# Can Brief Illness Perception Predict Pain Related Outcomes for People with Chronic Low Back Pain?

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## Abstract

**Introduction:** Treating patients with complex chronic non-malignant pain can be complicated by psychological and/or social factors. A vital importance for recovery is how the patient copes with pain and the emotional suffering that accompanies it. Patients´ Illness Perception (IP) and expectations towards the treatment has proven to play an important role for the treatment response. We aimed to identify changes in patients´ IP from admission to discharge for patients with Chronic Low Back Pain (CLBP) admitted to a large Interdisciplinary Pain Center (IPC) in Denmark. Additionally, to examine if IP can affect the following items: pain catastrophizing, pain during movement, quality of life, and patient satisfaction.

**Methods:** The questionnaires used were all a part of the Danish Clinical Pain Registry (PAINDATA). The study is reported on ClinicalTrials.gov (REG-1303-2022). The participants all suffered from CLBP. The enrollment took place from 12. June 2020 to 3. April 2022.

**Results:** A total of 80 patients were included in the study. Changes in the Brief Illness Perception Questionnaire (BIPQ) from admission to discharge were significant p=0.007. Seventy-two patients had a low degree of IP at admission and 65 patients at discharge. Significant changes were detected from admission to discharge for the following supplemental items: fear avoidance (p=0.002), Quality of Life (p=0.001), and pain catastrophizing (p=0.002). Furthermore, 83% of the included patients were satisfied or very satisfied with the treatment provided by the IPC at discharge.

**Conclusion:** IP affect patient reported outcomes. Therefore, it is important to target IP in the IPCs when patients are admitted. The BIPQ seems to be a useful tool for that purpose.

## Background

Chronic Low Back Pain (CLBP) has globally been the leading cause of disability for several decades [1,2]. The prevalence of CLBP continues to rise as a cause of higher life expectancy, resulting in high levels of disability, reduced quality of life, increased medical expenditures, and significant economic costs [3-5]. Pain intensity is a primary outcome used in clinical practice to quantify the severity of CLBP and the efficacy of its treatment; however, pain is a subjective experience that can be impacted by a huge number of additional factors [6-8]. Treating patients with complex chronic non-malignant pain can be complicated by psychological and/or social factors [9]. To address these issues, biopsychosocial, by nature, interdisciplinary pain programs provide integrated interventions by an interdisciplinary team in a unified setting with unified goals [10]. However, patients´ Illness Perception (IP) and expectations towards the provided treatment have proven to play an essential role in how the patients´ outcomes respond to the treatment provided by the IPC [11]. Therefore, it is needed to find a way to identify patients´ illness perception when planning the patient course in the IPC thereby in close collaboration with the patient, to reflect and identify, possible obstacles to obtain an optimal treatment for the individual patient. The BIPQ has been used in clini-

cal practice to assess the patients´ IP, expectation of treatment, and beliefs about rehabilitation and has proven to be a valuable instrument for a wide variety of patient groups [12].

We hypothesized that using the BIPQ at admission (adm) and discharge (dis) could shed a light on possible psychological factors that could influence the patient course and patient satisfaction.

Therefore, we aimed to identify changes in BIPQ from adm to dis for patients with CLBP admitted to a large IPC in Denmark. Additionally, we wished to examine if the patient's illness perception could affect: Pain Catastrophizing, pain during movement, quality of life, and patient satisfaction.

## Methods

All data included in this retrospective observational cohort study derives from the Danish Clinical Pain Registry, which in the following will be referred to as PainData (https://paindata-test.rsyd.dk). PainData is a Danish electronic internet-based clinical pain registry established to improve the understanding and treatment of high-impact chronic pain in Danish Pain Centers [13].

### Ethics

Data from PainData is delivered from a third party anonymously and therefore, none of the investigators have had any access to patient identification numbers.

