# Healthcare professional reactions to patient pain: Impact of knowledge about medical evidence and psychosocial influences

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**Running title**: Professionals' responses to patient pain

**Key words**: pain, healthcare practitioner responses, medical evidence, psychosocial influences

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## ABSTRACT AND PERSPECTIVE

This study examined the impact of evidence concerning the presence of: a) a biomedical basis for pain, and b) psychosocial influences, on practitioner appraisals of patient pain experiences. Further, the potential moderating role of patient pain behaviour was examined**.** In an online study, 52 general practitioners (GPs) and 46 physiotherapists (PTs) viewed video sequences of 4 patients manifesting pain, with accompanying vignettes describing presence or absence of medical evidence and psychosocial influences. Participants estimated pain intensity, daily interference, felt sympathy, effectiveness of pain medication, self-efficacy, their likability and suspicions of deception. Primary findings indicated lower perceived pain and daily interference, less sympathy, lower expectations of medication impact, and less self-efficacy when medical evidence was absent. The same results were found when psychosocial influences were present, but only when the patient displayed higher levels of pain behavior. Further, absence of medical evidence was related to less positive evaluations of the patients and to higher beliefs in deception in both professions. The presence of psychosocial influences was related to less positive evaluations and higher beliefs in deception in both professions. In sum, a range of contextual factors influence healthcare practitioner responses to patient pain. Implications for caregiving behavior are discussed.

**Perspective:** The present study indicates that in the absence of clear medical evidence and in the presence of psychosocial influences patient pain might be taken less seriously by healthcare practitioners. These findings are important to further understand the difficulties that relate to the clinical encounter between pain patients and healthcare practitioners.

**Key words**: pain, healthcare practitioner responses, medical evidence, psychosocial influences

## INTRODUCTION

Pain management poses a considerable challenge for both healthcare practitioners and people in pain.[6,39,40,51,53,62] Basic to delivery of care is the necessary but difficult task of understanding the subjective experience of pain, a covert experience to which observers do not have direct and complete access.[26] Recognizing the private features of the experience inevitably creates uncertainty in the healthcare practitioner about the basis for pain complaints and symptoms and appropriate treatment decisions.[56]

Although pain is now widely acknowledged to be a biopsychosocial phenomenon[23], the biomedical model which presumes that pain is caused by physiological pathology remains the most influential in patient care.[32] This model leaves little room for multiple psychosocial factors to play influential roles in pain experience and disability.[18,41] Accordingly, although healthcare practitioner uncertainty is inherent and ubiquitous in patient care[24,25], we may expect it to be heightened when medical evidence for the pain is absent and/or when there are psychosocial stressors that impact on the patient's pain experiences.[38,56] A thorough understanding of the influence of the absence of medical evidence and the presence of psychosocial influences on healthcare practitioners' responses is essential since pain complaints for which there is no clear medical explanation are highly prevalent.[27,30,33,34,48] Further, psychosocial influences on the pain experience have widely been acknowledged in the literature.[7,23,36,44,46]

Using an online experimental design, the present study had four objectives. First, we investigated the effects of both absence or presence of medical evidence and psychosocial influences on healthcare practitioner (physiotherapists and general practitioners) appraisals (i.e., estimates of pain, interference, sympathy, adequacy of pain medication and self-efficacy) by means of vignettes with video sequences of actual patients displaying full body pain behavior. Second, we examined variations in patient pain behavior as a potential moderating factor in the relationship between absence versus presence of medical evidence and psychosocial influences on the one hand and the healthcare practitioner responses on the other. Patient pain behavior provides a range of cues of great importance to healthcare practitioners and other observers[14,20,64], which may limit or facilitate interpretations of the role of medical explanation and psychosocial influences. Third, we investigated whether the absence of medical evidence and the presence of psychosocial influences relate to the healthcare practitioner's belief in deception and his or her evaluation of the patient (in terms of likability). Research suggests that healthcare practitioners may dislike patients when clear medical evidence for the pain is lacking.[57,62] Further, healthcare providers may have more doubts about the genuineness of the pain symptoms[38,40,43] when pain has no clear medical explanation.

To our knowledge, our study is the first to investigate the effect of the presence of psychosocial influences on healthcare practitioners' responses, independently from the effect of the absence of medical explanation. Furthermore, our study is the first to do this with videos displaying the patients' full body pain behaviors. Previous research into the influence of contextual information on observer responses has largely relied on short written stories about fictitious patients,[55,57] or on videos displaying only the patients' facial pain expressions.[17] Our approach using videotaped full body pain behaviors of actual patients in pain is more akin to clinician assessment in natural settings, and therefore, more ecologically valid. Finally, in our study, participants were general practitioners and physiotherapists who have a pre-eminent role in the care of patients with pain.[4,22,37] In particular, general practitioners are responsible for the first-line care of patients with pain and physiotherapists are responsible for the first-line interventions for many high impact pain conditions. Nevertheless, we are unaware of any study that investigated the influence of medical evidence and psychosocial factors in these groups of practitioners.

## MATERIALS AND METHODS

### Participants

Participants were recruited by mail (physiotherapists; PTs) or telephone (general practitioners; GPs). Four hundred emails were sent to members of the Institute for Permanent Education in Physiotherapy of Ghent University. Further, 142 Flemish GPs were randomly (computerized randomization) selected from the online public list of Belgian GPs. Seventy-four PTs and 87 GPs agreed to participate. The GPs and PTs were sent an email with the link to the online experiment. Five PTs and 7 GPs completed only the first part of the experiment (i.e., the sociodemographics questionnaire), 7 PTs and 8 GPs reported technical problems, and 14 PTs and 19 GPs did not complete the experiment despite reminders. Further, one mail with the link to the experiment was not sent successfully to one GP. In consequence, 48 PTs and 52 GPs completed the experiment (response rate for PTs = 12%; response rate for GPs = 37%). To be eligible, participants had to speak Dutch fluently and they had to be active as a GP or PT. The study was approved by the ethical committee of the Faculty of Psychology and Educational Sciences of Ghent University and by the medical ethical committee of the Ghent University Hospital. Consent was obtained from each participant.

