University procedures and was undertaken in consultation with the employer organization. Participant information was provided, and completion and return of the questionnaire were taken as informed consent.

Results
Sample Characteristics
Within the nonclinical sample, for those participants who provided details about their sex, the split was 30% men and 70% women. Within the subsample reporting frequent musculoskeletal pain, the available sex split was 21% men and 79% women. The chronic back pain sample was 38% men and 62% women. The age profiles of the populations were broadly comparable with age groups up to 45 years, but the nonclinical group had a higher proportion in the 45 to 54 category (31% versus 21%) and a lower proportion in the over 55 group (15% versus 28%). The health profile (SF-36 t scores) of the nonclinical population is shown in Table 2 (UK norm equates to score = 50 [SD = 10]).

Scores on the PBQ
The difference in scores between the nonclinical sample and the CLBP sample are shown in Table 3. Table 4 illustrates the differences within the nonclinical sample when comparing those who report frequent musculoskeletal pain with those who do not.
When comparing the frequent pain subsample with the CLBP sample,

differences on both scales were signi-


cificant at P<.001 (rf=0.30 and
d=0.27, respectively).


Exploratory Factor Analysis

Initial analysis of the combined sam-
ple suggested a 2- or 3-factor solution
explaining 55% and 62% of the vari-
ance, respectively. The 2-factor solu-
tion closely matched the original
solution described by Edwards
et al.40 However, neither solution
matched Costello and Osborne's
ideal.52 The 2-factor solution cross-
loaded on item 11 (sign of illness)
(.379 on organic and -.337 on psy-
chological), and the 3-factor solution
produced a factor with only 2 items
(3 [relief of pain] and 10 [control of
pain]). Analysis of the scree plot
would suggest a 2-factor solution,
but all factors within the 3-factor
solution had eigenvalues >1.

Two-Factor Solution

Factor loadings are summarized in
Table 5. Within the nonclinical sam-
ple, item 11 (sign of illness) cross-
loaded weakly, but there were no
other cross-loadings or weak load-
ings. Six items loaded strongly.
Within the no frequent pain sub-
sample, factor loadings were similar
to the whole nonclinical sample;
item 11 cross-loaded weakly, and
the same 6 items (1, 2, 4, 8, 9, and 12)
loaded strongly. In the frequent pain
subsample, item 11 continued to
cross-load, but loaded weakly only
on the psychological scale; it loaded
.447 on the organic scale. Items 1
and 2 ("sign of damage" and "exer-
cise makes worse") no longer loaded
strongly. Within the CLBP sample,
item 11 did not cross-load, but
loaded at .503 on the organic scale.
Item 6 (relaxation) loaded only
weakly within this sample at -.352.
Only 4 items loaded strongly, as with
the frequent pain subsample.

Table 2.

<table>
<thead>
<tr>
<th>SF-36 Scale</th>
<th>Whole Sample</th>
<th>Frequent Pain Subsample</th>
<th>No Frequent Pain Subsample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical function</td>
<td>50.6 (9.1)</td>
<td>43.7 (10.8)</td>
<td>52.5 (7.7)</td>
</tr>
<tr>
<td>Role-physical</td>
<td>50.4 (9.8)</td>
<td>41.4 (13.1)</td>
<td>52.8 (6.9)</td>
</tr>
<tr>
<td>Bodily pain</td>
<td>50.7 (10.1)</td>
<td>38.8 (9.7)</td>
<td>54.0 (7.4)</td>
</tr>
<tr>
<td>General health</td>
<td>50.2 (9.5)</td>
<td>43.6 (9.8)</td>
<td>52.0 (8.6)</td>
</tr>
<tr>
<td>Vitality</td>
<td>48.3 (10.7)</td>
<td>41.4 (10.8)</td>
<td>50.3 (9.8)</td>
</tr>
<tr>
<td>Social function</td>
<td>48.7 (10.6)</td>
<td>41.3 (12.2)</td>
<td>50.7 (9.1)</td>
</tr>
<tr>
<td>Role-emotional</td>
<td>50.3 (10.3)</td>
<td>45.4 (13.1)</td>
<td>51.6 (9.0)</td>
</tr>
<tr>
<td>Mental health</td>
<td>49.0 (10.2)</td>
<td>44.6 (11.1)</td>
<td>50.2 (9.7)</td>
</tr>
</tbody>
</table>

Scores are expressed as mean (standard deviation). SF-36 = 36-item Short-Form Health Survey.