The study is reported on Clinical Trials.gov (REG-1303-2022). All information has been stored and decrypted according to The Danish Data Protection Agency. Patients who contribute to the PainData database fill out a written (electronic) inquiry where the patient consents to the information from the questionnaires and the patient record (e.g. examination and diagnosis) can be used for quality and research purposes, therefore, no further patient acceptance was needed.

The manuscript follows the guidelines of Reporting of Observational Studies in Epidemiology (STROBE) [14] statement and is conducted in accordance with the principles of the Declaration of Helsinki [15].

### PainData

The PainData Registry (see https://PainData-test.rsyd.dk) is designed to capture Patient Related Outcomes (PRO) data at different time points related to the clinical contact in Danish Pain Centers. Patients can access the registry 24 hours per day, 7 days per week, via different web browsers. After referral to a Pain Center before the initial consultation, all patients are invited to answer questions about their clinical pain characteristics and adaptations to pain through a web-based questionnaire system sent via a personal link to the patients' official inbox, e-Boks (the channel that the Danish State and municipalities use to send official documents to citizens). Questionnaires are completed at home before the first consultation. None of the questions are mandatory. In addition to basic demographics, data include pain intensity, disability, physical and mental health, quality of life, several psychological constructs, and patient values in relation to treatment. During completion of the validated questionnaires, patients are invited to give consent to storage of data in the PainData research database and used for later research. The BIPQ was not a part of the standard PainData set. Interdisciplinary Pain Center, Zeeland University Hospital Koege (ZUHK) asked for the BIPQ to be added to their PainData set in June 2019 [16].

### Participants

The participants were enrolled during the period 12. June 2020 to 3. April 2022 and were all admitted to the same IPC in Denmark. Inclusion criteria: ≥18 years, patients with CLBP, who have completed the BIPQ during the first and last consultation.

### Setting

The IPC is an out-care facility. The interventions are based upon the bio, psycho, social model [17] and are performed by an interdisciplinary team of specialist including doctors, nurses, psychologists, physiotherapists, and social workers in close cooperation with the patients and their relatives.

### Outcomes

The primary outcome was changes in BIPQ from adm. to dis. for patients with CLBP. The secondary outcomes were changes from adm. to dis. for the following items: fear avoidance score, pain during movement, quality of life, and pain self-efficacy. Furthermore, by using linear regression analyses, we wanted to detect if BIPQ effects patients, pain self-efficacy, fear avoidance, NRS, pain during movement, quality of life, pain catastrophizing, and satisfaction.

### Data collection

The following data were extracted from the PainData set:

At admission:

- Illness perception

- Demographic data (sex, age, education in years, employment status and marital status)

- Pain catastrophizing

- Pain during mobilization

- Self-efficacy

- Fear avoidance

- Quality of life

At discharge:

- Illness perception

- Self-efficacy

- Fear avoidance

- Pain during mobilization

- Pain catastrophizing

- Quality of life

- Patient satisfaction

Patients were not asked to elaborate on item 4 in BIPQ at dis: "Do you think the treatment can have a positive impact on your illness" since it did not makes sense to ask patients the question at adm. Item 4 was excluded from the test due to statistically considerations with comparison from adm. to dis. A full BIPQ analysis including item 4 was separately conducted.

## Clinical assessments

### Illness perception by BIPQ

BIPQ [16] is a validated tool designed to assess cognitive and

emotional perceptions of illness. BIPQ consists of nine items rated on a scale from 0 (minimum) to 10 (maximum) and assess emotional and cognitive perceptions. Cognitive illness perceptions are measured through questions such as "consequences" (How much does your illness affect your life?), "identity" (How much do you experience symptoms from your illness?), "timeline" (How long do you think your illness will continue?), "personal control" (How much control do you feel you have over your illness?), "treatment control" (How much do you think your treatment can help your illness?). Emotional perceptions of illness perception are measured with questions such as; (How concerned are you about your illness?) and (How much does your illness affect you emotionally?). Finally, illness understanding is measured through the question (How well do you feel you understand your illness?). The last and ninth question is open-ended. The patient can provide three different explanations for their illness. The cut-off point is set to be 36 for patients with CLBP [11,16-18]. A higher score reflects a negatively and an unfavorable view of the illness (range: 0-80).