### Design

The online experiment consisted of two main parts: (1) the sociodemographics survey and (2) the experiment proper. During the experiment proper, each participant was shown pictures of 4 different patients, each accompanied by a written vignette (detailed below). The information in the vignettes was manipulated across participants in a 2 x 2 within-subjects design. Vignettes described the presence or absence of (1) medical evidence for the pain and (2) psychosocial influences upon the pain experience (see Appendix A). After each picture, a video sequence of the patient performing a pain-inducing activity was shown. Subsequently, participants estimated the patient's pain, the degree of the patient's pain interference with daily activities, their own sympathy for the patient, the likely effectiveness of pain medication and the expectations of self-efficacy in treating the patient. Subsequently, pictures of the patients again were shown and participants reported their evaluation of the patient (in terms of likability) and their beliefs in the likelihood of deception.

**Stimuli**

The video sequences and pictures were selected from the Ghent Pain Videos of Daily Activities (G-PAVIDA), consisting of video sequences displaying 34 chronic back pain patients (19 women, 15 men; $M_{age}$= 52 years (range: 23-74; $SD_{age}$ = 12 years) who had performed four back straining movements. All patients were suffering from chronic low back pain and were receiving (outpatient) treatment for the pain at the University Hospital in Ghent. The patients were asked to execute four movements: 1) lying down on a bed and standing up, 2) sitting down on a chair and standing up, 3) taking a box from the ground, putting it on a table and replacing it on the ground, and 4) picking up marbles from the ground. Each movement was videotaped and every patient started the movement in an upright position with the face directed to the camera. The video sequences display the patients' full body pain behaviors, i.e., facial pain expression and active head, torso or limb pain behavior (e.g., guarding, holding or rubbing).

For the present study, video sequences displaying the first of the four movements described above were selected for four different patients (four video sequences in total). These patients were selected based on specific criteria. In particular, to ensure generalizability across gender, we selected two female patients and two male patients. To investigate effects of pain expression, two patients displaying a low level of pain and two patients displaying a high level of pain were selected based upon global judgments of the vigor of their pain display (the videos were also coded to confirm the distinction between low and high levels of pain expression, see below). Furthermore, we also ensured that the patients' ages across the genders and across the two levels of pain expression were similar (see Table 1). The videos were coded in order to verify the distinction between low and high intensity pain expression. In particular, pain expressions of all 34 patients were coded by a trained and reliable rater using an adjusted coding system based upon the pain behavior-coding manual of Sullivan and colleagues (the Pain Can Paradigm, unpublished manual; Our coding scheme is particularly suitable for the levels of pain expressed by the patients in this study; it is not as comprehensive as the pain behavior coding manual of Sullivan and colleagues, as the set up did not allow fine grained coding of the facial pain expressions of the patients). To calculate inter-rater reliability, 20% of the pain expressions were coded by a second independent rater. Each movement was coded for the presence of one or more of the key facial pain expressions[14,47,49] [(absent (0), slightly present (1), distinctly present (2)]. Next, the presence (1) or absence (0) of active pain behavior (e.g., guarding, holding or rubbing) was coded per second. Inter-rater reliability was calculated according to the formula given by Ekman and Friesen[29] that assesses the proportion of agreement on actions recorded by two coders relative to the total number of actions coded as occurring by each coder. Acceptable inter-rater reliability was achieved for facial pain expression (.66) and active pain behavior (.89). The scores on facial pain expression could range from 0-2 and the scores on active pain behavior were calculated by summing the seconds in which the patient was showing active pain behavior. Furthermore, the duration of each movement was also considered as indicative of pain behavior. The scores on facial pain expression, active pain behavior and duration of the movement are presented in Table 1. Furthermore, we provided information on percentiles to indicate how the selected patients related to the larger patient sample ($N$ = 34) regarding pain expression scores (see Table 1; For more information on the Ghent Pain Videos of Daily Activities (G-PAVIDA), also regarding the use of the videos for research purposes, please contact Lies De Ruddere (Lies.DeRuddere@UGent.be) or Liesbet Goubert

(Liesbet.Goubert@UGent.be)). Video sequences were presented by the 3.0.6.0 web version of the INQUISIT Millisecond software package.

**Vignettes**

Vignettes described (1) the presence or absence of medical evidence for the pain and (2) the presence or absence of psychosocial influences upon the pain experience (see Appendix A). Medical evidence in the vignettes was referred to as "a compressed nerve" or "a primary arthritis". Vignettes describing the presence of psychosocial influences included "job stress and feelings of anxiety" or "relational problems and depressed mood". These medical explanations and psychosocial influences were counterbalanced across patients and across vignettes. In order to make the pictures and video sequences of the patients more vivid/realistic for the participants, information about 'medical evidence' and 'psychosocial influences' provided within the vignettes was embedded within a broader context entailing information about the patient's (fictitious) first name (Kris, Jo, Kim, Dominik), age (55, 58, 59, 57), job (surveyor, teacher, public employee, bank employee) and number of children (4, 2, 1, 3). This background information presented in the vignettes was counterbalanced across the vignettes and across the patients so that the results of the study would not be confounded by this information (see appendix A for examples of vignettes).

