

REVIEW ARTICLE

The association between health care professional attitudes and beliefs and the attitudes and beliefs, clinical management, and outcomes of patients with low back pain: A systematic review

B. Darlow^{1,2}, B.M. Fullen³, S. Dean⁴, D.A. Hurley³, G.D. Baxter², A. Dowell¹

1 Department of Primary Health Care and General Practice, University of Otago, Wellington, PO Box 7343, Wellington South 6242, New Zealand

2 Centre for Physiotherapy Research, School of Physiotherapy, University of Otago, PO Box 56, Dunedin 9054, New Zealand

3 School of Public Health, Physiotherapy and Population Science, University College Dublin, Belfield, Dublin 4, Ireland

4 Peninsula College of Medicine and Dentistry, Universities of Exeter and Plymouth, Exeter EX2 4SG, United Kingdom

Correspondence

Ben Darlow

Department of Primary Health Care and General Practice, University of Otago, Wellington, PO Box 7343, Wellington South 6242, New Zealand.

Tel.: +64 4 385 5995;

fax: +64 4 385 5539.

E-mail: ben.darlow@otago.ac.nz

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Abstract

Background: It has been suggested that health care professional (HCP) attitudes and beliefs may negatively influence the beliefs of patients with low back pain (LBP), but this has not been systematically reviewed. This review aimed to investigate the association between HCP attitudes and beliefs and the attitudes and beliefs, clinical management, and outcomes of this patient population.

Methods: Electronic databases were systematically searched for all types of studies. Studies were selected by predefined inclusion criteria. Methodological quality was appraised and strength of evidence was determined.

Results: Seventeen studies from eight countries which investigated the attitudes and beliefs of general practitioners, physiotherapists, chiropractors, rheumatologists, orthopaedic surgeons and other paramedical therapists were included. **There is strong evidence that HCP beliefs about back pain are associated with the beliefs of their patients.**

There is moderate evidence that HCPs with a biomedical orientation or elevated fear avoidance beliefs are more likely to advise patients to limit work and physical activities, and are less likely to adhere to treatment guidelines. There is moderate evidence that HCP attitudes and beliefs are associated with patient education and bed rest recommendations. There is moderate evidence that HCP fear avoidance beliefs are associated with reported sick leave prescription and that a biomedical orientation is not associated with the number of sickness certificates issued for LBP. **Conclusion:** HCPs need to be aware of the association between their attitudes and beliefs and the attitudes and beliefs and clinical management of their patients with LBP.

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1. Introduction

Low back pain (LBP) is a significant and expensive health condition, with direct and indirect costs representing an important financial burden (Dagenais et al., 2008). LBP has been estimated to cost 2% of gross domestic product in developed countries (van Tulder et al., 1995; Wieser et al., 2010).

LBP treatment guidelines acknowledge the importance of psychosocial factors on the outcome of LBP (Kendall et al., 1997). A recent systematic review found patient depression, psychological distress, passive coping strategies and fear avoidance beliefs to be independently associated with poor LBP outcome (Ramond et al., 2011); other reviews have also highlighted the importance of pain self-efficacy beliefs and catastrophising (Main et al., 2010).

A number of tools have been developed or adapted to assess the attitudes and beliefs of health care professionals (HCP) (Bishop et al., 2007) and it has been suggested that HCP attitudes and beliefs may negatively influence the beliefs of their patients (Vlaeyen and Linton, 2006). Although factors which affect general practitioner (GP) attitudes and beliefs regarding acute LBP management have been previously investigated (Fullen et al., 2008), the association between HCP attitudes and beliefs and patient-related factors has not been systematically reviewed.

Parsons et al. (2007) investigated the interaction of patients' and primary care practitioners' beliefs and expectations on the process of care for chronic musculoskeletal pain. This systematic review demonstrated that HCP beliefs influenced patient management and the patient's satisfaction with care; however, it did not specifically address LBP, was limited to chronic pain, and only included qualitative studies relating to GPs (Parsons et al., 2007).

The aim of this study was to systematically review the evidence regarding the association between HCP attitudes and beliefs and patient-related factors for LBP of any duration. We hypothesised that there would be an association between HCPs' attitudes and beliefs and (i) patient attitudes and beliefs, (ii) patient clinical management, and (iii) patient outcome.

2. Methods

2.1 Search strategy

Electronic searches of Medline, EMBASE, CINAHL, AMED, PsycINFO, and the Cochrane Central Register of Controlled Trials (January 1990–March 2010) were conducted in late March 2010.