### Fear avoidance by Tampa Scale of Kinesiophobia (TSK)

TSK is a self-reported 17 item questionnaire that quantifies an excessive, irrational, and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or re-injury [19,20]. It uses a 4-point Likert scale (Strongly Disagree-Disagree-Agree-Strongly Agree). The scores range from 17 to 68 where the lowest 17 means no or negligible kinesiophobia. Scores above 37 are generally considered to indicate kinesiophobia [19,20].

### Self-efficacy by Pain Self-Efficacy Questionnaire (PSEQ)

PSEQ is a 10-item questionnaire, to assess the confidence people with ongoing pain have in performing activities while in pain and assess the impact pain is having on the respondent's life [18]. The score is presented with a range from 0-60, where high scores indicate greater levels of confidence in dealing with pain [18].

### Pain measurement by Numeric Rating Scale (NRS)

NRS measures pain during movement from 0 to 10. 0=no pain at all and 10=the worst imaginable pain [21].

### Pain catastrophizing by Pain Catastrophizing Scale (PCS)

The PCS [22] instructs patients to reflect on past painful experiences, and to indicate the degree to which they experienced each of 13 thoughts or feelings when experiencing pain, on 5-point scales with the end points 0=not at all and 4=at all times. The total score is the sum of scores for the individual items: Rumination ("I can't stop thinking about how much it hurts"), magnification ("I worry that something serious may happen"), and helplessness ("There is nothing I can do to reduce the intensity of the pain"). The total score of the PCS ranges from 0-52, however, a total PCS score of 30 represents clinically relevant level of catastrophizing [22].

### Quality of Life, by PROMIS Scale and EQ5D

PROMIS Global Score [23] is a self-reported 9 item presented on a Likert scale combined with the EQ5D [24] and 0-10 NRS. The eleven point scale is from 0-10. Ten is the worst imaginable pain and 0 is no pain. The first nine questions are related to the patient's wellbeing such as: Participating in social activities, physical health, every day activity, and emotional problems. Patients indicate on a scale from 1 to 5 the state of quality. Five

indicates the highest score of wellbeing for each question. Additionally to these data the result of EQ5D and 0-10 on NRS scale is added in the final scores. Score below 40 is considered as a sign of reduced Quality of Life [23].

### Patient satisfaction

Measured from one to seven. One is very satisfied with the provided treatment and seven is very unsatisfied.

### Statistical analysis

Since this is an observational cohort study no sample size calculation has been performed.

The statistical analysis was performed by IBM SPSS software version 25 for Windows (SPSS Inc. Chicago, IL). Data were tested for normal distribution visually by histograms, and Q-Q plots and quantitatively with Kolmogorov-Smirnov test. Nonparametric data were presented by using the median and Interquartile Range (IQR). Parametric data were reported by using mean and Standard Deviation (SD). Categorical data were presented as frequency (n). To describe the strengths and the correlation between variables, Spearman's Rank Order Correlation (Rho) was used and to identify the differences from adm. to dis. the paired t-test was used. The level of statistical significance was presented as $p<0.05$. The exploratory multiple linear regression analysis was performed by using, respectively, the dependent variable BIPQ at adm. or BIPQ at dis.

### Results

A total of 80 patients with chronic low back pain admitted to a large IPC in Denmark, met the inclusion criteria. Twenty-five males and fifty-five females. Mean age was 54 years, interquartile-range (19-85), 21 were non-married, and 59 married.

For the primary outcome, changes in BIPQ from adm. to dis., the results showed a significant change in means from (47.29) at adm. to (44.39) at dis. (p=0.007) (Table 1). A total of 72 patients (94 %) had a BIPQ score above 36 indicating an unfavorable illness perception at adm. and 65 patients (88%) at dis.