**Measures**

Participants were asked about their sex, age (in years), nationality, marital status, employment (part time or full time), profession (PT or GP), work experience (in years), and work practice (e.g., group versus solo practice). Further, a visual analogue scale (0-100 mm) was used to estimate the patient's pain, the degree of interference of the patient's pain with daily activities, the practitioner's sympathy for the patient, the probable effectiveness of pain medication and their perceived self-efficacy in treating the patient. Although we do not have data on the reliability of the measures of interference, effectiveness of pain medication and self-efficacy, De Ruddere and colleagues demonstrated that the measures of pain and sympathy are reliable measures.[17] Further, according to Williams[65], visual analogue scales are considered valid measures of observers' estimates of others' pain.

Next, the participant rated the general valence of the patient, the likability of the patient and the sympathy felt for the patient by a visual analogue scale from -100 (extremely negative; extremely dislikeable; no sympathy at all) to 100 (extremely positive; extremely likeable; a lot of sympathy). A mean score for participant evaluation of the patient was calculated by averaging the scores on the three questions. Finally, the extent to which the participant thought the patient was feigning her or his pain was measured by a visual analogue scale (0 indicated 'not at all', 100 indicated 'a lot').

**Procedure**

Participants who were willing to participate in the experiment were sent an email with the link to the online experiment. Prior to the sociodemographics survey, participants were informed that the study examined healthcare practitioners' impressions of patients with pain. After completing the sociodemographics questionnaire, they were introduced to the experiment.

The participants were informed that (1) written information about four persons and their pain complaints would be given, followed by (2) presentation of video sequences of these persons. Subsequently, a (neutral) picture of a first patient combined with one vignette was shown. When the participant pressed the space bar, the video sequence of the same patient performing the pain-inducing activity was presented. This procedure was repeated with the video sequences of the three other patients. Vignettes were counterbalanced across participants for the four patients. Within each participant, the four patients were presented with a different vignette describing 1) presence of both clear medical evidence and psychosocial influences, 2) absence of clear medical evidence and presence of psychosocial influences, 3) presence of clear medical evidence and absence of psychosocial influences or

4) absence of both clear medical evidence and psychosocial influences (see Appendix A for examples of vignettes). Each patient was shown once. In sum, four video sequences were shown in a different order to the participants. After the presentation of each video sequence, a screen with the five rating scales appeared and participants were requested to estimate the patient's pain, the degree of interference of the patient's pain with daily activities, their sympathy for the patient, the likely effectiveness of pain medication and their self-efficacy in treating the patient. Next, the (neutral) picture of each patient was shown to the participant who rated the patient's valence and likability, as well as the sympathy felt for the patient. Subsequently, the (neutral) picture of each patient was shown again to the participant who rated the extent to which she/he thought the patient was feigning his or her pain.

Table 1

The age of each patient and, for each patient, the scores on 1) facial pain expression, 2) active pain behavior, 3) the duration of the video

| patient | age | facial pain expression | active pain behavior | duration |
|---|---|---|---|---|
| FL | 65 | 1 (50) | 19s (70) | 21s (50) |
| ML | 55 | 1 (50) | 16s (60) | 18s (50) |
| FH | 46 | 1 (50) | 26s (80) | 30s (80) |
| MH | 63 | 1 (50) | 28s (90) | 30s (80) |

*Note 1*. In the column 'patient', the first initial refers to the gender of the patients (F = female, M = male) and the second initial to the level of pain expression that is displayed by the patient (based on face validity; L = lower pain expression; H = higher pain expression).

*Note 2*. The percentile with regard to the scores of the 34 patients of the G-PAVIDA each patient fitted in is provided between brackets.

**Statistical analyses**

Outcome variables were participants' estimates of the patient's pain ('pain'), the interference of the patient's pain with daily activities ('interference'), their own sympathy for the patient ('sympathy'), the likely effectiveness of pain medication ('medication'), their self-efficacy in treating the patient ('self-efficacy'), the evaluation of the patient ('evaluation') and their beliefs in deception ('deception'). The presence/absence of medical evidence ('medical evidence') and psychosocial influences ('psychosocial influences') as well as the level of pain behaviour (i.e., facial pain behaviour, active pain behaviour and duration of the movement; cf. Table 1) displayed by the patient (a low level of pain behaviour versus a high level of pain behaviour) and the profession of the participant (PT or GP) were the independent variables.

The factors in the present study were manipulated partially within and partially between subjects. Within subjects, each level of 'medical evidence' and 'psychosocial factors' was combined with only one of the two levels of 'pain behavior'. Between subjects, each level of 'medical evidence' and 'psychosocial factors' was combined with each level of 'pain behavior'. Because this type of factorial design cannot be analyzed using classical repeated measures analyses, the results were analyzed using linear mixed effects models as implemented in the R package "Linear and Nonlinear Mixed Effects Models".[42] Linear mixed effects models account for the correlations in within-subjects data by estimating subject-specific deviations (or random effects) from each population-level factor (or fixed factor) of interest (see West and colleagues[35] for an elaboration). Each analysis required three steps. First, all relevant factors and interactions were entered in the model as fixed factors. In the second step, we assessed whether it was necessary to add a random effect for each of the fixed factors in the analysis: if a random effect significantly increased the fit of the model, it was included in the final model. In the third step, we inspected the ANOVA table of the final model and tested specific hypotheses about possible main effects or interactions (see De

Ruddere and colleagues[15] and Verbruggen and colleagues[60] for a similar approach). When testing specific hypotheses, standardized regression weights were reported as a measure of effect size. The same method was used in a second set of analyses, in which we investigated the influence of medical evidence and psychosocial influences on deception and evaluation with profession as a between subject variable.