Table 3.

<table>
<thead>
<tr>
<th>PBQ Scale</th>
<th>Nonclinical Sample</th>
<th>CLBP Sample</th>
<th>Cohen d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>22.1 (5.5)</td>
<td>26.1 (5.2)</td>
<td>0.733</td>
</tr>
<tr>
<td>Psychological</td>
<td>12.2 (3.9)</td>
<td>11.2 (3.6)</td>
<td>0.260</td>
</tr>
</tbody>
</table>

Scores are expressed as mean (standard deviation).

Table 4.

<table>
<thead>
<tr>
<th>PBQ Scale</th>
<th>No Frequent Pain</th>
<th>Frequent Pain</th>
<th>Cohen d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>21.5 (5.4)</td>
<td>24.5 (5.3)</td>
<td>0.558</td>
</tr>
<tr>
<td>Psychological</td>
<td>12.2 (3.9)</td>
<td>12.2 (3.9)</td>
<td>0.558</td>
</tr>
</tbody>
</table>

Scores are expressed as mean (standard deviation).

Three-Factor Solution

Factor loadings for the 3-factor solu-
tion are summarized in Table 6. Within
the nonclinical sample, the factor structure mirrored that within
the combined sample. Items 3 and
10 ("relief" and "control") formed a
"new" factor (factor 3). Item 11 ("ill-
ness") loaded weakly on the psycholog-
ical factor (factor 2), rather than
the organic factor (factor 1). There
was no cross-loading. Six items (1, 4,
5, 9, 10, and 12) loaded strongly.

Within the no frequent pain subsample, item 7 ("hobbies and social
activities") loaded weakly on the
psychological factor but no longer
loaded on the organic factor. Item 11
continued to load weakly on the psy-
chological factor. Six items (1, 2, 4,
9, 10, and 12) loaded strongly.

Within the frequent pain subsample, item 2 ("exercise makes worse")
loaded weakly on the "new" factor,
but no longer loaded on the organic
factor. Item 7 loaded on the organic
Assessment of Pain Beliefs Using the Pain Beliefs Questionnaire

Table 5.
Two-Factor Solution of the Pain Beliefs Questionnaire Across Samples

<table>
<thead>
<tr>
<th>Item</th>
<th>Combined Sample</th>
<th>Nonclinical</th>
<th>No Frequent Pain</th>
<th>Frequent Pain</th>
<th>CLBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.567</td>
<td>.601</td>
<td>.622</td>
<td>.551</td>
<td>.498</td>
</tr>
<tr>
<td>2</td>
<td>.678</td>
<td>.664</td>
<td>.688</td>
<td>.581</td>
<td>.575</td>
</tr>
<tr>
<td>3</td>
<td>.647</td>
<td>.564</td>
<td>.503</td>
<td>.548</td>
<td>.719</td>
</tr>
<tr>
<td>4</td>
<td>-.685</td>
<td>-.682</td>
<td>-.666</td>
<td>.668</td>
<td>-.666</td>
</tr>
<tr>
<td>5</td>
<td>.528</td>
<td>.529</td>
<td>.574</td>
<td>.489</td>
<td>.492</td>
</tr>
<tr>
<td>6</td>
<td>-.539</td>
<td>-.553</td>
<td>-.492</td>
<td>.545</td>
<td>-.352</td>
</tr>
<tr>
<td>7</td>
<td>.554</td>
<td>.511</td>
<td>.475</td>
<td>.503</td>
<td>.625</td>
</tr>
<tr>
<td>8</td>
<td>.646</td>
<td>.672</td>
<td>.643</td>
<td>.691</td>
<td>.572</td>
</tr>
<tr>
<td>9</td>
<td>-.756</td>
<td>-.741</td>
<td>-.723</td>
<td>.714</td>
<td>-.737</td>
</tr>
<tr>
<td>10</td>
<td>.553</td>
<td>.483</td>
<td>.400</td>
<td>.553</td>
<td>.566</td>
</tr>
<tr>
<td>11</td>
<td>-.337</td>
<td>-.347</td>
<td>-.341</td>
<td>.447</td>
<td>.330</td>
</tr>
<tr>
<td>12</td>
<td>-.858</td>
<td>-.889</td>
<td>-.926</td>
<td>.838</td>
<td>-.780</td>
</tr>
</tbody>
</table>

*CLBP=chronic low back pain.

factor, unlike the no frequent pain subsample. Item 11 continued to load weakly on the psychological factor. Six items (3, 4, 5, 8, 9, and 12) loaded strongly. There was no cross-loading.