The search strategy was developed in consultation with a medical librarian and used a combination of MeSH terms and keywords. All MeSH terms were mapped to subject headings and checked for other contexts to ensure inclusion of all appropriate terms; a separate strategy was developed for each database to account for variations in MeSH terms. The final strategies were independently checked by two reviewers

(BD, BF). The strategies had four components which were combined: (1) attitudes and beliefs, (2) health care professionals, (3) low back pain, and (4) patient attitudes and beliefs, management, or outcomes. The complete search strategy for Medline via Ovid is available online (Table S1, see the online version at 10.1016/j.ejpain.2011.06.006). Hand searches for relevant articles were also conducted on the bibliographies of identified articles and related systematic reviews.

2.2 Study selection and inclusion criteria

Studies relating to LBP (all types and categories) that investigated an association between HCP attitudes and beliefs and patient attitudes and beliefs, clinical management, or outcomes were included. Original empirical studies (both quantitative and qualitative methodologies), written in English, published between January 1990 and March 2010 were eligible. Studies were excluded if they primarily related to HCP attitudes about outcome expectation, race/ethnicity, gender, or narcotic medications and the relationship to LBP, or to patient satisfaction as an outcome. Titles and abstracts of citations retrieved by the literature search were independently scrutinised for eligibility by two reviewers (BD, BF). Full papers were retrieved and evaluated if the paper appeared to fulfil inclusion criteria, if eligibility was unclear based upon the content of the abstract, or if the abstract was not available. Disagreement regarding eligibility was resolved by consensus between the two reviewers.

2.3 Data extraction

Potentially relevant papers were independently scrutinised by two reviewers (BD, BF) using a standardised data extraction sheet. The categories of data extracted were: study characteristics; study population characteristics; HCP attitudes and beliefs investigated; and the association with patients with LBP. Following data extraction a final decision on the eligibility of papers was made by consensus between the two reviewers.

2.4 Quality assessment

Two appraisal systems were chosen for this review; the Epidemiological Appraisal Instrument (EAI) was used to appraise quantitative studies (Genaidy et al., 2007), and the Critical Appraisal Skills Programme (CASP) system for qualitative studies (Public Health Resource Unit, 2006). Two reviewers independently appraised the articles (SD, DH); all disagreements regarding

ratings were resolved by consensus between these two reviewers. One article was rated by a third reviewer (DB) as SD is the first author; SD was not involved in any decision regarding this study (Dean et al., 2005). No guidelines have been developed to rate research as of low, moderate or high quality within these two systems [*personal communication*]. We designated research fulfilling less than 50% of criteria as being of low quality, 50–75% as being of moderate quality and more than 75% as being of high quality. Studies of low quality were excluded from analysis.

2.5 Synthesis of evidence

The strength of evidence according to the grading system used in the Agency for Healthcare and Policy Research (AHCPR) guidelines was the primary outcome measure (Bigos et al., 1994). The quality of evidence according to the Grading of Recommendations Assessment, Development and Evaluation (GRADE) guidelines was the secondary outcome measure (Guyatt et al., 2008).

2.6 Thematic analysis and generalizability

Two reviewers (BD and TD) independently analysed themes related to (i) study results and (ii) study population characteristics which might be used to assess generalizability, before an agreed collation by those reviewers.

3. Results

Study identification and selection for analysis is summarised in Fig. 1. In total, 20 studies fulfilled the inclusion criteria. Results of one study were reported in two separate publications, which met the inclusion criteria when combined (Buchbinder et al., 2001a,b); this was treated as one study in the review process. Five studies were rated as being of high quality and 12 were rated as moderate quality (Tables S2 and S3, see the online version at 10.1016/j.ejpain.2011.06.006). Three studies were rated as low quality (Brynhildsen et al., 1995; Rupert, 2000; Houben et al., 2004) and were excluded from analysis. All decisions regarding study inclusion and quality rating were reached by consensus, although a third reviewer was appointed to resolve disagreements, this was not required.