**RESULTS**

The data of two participants were excluded, as one participant worked as a speech therapist and one participant was an academic not engaged in clinical practice. The mean age of the remaining sample (*N* = 98) was 45.29 years (*SD* = 12.06; range = 25 – 73 years). Almost all participants were married, in a relationship or cohabiting (99%). The sociodemographic data of the 46 PTs and the 52 GPs are provided in Table 2. The data with regard to the sex of the GPs and PTs is in accordance with data provided by the annual statistics of the Federal public service in Belgium (distribution in Flanders for GPs: 68% men and 32% women; for PTs: 40% men and 60% women[21]).

Table 2

Characteristics of the physiotherapists (PTs) and the general practitioners (GPs)

| | Means and SD/% PTs | Means and SD/% GPs |
|---|---|---|
| sex | 37% male | 75% male |
| age | 39.02 (10.77) | 50.83 (10.37) |
| fulltime employment | 85% | 96% |
| years as physiotherapist/GP | 15.93 (10.68) | 25.06 (10.24) |
| work practice | | |
| ▪ solo practice | 35% | 60% |
| ▪ group practice | 39% | 40% |
| ▪ hospital | 20% | / |
| ▪ nursing home | 4% | / |
| ▪ rehabilitation centre | 2% | / |

**Impact of medical evidence and psychosocial influences on the healthcare practitioners' responses and the moderating role of the patient's pain behavior**

The results indicated a significant main effect of pain behavior on all ratings. In particular, when the patient displayed a high level of pain behavior (compared to a low level of pain behavior), participants reported higher pain estimates ($F(1,278) = 319.01$, $p < .001$, $\beta = 1.17$), higher interference estimates ($F(1,278) = 128.49$, $p < .001$, $\beta = 0.89$), more sympathy ($F(1,278) = 5.87$, $p = .016$, $\beta = 0.23$), higher ratings on the likely effectiveness of medication ($F(1,278) = 86.15$, $p < .001$, $\beta = 0.23$) and higher ratings on the self-efficacy in treating the patient ($F(1,278) = 10.46$, $p = .001$, $\beta = 0.24$).

Further, the results revealed a significant main effect of medical evidence on all ratings. When medical evidence for pain was absent (compared to when medical evidence for the pain was present), participants reported lower pain estimates ($F(1,278) = 38.02$, $p < .001$, $\beta = -0.40$), lower interference estimates ($F(1,278) = 12.91$, $p < .001$, $\beta = -0.33$), less sympathy ($F(1,278) = 36.70$, $p < .001$, $\beta = -0.41$), lower ratings on the likely effectiveness of medication ($F(1,278) = 82.77$, $p < .001$, $\beta = -0.66$) and less self-efficacy ($F(1,278) = 30.63$, $p < .001$, $\beta = -0.41$).

Next, a significant main effect of psychosocial influences was found for pain, sympathy, medication and self-efficacy, but not for interference ($F(1,278) = 1.87$, $p = 0.173$). When psychosocial influences were present (compared to when psychosocial influences were absent), results indicated lower scores on pain ($F(1,278) = 13.98$, $p < .001$, $\beta = -0.26$), sympathy ($F(1,278) = 24.17$, $p < .001$, $\beta = -0.33$), likely effectiveness of medication ($F(1,278) = 25.87$, $p < .001$, $\beta = -0.37$) and self-efficacy ($F(1,278) = 14.85$, $p < .001$, $\beta = -0.28$). Finally, there was a significant main effect of profession, but only for the variable likely effectiveness of medication ($F(1,96) = 4.18$, $p = .04$, $\beta = 0.23$). These results revealed that GPs, overall, rated medication as more effective than PTs.

For all outcomes, no interaction between medical evidence and psychosocial influences was found. However, a significant psychosocial influences x pain behavior interaction was found (pain: $F(1,278) = 7.18$, $p = .008$; interference: $F(1,278) = 12.63$, $p < .001$; sympathy: $F(1,278) = 7.02$, $p = .009$ ; pain medication $F(1,278) = 19.75$, $p < .001$; self-efficacy $F(1,278) = 6.57$, $p = .01$). These results indicate that, when patients were displaying a high level of pain behavior, the presence of psychosocial influences was related to lower pain ratings ($F(1,278) = 20.71$, p < .001, $\beta = -0.45$), lower interference estimates ($F(1,278) = 13.00$, $p < .001$, $\beta = -0.41$), less sympathy ($F(1,278) = 28.94$, $p < .001$, $\beta = -0.51$), lower ratings on the likely effectiveness of medication ($F(1,278) = 45.38$, $p < .001$, $\beta = -0.72$) and to less self-efficacy

($F(1,278) = 20.25$, $p < .001$, $\beta = -0.49$) than when psychosocial influences were absent. There was no effect of psychosocial influences when patients were displaying a low level of pain. Further, for all outcomes, there was no medical evidence x profession interaction, still, a psychosocial influences x profession interaction for medication ($F(1,278) = 7.09$, $p = .008$) was found. These results showed that psychosocial influences impacted upon estimations of the likely effectiveness of medication, but only for GPs ($F(1,278) = 32.09$, $p < .001$) and not for PTs ($F(1,278) = 2.76$, $p = .098$). Specifically, the GPs rated medication as less effective for the patient when psychosocial influences were present compared to when psychosocial influences were absent ($\beta = 0.56$).