Within the CLBP sample, item 2 loaded weakly (.377) on the "new" factor, but not on either of the other factors. Item 7 cross-loaded weakly on the "new" factor and the organic factor (-.364 and .340, respectively). Item 11 loaded weakly on the organic factor, unlike any of the other samples. Item 6 ("relaxation") failed to load on any factor. Five items (3, 4, 8, 9, and 12) loaded strongly.

**Correlation Between Factors**

Between-factor correlations are not considered for the 3-factor solution as the makeup of the factors themselves varies between samples. Within the 2-factor solution, correlation between factors was -.17 for the CLBP sample, whereas for the nonclinical sample it was -.53. Within the nonclinical sample the correlation ranged from -.23 ("frequent pain") to -.65 ("no frequent pain").

**Reliability**

Reliability was adequate for both scales across all samples. The Cronbach alpha for the organic scale was .8 or higher throughout the study.

Table 6.
Three-Factor Solution Across Samples*

<table>
<thead>
<tr>
<th>Item</th>
<th>Combined Sample</th>
<th>Nonclinical</th>
<th>No Frequent Pain</th>
<th>Frequent Pain</th>
<th>CLBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.719</td>
<td>.735</td>
<td>.740</td>
<td>.569</td>
<td>.569</td>
</tr>
<tr>
<td>2</td>
<td>.541</td>
<td>.593</td>
<td>.621</td>
<td>.359</td>
<td>.377</td>
</tr>
<tr>
<td>3</td>
<td>.617</td>
<td>.497</td>
<td>.460</td>
<td>.741</td>
<td>.651</td>
</tr>
<tr>
<td>4</td>
<td>.693</td>
<td>.677</td>
<td>.672</td>
<td>.703</td>
<td>.767</td>
</tr>
<tr>
<td>5</td>
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<td>6</td>
<td>.461</td>
<td>.520</td>
<td>.513</td>
<td>.477</td>
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<td>.337</td>
<td>.464</td>
<td>.364</td>
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<td>.697</td>
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<td>.820</td>
<td>.578</td>
<td>.559</td>
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<td>11</td>
<td>.338</td>
<td>.360</td>
<td>.372</td>
<td>.342</td>
<td>.379</td>
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<tr>
<td>12</td>
<td>.872</td>
<td>.891</td>
<td>.924</td>
<td>.851</td>
<td>.785</td>
</tr>
</tbody>
</table>

*CLBP=chronic low back pain.
The Cronbach alpha for the psychological scale exceeded .8 in the nonclinical sample but dropped to .73 in the CLBP sample.

**Discussion**

This study sought to explore differences in the strength and nature of pain beliefs among samples with and without painful musculoskeletal problems, and the results clearly illustrate the difference in both belief strength and structure. The PBQ provides 2 scales. The first, organic, deals with both the perceived cause of the pain ("hurt=harm") and its management (issues of control and exercise/activity), and as such it could be considered a measure of biomedical thinking. The second scale, psychological, deals with the impact of anxiety, depression, attention to pain, and relaxation. This study, with much larger sample sizes, supports the findings of Sloan et al, demonstrating that patients with CLBP have stronger organic pain beliefs and weaker psychological pain beliefs than nonpatients. In other words, this finding shows that patients with chronic pain have stronger beliefs that (1) "hurt=harm," (2) "more hurt=more harm," and (3) others are best placed to manage their pain. They also are less likely to accept the impact of psychological factors or the benefits of relaxation. Sloan and colleagues’ data showed that there was a large effect size for the organic scale ($d=1.01$) and a small effect size for the psychological scale ($d=0.38$). Similarly, in this study, when comparing patients with those in the nonclinical sample not reporting frequent musculoskeletal pain, the effect sizes were $d=0.86$ and $d=0.26$, respectively.

Within the nonclinical sample, the organic scale also clearly differentiated between those with and without frequent musculoskeletal pain, and the effect size was moderate ($d=0.56$). Few similar data were available for comparisons within nonclinical populations, but this was a stronger effect size than was found for catastrophizing by Severijns et al when comparing those with and without current pain within a community sample ($d=0.34$).