Regarding the secondary outcomes, significant changes was detected from adm. to dis. for the following items: Fear avoidance (p=0.002), quality of Life (p=0.001), and pain catastrophizing (p=0.002) (Table 1). Furthermore, 83 % of the included patients were very satisfied or satisfied with the treatment provided by the IPC at dis. (Table 3).

### Linear regressions analysis

The regression analysis performed with BIPQ at adm. (without item four) as the dependent variable demonstrates significance regarding quality of life at adm. (p<0.001), Pain Catastrophizing at adm. (p<0.001), and pain self-efficacy at adm. (p=0.003) (Table 2). BIPQ (without item four) at dis. as the dependent variable, significance was found for pain during movement at dis. (p=0.007) and pain catastrophizing at dis. (p<0.001) (Table 3).

The regression analysis performed with BIPQ at adm. (including item four) as the dependent variable demonstrates significance regarding Pain Catastrophizing at dis. (p=0.047) and patient satisfaction at dis. (p=0.006) (Table 4).

**Table 1:** Changes in health related outcomes from admission to discharge.

| Assesment tools | At admission | At discharge | Difference (Independent samples t-test) | Sign. P-level |
|---|---|---|---|---|
| BIPQ, mean | 47.3 | 44.4 | 2.9 | 0.007 |
| NRS, mean | 6.4 | 5.9 | 0.5 | NS |
| Fear Avoidance, mean | 4,9 | 3,5 | 1.4 | 0.002 |
| Pain catastrophizing, mean | 28,3 | 24,9 | 3.4 | 0.002 |
| PSEQ, mean | 5.97 | 5.95 | 0.03 | NS |
| Quality of Life, mean | 36,5 | 39,5 | -3.05 | 0.001 |

NS: Non-Significant; BIPQ: Brief Illness Perception Questionnaire; NRS: Numeric Rating Scale; PSEQ: Pain Self-Efficacy Questionnaire.

**Table 2:** Linear regression, the relationship between BIPQ at admission without item 4, and health related outcomes.

| Assesment tools | B | 95% CI for B | Sign. | NS |
|---|---|---|---|---|
| p-level | 4,9 | 3,5 | 1.4 | 0.002 |
| Fear avoidance | -0.2 | (-.60-0.26) | NS | 0.002 |
| NRS | 0.2 | (-0.51-0.98) | NS | NS |
| Quality of life | -0.3 | (-0.47-0.03) | <0.001 | 0.001 |
| PCS | 0.3 | (0.16-0.45) | <0.001 | |
| PSEQ | -0.7 | (-1.18- 0.26) | 0.003 | |

Dependent variable BIPQ at admission without item 4.
BIPQ: Brief Inventory Pain Questionnaire; NRS: Numeric Rating Scale; PCS: Pain Catastrophizing Scale; PSEQ: Pain Self-Efficacy Questionnaire; NS: Non-significant.

**Table 3:** Linear regression, the relationship between BIPQ at discharge without item 4, and health related outcomes.

| Assesment tools | B | 95% CI for B | Sign. p-level | NS |
|---|---|---|---|---|
| Fear avoidance | 0.1 | (-0.53-0.66) | NS | 0.002 |
| NRS | 1.0 | (0.29-1.79) | 0.007 | 0.002 |
| Quality of life | -0.2 | (-0.51-0.24) | NS | NS |
| PCS | 0.3 | (0.17-0.48) | <0.001 | 0.001 |
| PSEQ | -0.5 | (-1.04-0.10) | NS | |
| Satisfaction | -0.3 | (-1.23-0.58) | NS | |

Dependent variable BIPQ at discharge without item 4.
BIPQ: Brief Inventory Pain Questionnaire; NRS: Numeric Rating Scale; PCS: Pain Catastrophizing Scale; PSEQ: Pain Self-Efficacy Questionnaire; NS: Non-significant.

## Discussion

In this study, we found a significant change in BIPQ, fear avoidance, quality of life, and pain catastrophizing from adm. to dis. Furthermore, most of patients with persistent CLBP admitted to the IPC were satisfied with the treatment.