Further, none of the three way interaction effects were significant. Finally, there was one four-way interaction effect between profession, pain behavior, medical evidence and psychosocial influences for self-efficacy ($F(1,278) = 5.80$, $p = .017$). These results indicated that there was a two-way interaction effect between medical evidence and psychosocial influences, but only for PTs when patients were displaying a low level of pain ($F(1,278) = 5.01$, $p = .025$). In particular, when medical evidence was absent, lower ratings on self-efficacy in helping the patients were given when psychosocial influences were present compared to when psychosocial influences were absent ($F(1,278) = 6.31$, $p = .012$, $\beta = -1.17$). When there was medical evidence, no effect of psychosocial influences was found ($F(1,278) = 0.58$, $p = .446$). The results remained similar after controlling for the age and sex of the participants.

**Impact of medical evidence and psychosocial influences on the participants' evaluations of the patients and their beliefs in deception**

The absence of medical evidence (compared to the presence of medical evidence) was related to less positive evaluations of the patients ($F(1,288) = 9.97$, $p = .002$, $\beta = -0.14$) and to higher scores on deception ($F(1,288) = 27.10$, $p < .001$, $\beta = 0.23$). Further, the presence of psychosocial influences (compared to the absence of psychosocial influences) was also related to less positive evaluations of the patients ($F(1,288) = 13.45$, $p < .001$, $\beta = -0.17$) and to higher scores on deception ($F(1,288) = 30.80$, $p < .001$, $\beta = 0.25$). There was no main effect of profession. Further, the two-way interaction effects and the three way interaction effect were not significant. The results remained similar after controlling for the age and sex of the participants.

## DISCUSSION

The design of our study allowed investigation of healthcare practitioners' responses towards the pain of patients. A first important finding related to the lower ratings on pain, interference, sympathy, adequateness of pain medication and self-efficacy in treating the patient when clear medical evidence for the pain was absent. These results are in line with findings of several vignette studies indicating that the absence of medical evidence relates to lower pain estimates in lay observers[8,9,54], medical students[10], internal medicine physicians[55] and nurses.[57] Further, the results are consistent with recent findings[16,17] indicating that lay observers attribute lower pain, feel less sympathy for the patient, and are less inclined to help the patient when a medical explanation for the pain is lacking. Next, the results extend the findings of Taylor and colleagues[57] that show that nurses are less willing to undertake pain relief actions when medical evidence for pain is absent. Further, the results are consistent with qualitative research findings[40], indicating that primary care providers feel ineffective and frustrated when treating chronic pain patients, many of whom do not present with medical pathology.

The important and robust effect of knowledge about medical evidence was further highlighted by the finding that it was not influenced by one of the most important cues for healthcare practitioners when providing patient care, i.e., the level of pain that is displayed by the patient.[20] Furthermore, in our study, absence of medical evidence was positively related to beliefs in deception by both PTs and GPs. Although Craig and colleagues[12,13] suggest that absence of diagnosable pathology serves as a risk factor for observers to impute to the patient an intent to feign the pain, our study is, to our knowledge, the first to investigate this association in healthcare practitioners. The findings may reflect emphasis on the biomedical model as taught in schools of medicine and physical therapy, and a mode of thinking supported by industry and continuing education activities. The biomedical model as a dominant heuristic probably makes observers prone to skepticism when confronted with patient complaints that do not fit within this perspective. Accordingly, beliefs in deception (voluntary misrepresentation) may be 'mental shortcuts' or 'premature closures' to ease the decision process or to actually 'close' the difficult patient encounter.[5] Further, the absence of clear medical evidence for the pain was also related to less positive evaluations of the patients by GPs and PTs. This finding is consistent with the findings of vignette studies showing that patients are disliked more by nurses[57] when clear medical evidence for the pain is absent.

A second important finding relates to the lower ratings on pain, interference, sympathy, likely effectiveness of medication (only in PTs) and self-efficacy in treating the patient when psychosocial influences were present. More importantly, the effect of psychosocial influences was only found when the patient was displaying a high level of pain behavior. Our results are in accordance with Tait and colleagues[56] who argue that observers' uncertainty is heightened when they are confronted with patients in severe pain conditions. For example, Solomon and colleagues[52] found that observers underestimated pain more when patients were displaying a high level of pain behavior. According to Kahneman[31], feeling uncertain in decision-making may enhance observer proneness to contextual information. This may explain why information about psychosocial influences was only important when the patient was displaying a high level of pain behavior. Further, similar to the findings regarding the effect of medical evidence, knowledge about the influencing role of psychosocial stress factors was related to greater imputation of deception and to a less positive evaluation of the patient by both professions. In line with the findings regarding the effect of medical evidence, these effects may be attributed to general use of a strict biomedical model as a heuristic in making decisions about a patient's pain.

Importantly, our findings indicated that medical evidence and psychosocial stress factors impact on participant ratings. Interactions might have been expected, for instance, psychosocial stress factors could have been anticipated to be more pronounced in the absence of medical evidence than in the presence of medical evidence. Null findings (the absence of an interaction effect) of course have many potential ad hoc speculative explanations, but it is possible that the medical evidence and the information about psychosocial stress factors separately provided sufficiently meaningful cues for participants to assist participants in their pain judgments. Apparently, an absence of medical evidence did not make judges more uncertain and/or more inclined to take the information about psychosocial influences into account.