Organic scale scores were highest in the CLBP group and lowest within the group without frequent musculoskeletal symptoms. These data, therefore, may suggest that differences in organic/biomedical pain beliefs are related to the presence and impact of pain—those most affected having highest scores, or the most biomedical view. This medically biased perspective also could explain the very strong desire for a clear diagnosis among this particular patient group. It is possible, however, that the beliefs were affected not only by the presence of pain, but also by the individual’s involvement with the health care system. Walker et al found that those “trapped in the system” felt powerless and helpless, which could reinforce a more biomedical perspective, but this study had no clear measure of involvement with the health care system, as patients attending the Back Team program could have arrived by a variety of routes. Future studies should seek to quantify this factor and evaluate its impact.

Although, in the case of the organic scale, increases occurred incrementally from the no frequent pain group through the frequent pain group to the CLBP group, for the psychological scale, the presence of frequent pain made no difference in scores within the 2 subgroups of the nonclinical sample. This finding may suggest that differences in the strength of psychological pain beliefs may be related more to chronicity, or the impact of pain, rather than simply to its presence.

The exploratory factor analysis undertaken provides insight not only into variations of factor structure between samples and subsamples but also into issues with the technique itself. The initial factor analysis of the combined sample (N=3,555) provided evidence to support either a 2- or 3-factor solution. Neither solution was ideal; the 2-factor solution showed cross-loading on item 11 ("pain is a sign of illness") and the 3-factor solution had a "new" factor with only 2 items. Although 2-item factors are considered to be potentially weak and unstable, they occur in some widely used measures (eg, the pain scale of SF-36). Ultimately, the 3-factor solution lacked utility; however, as the factor composition changed across samples and within the CLBP sample, 3 items loaded weakly and 1 failed to load at all. Nevertheless, consideration of the 3-factor solution provides insight into the way in which the presence of pain may affect the structure of beliefs and not simply their strength.

Within the frequent pain subsample, item 2 ("exercise makes pain worse") loaded with the control-related items of the “new” factor rather than on the factor dealing with “cause.” Within the CLBP sample, the control and exercise items also were joined by item 7 (hobbies/social activities), which suggests that the presence of pain increasingly leads to activity avoidance being seen as an element of pain control and that there is an underlying mechanism behind the avoidance behaviors common among those reporting CLBP. The 2-factor solution mirrors that described by the PBQ’s authors but accounts for 55% of the variance rather than 82% as originally described. However, this percentage represents a reasonable proportion of the variance explained compared with other pain scales, and internal consistency was acceptable. Hence, the PBQ is a useful tool for measur-
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The strength of this study lies in its sample sizes, particularly as factor analysis is a “big sample” technique. However, it is essentially a cross-sectional design, so no causal inferences can be made. Both samples are female-biased. However, sex bias is not unusual in chronic pain populations, and the distribution within the CLBP sample is identical to that of the sample used in the development of the PBQ. The bias within the nonclinical sample dictates that it cannot be considered a truly representative sample, but the t scores do suggest that the sample is reasonably representative in terms of overall health profile in relation to United Kingdom population norms.

Further analysis will explore sex differences with the PBQ; the relationship between the PBQ and the Multi-dimensional Health Locus of Control Questionnaire, as described by Edwards et al; and between PBQ and the Roland-Morris Disability Questionnaire, as described by Walsh and Radcliffe. Relationships with anxiety, depression, and self-efficacy also will be considered. Future research should utilize prospective studies to determine whether pain beliefs change in response to pain (particularly chronic pain) and whether certain beliefs are risk factors for chronicity. Longitudinal studies are needed to assess the stability of beliefs and their structure over time.

In conclusion, the pain beliefs of patients with CLBP are significantly different when compared with a broadly representative sample of the general population within the United Kingdom. The patients with chronic pain have a much more biomedical view of pain, with a stronger belief that “hurt=harm.” The presence of pain is associated with differences in both belief strength and overall belief structure; however, this study provides no indication of whether this relates to cause or effect. Nevertheless, the study findings support the view that patients living with chronic pain think differently about the causes and consequences of pain when compared with individuals without chronic pain and provides an illustration of how activity avoidance is increasingly associated with pain control within this patient group. If beliefs are changed by the presence of pain, it could also explain why some efforts to change population beliefs about pain have been unsuccessful in influencing key outcomes such as health care utilization and sickness absence. The PBQ appears to be a simple, quick, and effective measure of pain beliefs that may be of value in both research and practice.

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