Perception of illness refers to a patient´s cognitive appraisal and personal understanding of a medical condition and its potential consequences and how to experience and mentally frame living with a disease [16]. A review by Sawyer et al. found favorable illness perception to be associated with better health outcomes, while unfavorable illness perception has been associated with worse outcomes [25]. Therefore, it could be beneficial to incorporate the concept into the IPC practice to support

**Table 4:** Linear regression, the relationship between BIPQ at admission and health related outcomes at discharge.

| Assesment tools | B | 95% CI for B | Sign. |
|---|---|---|---|
| p-level | 0.1 | (-0.53-0.66) | NS |
| Fear avoidance | -0.1 | (-1.20-0.91) | NS |
| NRS | 0.4 | (-0.97-1.68) | NS |
| Quality of life | -0.2 | (-0.65-0.29) | NS |
| PCS | 0.3 | (0.004-0.56) | 0.047 |
| PSEQ | -0.2 | (-1.24-0.79) | NS |
| Satisfaction | -2.3 | (-3.90-0.68) | 0.006 |

Dependent variable BIPQ at discharge without item 4.
BIPQ: Brief Inventory Pain Questionnaire; NRS: Numeric Rating Scale; PCS: Pain Catastrophizing Scale; PSEQ: Pain Self-Efficacy Questionnaire; NS: Non-significant.

a beneficial patient course [26,27]. When asking patients how they consider their illness and their opinions about how useful they think the upcoming treatment in the IPC will be, it allows the healthcare professionals to identify and correct any inaccurate beliefs patients may have. If we shed light on the matter of patient's illness perceptions, it is possible to try and nudge those beliefs in a direction that is more compatible with treatment or better health outcomes by e.g., using psychoeducational interventions [28,29] and hereby modify negative illness beliefs, which, can lead to improvements over a range of different health outcomes [25]. Added to previous studies our findings show that unfavorable illness Perception primarily is attributed to the following items, for how long time the illness will prevail, how does the illness affect my identity, and the emotional aspects of handling the illness. Additionally our findings indicate that patients with a firm understanding of the cause of the illness have a more favorable IP. Several studies have addressed the relation between CLBP, illness perception and quality of life but not in an IPC setting [3.30.31]. A new study from 2022 finds a highly significant correlation between IP and a reduced quality of life [30]. However, our findings only find a significant correlation between Quality of life and BIPQ at adm, not at dis. Løchting et al. [32] found that IP and PCS were associated after 12 months in people with CLBP [32]. However, we only found a significant association at adm. between IP and PCS but not at dis.

### Strengths and limitations

This study was performed prospectively and followed the development of BIPQ in patients´ admitted to the same large IPC in Copenhagen for a period of nearly two years. We have measured the same variables within the included cohort and have a complete set of data for all included patients. The study included patients with primarily CLBP, but it must be taken into account that the patient group, in addition, presents a variety of complex pain symptoms because the majority of the patients have several competing and simultaneous pain conditions. Neither the degree nor the type of these additional pain problems are specified in this study.

We had to exclude the answers provided from item four in the BIPQ at dis. since the question was less meaningful. Therefore, it was not an option to compare the BIPQ at adm. and dis. with item four included, considering the risk of a weaker reliability. However, we have tried to address the problem by performing regression analyses with and without item 4.

Patients receive various approaches during the treatment provided by the IPC, such as psychological treatment, physiotherapeutic intervention, and pharmaceutical treatment, conversations with nurses and doctors or group treatment. It is out of the scope of this study to address the treatments the individual patients have received, even though we are aware that these possible confounders could have affected the outcomes.

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## Conclusion

Patients´ IP was affected in a positive way from admission to discharge in the IPC. Furthermore, patient outcomes were found to be affected significantly by the BIPQ. Even though many patients had an unfavourable IP, the majority were still satisfied with the treatment provided by the IPC. Our findings imply the importance of using an instrument to address the IP when patients are admitted to an IPC since the IP can affect essential patient outcomes such as quality of life.

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