The findings may have clinical implications. Attributing lower pain and disability to patients may impact treatment decisions and may lead to inadequate pain management. Nilsen and colleagues[43] found that patients with symptoms for which there was no clear biomedical basis were at risk of not receiving certificates attesting to their being ill. Moreover, healthcare practitioners may be perceived by patients as invalidating their pain complaints, leading to perceived injustice and exacerbating the disability.[50] Epstein and colleagues[19] found healthcare practitioners' actions to be more likely invalidating when patients presented symptoms for which there was no clear biomedical explanation. Further, less sympathy for the patient may adversely impact the healthcare practitioner - patient relationship, and in turn, may diminish clinical outcome.[61] Next, the belief that pain medication would be less effective may influence the actual prescription of medication by GPs. Hence, those patients with pain for which there is no clear medical evidence and/or for which psychosocial influences are of importance, may obtain insufficient pain relief. Importantly, clinical guidelines support the prescription of medication, whether the cause of the pain is known or not or whether psychosocial influences are present or absent.[1,11,59] Finally, given that lower levels of self-efficacy are related to lower levels of performance accomplishments[3], we argue that feeling ineffective in treating the patient might negatively impact patient care. Although research is scarce concerning the actual relationship between observer behavior and patient outcomes, there is no question that patients with pain for which there is no clear medical evidence feel frustrated and disbelieved by others.[2,28,45,58,63]

Some limitations, each of which point to directions for further research, need attention. First, our study provided only an analogue of the clinical setting in order to use the power of an experimental investigation. Analogue studies limit the ecological validity of findings, but we note that in this study some verisimilitude to the real setting was accomplished; actual clinicians were rating the behaviors of real patients while they were manifesting pain. This is in contrast with previous studies that have largely relied on short written stories about fictitious patients.[55,57] Nevertheless, the design did not allow study of the relational aspects in the patient – healthcare practitioner interaction, which are potential determinants of outcomes.[61] Furthermore, a lot of worthwhile information might be gathered from the patient, which makes the preliminarily assessments in our study not wholly representative of actual clinical diagnostic situations. Ecological validity requires demonstrations that the experimental setting used in our study matches with the practitioner – patient encounter in real life. Therefore, future research would contribute by the investigation of the influence of medical evidence and psychosocial influences in real life interactions between healthcare practitioners and patients with pain. Second, the low response rate might have led to certain biases in our study. For example, only highly motivated GPs and GPs might have participated in our study, making the sample not representative for the whole population of Flemish GPs and PTs. Nonetheless, the study samples are representative for the population of Flemish GPs and PTs in terms of gender, which, in turn, improves the representativeness of the results. Third, although video sequences of actual patients with chronic low back pain were used in the study, one may question whether the four patients were representative of the full population of patients with (different forms of) pain. Fourth, more research is needed into how healthcare practitioner responses may relate to patient outcomes, such as treatment outcomes and psychosocial wellbeing. Fifth, except for the ratings of pain[16,17,65], we do not have sufficient data concerning the validity and reliability of the measures of the dependent variables. Single or low numbers of items may decrease statistical power to detect differences, and might be less reliable. Future research may include more comprehensive measures. Sixth, the manipulation of the absence versus presence of psychosocial influences might lack ecological validity because it is not common for health care practitioners to be provided with such certainty about the relationship between psychosocial factors and pain. Therefore the sentence “psychosocial influences seem to influence the pain” might have increased the chance of "bias". Finally, given that the practitioner’s low self-efficacy might negatively impact on his/her performance[3], thorough research is needed into how healthcare practitioners may feel more effective in treating patients who present with symptoms that are not understood medically or who present with psychosocial stress factors. To conclude, the results of our study indicate that patient pain in the absence of clear medical evidence and in the presence of psychosocial influences might be taken less seriously by healthcare practitioners.

**Disclosures**

This study was supported by a grant from the Fund for Scientific Research (FWO) – Flanders (G.0299.09). There are no conflicts of interest that may arise as a result of the research presented in this manuscript.

**Acknowledgments**

The authors would like to thank Sara Kindt and Pauline Mensaert for their help in recruiting the participants. Further, the authors would like to thank the physiotherapists and the general practitioners for their willingness in reporting on their professional responses towards the patients presented in the vignettes. Finally, the study presented in this manuscript was selected for the Belgian Pain Society (BPS) Award 2013. Therefore, the authors would like to thank the BPS.

## REFERENCES

1.Airaksinen O, Brox JI, Cedraschi C, Hildebrandt J, Klaber-Moffett J, Kocavs F, Mannion AF, Reis S, Staal JB, Ursin H, Zanoli G: European guidelines for the management of chronic nonspecific low back pain. Eur Spine J 15:S192-S300, 2006

2.Allegretti A, Borkan J, Reis S, Griffiths F: Paired interviews of shared experiences around chronic low back pain: classic mismatch between patients and their doctors. Fam Pract 27:676-683, 2010

3.Bandura A: Self-efficacy mechanisms in human agency. Am Psychol 37:122-147,1982

4.Blackburn MS, Cowan SM, Cary B, Nall C: Physiotherapy-led triage clinic for low back pain. Aust Health Review 33:663-670, 2009

5.Borrell-Carrio F, Epstein RM: Preventing errors in clinical practice: a call for self-awareness. Ann Fam Med 2:310-316, 2004

6.Breivik H: Opioids in chronic non-cancer pain, indications and controversies. European J Pain 9:127-160, 2005

7.Carragee EJ: Persistent low back pain. N Engl J Med 352:1891-1898, 2005

8.Chibnall JT, Tait RC: Observer perceptions of low back pain: effects of pain report and other contextual factors. J Appl Soc Psychol 25:418-439, 1995

9.Chibnall JT, Tait RC: Social and medical influences on attributions and evaluations of chronic pain. Psychol Health 14:719-729, 1999

10.Chibnall JT, Tait RC, Ross LR: The effects of medical evidence and pain intensity on medical student judgments of chronic pain patients. J Behav Med 20:257-271, 1997

11.Chou R, Qaseem A, Snow V, Casey D, Cross T, Shekelle P, Owens DK: Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. Ann Intern Med 147:478-491, 2007

12.Craig KD, Badali MA: Introduction to the special series on pain deception and malingering. Clin J Pain 20:377-382, 2004

13.Craig KD, Hill ML, McMurtry BW: Detecting deception and malingering. In: Handbook of Pain syndromes. Biopsychosocial perspectives (Block A.R., Kremer E.F., Fernandez E., Eds.), Lawrence Erlbaum Associates, New Jersey, London, 1999.

14.Craig KD, Prkachin KM, & Grunau RVE: The facial expression of pain. In: Handbook of pain assessment, third edition (Turk D.C., Melzack R., Eds.), The Guilford Press, New York, NY, 2011, pp. 117-133.

15.De Ruddere L, Goubert L, Prkachin KM, Stevens MAL, Van Ryckeghem DML, Crombez G: When you dislike patients, pain is taken less seriously. Pain 152:2342-2347, 2011

16.De Ruddere L, Goubert L, Stevens MAL, Deveugele M, Crombez G: Discounting pain in the absence of medical evidence is explained by negative evaluation of the patient. Pain 145:669-676, 2013

17.De Ruddere L, Goubert L, Vervoort T, Prkachin KM, Crombez G: We discount the pain of others when pain has no medical explanation. J Pain 13:1198-1205, 2012

18.Engel GL: The need for a new medical model: A challenge for biomedicine. Science 196:129-136, 1977

19.Epstein RM, Shields CG, Meldrum SC, Fiscella K, Carroll J, Carney PA, Duberstein PR: Physicians' responses to patients' medically unexplained symptoms. Psychosom Med 68:268-276, 2006

20.Ferrell BR, Eberts MT, McCaffery M, Grant M: Clinical decision making and pain. Cancer Nurs 14:289-297, 1991

21.FOD, Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu (2012). Jaarstatistieken. Available at http://www.health.belgium.be/eportal/Healthcare/Consultativebodies/Planningcommission/Statistiquesannuelles/index.htm

22.Foster NE, Hartvigsen J, Croft PR: Taking responsibility for the early assessment and treatment of patients with musculoskeletal pain: A review and critical analysis. Arthritis Res & Ther 15, 2012

23.Gatchel RJ, Peng YB, Peters ML, Fuchs PN, Turk DC: The biopsychosocial approach to chronic pain: scientific advances and future directions. Psychol Bull 133:581-624, 2007

24.Gerrity MS, DeVellis RF, Earp JA: Physicians' reactions to uncertainty in patient care. Med Care 28:724-736, 1990

25.Gordon GH, Joos SK, Byrne J: Physician expressions of uncertainty during patient encounters. Pat Educ Couns 40:59-65, 2000

26.Hadjistavropoulos T, Craig KD, Duck S, Cano A, Goubert L, Jackson PL, Mogil JS, Rainville P, Sullivan M, Williams ACdeC, Vervoort T, Fitzgerald, T.D: A biopsychosocial formulation of pain communication. Psychol Bull 910-939, 2011

27.Hiller W, Rief W, Brähler E: Somatization in the population: from mild bodily misperceptions to disabling symptoms. Soc Psychiatry Psychiatr Epidemiol 41:704-712, 2006

28.Holloway I, Sofaer-Bennett B, Walker J: The stigmatization of people with chronic back pain. Disab Rehab 29:1456-1464, 2007

29. Investigator's guide to the facial action coding system, Ekman P, Friesen W (Eds), Consulting Psychologists Press, Palo Alto, CA, 1978.

30.Jacobi F, Wittchen HU, Hölting C, Höfler M, Pfister H, Müller N, Lieb R: Prevalence, co-morbidity and correlates of mental disorders in the general population: results from the German Health Interview and Examination Survey (GHS). Psychol Med 34:597-611, 2004

31.Kahneman D: A Perspective on judgment and choice. Am Psychol 58:697-720, 2003

32.Kent PM, Keating JL, Taylor NF: Primary care clinicians use variable methods to assess acute nonspecific low back pain and usually focus on impairments. Man Ther 14:88-100, 2009

33.Lahmann C, Henningsen P, Noll-Hussong M: Somatoform pain disorder – overview. Psychiatr Danub 22:453-458, 2010

34.Lieb R, Pfister H, Mastaler M, Wittchen HU: Somatoform syndromes and disorders in a representative population sample of adolescents and young adults: prevalence, comorbidity and impairments. Acta Psychiatr Scand 101:194-208, 2000

35. Linear Mixed Models: A practical guide using statistical software, West BT, Welch KB, Galecki AT (Eds.), Chapman & Hall/CRC, London, 2007.

36.Linton SJ: A review of psychological risk factors in back and neck pain. Spine 25:1148-1156, 2000

37.Ludvigsson ML, Entohoven P: Evaluation of physiotherapists as primary assessors of patients with musculoskeletal disorders seeking primary health care. Physiotherapy 98:131-137, 2012

38.MacNeela P, Gibbons A, McGuire B, Murphy A: "We need to get you focused": general practitioners' representations of chronic low back pain patients. Qual Health Res 20:977-986, 2010

39.Mannion RJ, Woolf CJ: Pain mechanisms and management: A central perspective. Clin J Pain 16:S144-S156, 2000

40.Matthias MS, Parpart AL, Nyland KA, Huffman MA, Stubbs DL, Sargent C, Bair MJ: The patient-provider relationship in chronic pain care: providers' perspective. Pain Med 11:1688-1679, 2010

41.Melzack R, Wall PD: Pain mechanisms: a new theory. Science 150:971-979, 1965

42. Mixed-effects models in S and S-PLUS. Pinheiro JC, Bates DM (Eds.), Springer-Verlag, New York, 2000.

43.Nilsen S, Werner EL, Maeland S, Eriksen HR, Magnussen LH: Considerations made by the general practitioner when dealing with sick-listing of patients suffering from subjective and composite health complaints. Scand J Prim Health Care 29:7-12, 2011

44.Osborne TL, Jensen MP, Ehde DM, Hanley MA, Kraft G: Psychosocial factors associated with pain intensity, pain-related interference, and psychological functioning in persons with multiple sclerosis and pain. Pain 127:52-62, 2007

45.Peters S, Stanley I, Rose M, Salmon P: Patients with medically unexplained symptoms: sources of patients' authority and implications for demands on medical care. Soc Sci Med 46:559-565, 1998

46.Pincus T, Burton AK, Vogel S, Fiels AP: A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. Spine 27:E109-E120, 2002

47.Prkachin KM: The consistency of facial expressions of pain: a comparison across modalities. Pain 51:297-306, 1992

48.Rief W, Hessel A, Braehler E: Somatization symptoms and hypochondriacal features in the general population. Psychosom Med, 63:595-602, 2001

49.Rocha E, Prkachin KM, Beaumont SL, Hardy C, Zumbo BD: Pain reactivity and illness behavior in kindergarten-aged children. J Pediatr Psychol 28:47-57, 2003

50.Scott W, Sullivan MJ: Perceived injustice moderates the relationship between pain and depressive symptoms among individuals with persistent musculoskeletal pain. Pain Res Manage 17:335-340, 2012

51.Sinatra R: Causes and consequences of inadequate management of acute pain. Pain Med 11:1859-1871, 2010

52.Solomon PE, Prkachin KM, Farewell V: Enhancing sensitivity to facial expression of pain. Pain 71:279-284, 1997

53.Spacek A: Modern concepts of acute and chronic pain management. Biomed Pharmacother, 60, 329-335, 2006

54.Tait RC, Chibnall JT: Observer perceptions of chronic low back pain. J Appl Soc Psychol 24:415-431, 1994

55.Tait RC, Chibnall JT: Physician judgments of chronic pain patients. Soc Sci Med 45:1199-1205, 1997

56.Tait RC, Chibnall JT, Kalauokalani D: Provider judgments of patients in pain: seeking symptom certainty. Pain Med 10:11-34, 2009

57.Taylor AG, Skelton JA, Butcher J: Duration of pain condition and physical pathology as determinants of nurses' assessments of patients in pain. Nurs Res 33:4-8, 1984

58.Toye F, Barker K: 'Could I be imagining this?' – the dialectic struggles of people with persistent unexplained back pain. Disab Rehab 32:1722-1732, 2010

59.van Tulder M, Becker A, Bekkering T, Breen A, Gil del Real MT, Hutchinson A, Koes B, Laerum E, Malmivaara A: European guidelines for the management of acute nonspecific low back pain in primary care. Eur Spine J 15:S169-S191; 2006

60.Verbruggen F, Aron AR, Stevens MA, Chambers CD: Theta burst stimulation dissociates attention and action updating in human inferior frontal cortex. Proc Nat Acad Sci 107:13966-13971, 2010

61.Vowles KE, Thompson M: The patient-provider relationship in chronic pain. Curr Pain Headache Rep 16:133-138, 2012

62.Wasan AD, Wootton J, Jamison RN: Dealing with difficult patients in your pain practice. Reg Anesth Pain Med 30:184-192, 2005

63.Werner A, Malterud K: It is hard work behaving as a credible patient: encounters between women with chronic pain and their doctors. Soc Sci Med 57:1409-1419, 2003

64.Williams ACdeC: Facial expression of pain: An evolutionary account. Behav Brain Sci 25:439-488, 2002

65. Williams ACdeC: Assessing chronic pain and its impact. In: Psychosocial aspects of pain: A handbook for health care providers, progress in pain research and management, Vol. 27 (Dworkin, R.H. and Breitbart, W.S.), IASP Press, Seattle, 2004, pp. 97-115.

**APPENDIX A**

"Kris is 55 years old and the parent of four children. Kris works as a self-employed surveyor. Kris is your patient and is visiting you for the third time for back pain complaints. Based upon history and clinical examination, no clear pathology can be withheld. At this moment, no further major diagnostic examination is indicated. Psychosocial factors do not seem to influence the pain complaints." *(biomedical evidence absent; psychosocial influences absent)*

"Jo is 58 years old and the parent of two children. Jo works as a teacher in a primary school. Jo is your patient and is visiting you for the third time for back pain complaints. Based upon the medical and radiological examination, there is a compressed nerve in the back. Psychosocial factors do not seem to influence the pain complaints." *(biomedical evidence present; psychosocial influences absent)*

"Kim is 59 years old and the parent of one child. Kim works as a public employee. Kim is your patient and is visiting you for the third time for back pain complaints. Based upon history and clinical examination, no clear pathology can be withheld. At this moment, no further major diagnostic examination is indicated. Psychosocial factors seem to influence the pain complaints, in particular job stress and feelings of anxiety." *(biomedical evidence absent; psychosocial influences present)*

"Dominik is 57 years old and parent of three children. Dominik works as a bank employee. Dominik is your patient and is visiting you for the third time for back pain complaints. Based upon the medical and radiological examination, there is a clear primary arthritis in the back. Psychosocial factors seem to influence the pain complaints, in particular relational problems and a depressive mood." *(biomedical evidence present; psychosocial influences present)*