Table 1 summarises the characteristics of the 17 included studies, more detailed information is available online (Table S4, see the online version at 10.1016/j.ejpain.2011.06.006). Studies were of cross-sectional, longitudinal, concurrent cohort, and quali-

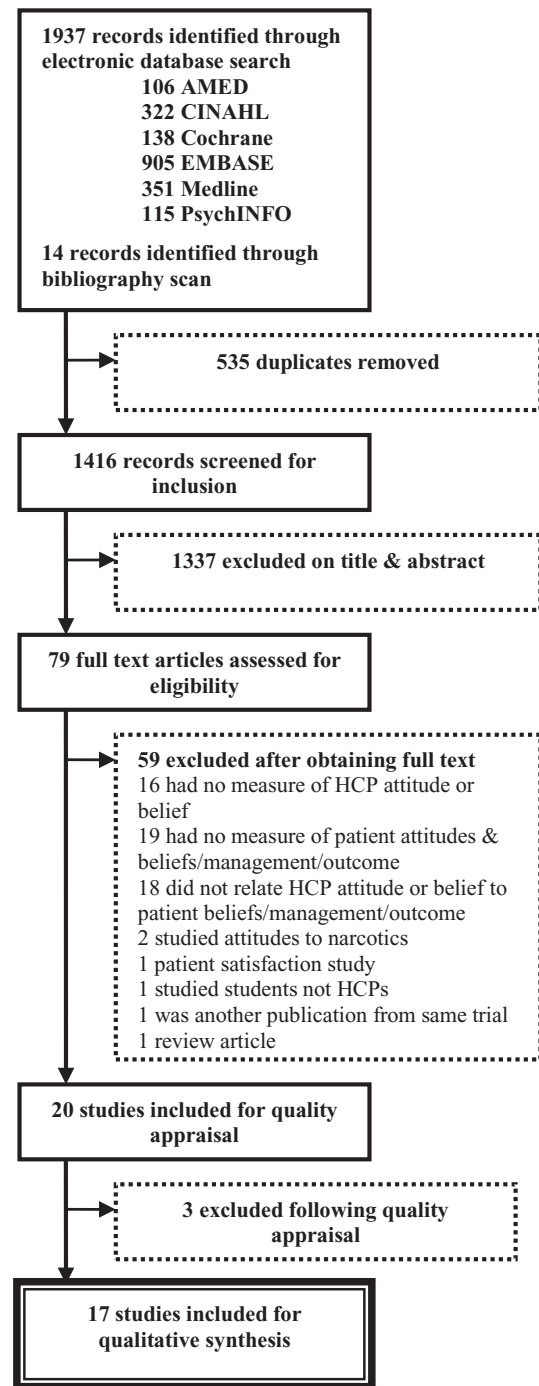


Figure 1 Flow of studies through the review process.

tative methodologies. They were conducted in the UK, France, the Netherlands, Australia, Germany, Norway, Sweden, and the USA. Studies were based in primary care, secondary care, or in settings including patients or practitioners from both primary and secondary care. The attitudes and beliefs of GPs, physiotherapists,

Table 1 Summary of included studies.

| Study | Type | Country Setting | HCP speciality | Patient type | Attitude/belief of HCP (scale) | Results | | Paper quality |
|------------------------------|------|---------------------|------------------------------|---|---|--|---|---------------|
| | | | | | | Association with patient-related factor | Association with patient-related factor | |
| Bishop and Foster (2005) | C-S | UK Majority 2° care | PT (n = 453) in M/S field | Three vignettes with acute NSLBP | Biomedical vs biopsychosocial orientation | Patient management Work recommendations: based upon BM view – the greater the perceived pathology the more likely the recommendation not to work | M | |
| Bishop et al. (2008) | C-S | UK Majority 1° care | GP (n = 442) PT (n = 580) | Vignette with acute NSLBP | Biomedical vs biopsychosocial orientation (PABS) | Patient management Work recommendations: advice to remain off work associated with higher BM scores & lower BPS scores | M | |
| Buchbinder et al. (2001a, b) | C-C | Australia 1° care | GP (n = 2556) | Two vignettes with acute/sub-acute NSLBP | Attitudes to LBP patients & management Attitudes following media intervention | Guideline adherence: subgroup with high BM/low BPS scores more likely to provide recommendations not aligned with guidelines | M | |
| Coudeyre et al. (2006) | C-S | France 1° care | GP (n = 887) | Reported behaviour with acute/chronic LBP | Fear avoidance beliefs (FABQ) | Patient management Guideline adherence: intervention group more likely to be aligned with guidelines Patient management High GP FABQ Phys associated with more sick leave prescription & more restrictive activity advice; low GP FABQ Phys associated with providing more specific LBP information & referral to spine specialist/back school Guideline adherence: high GP FABQ scores negatively associated with following guidelines for physical & occupational activities | H | |
| Coudeyre et al. (2007) | C-S | France 1° care | GP (n = 709) | Patients with acute NSLBP (n = 2727) | Fear avoidance beliefs (FABQ) | Patient attitudes & beliefs Weak correlation between GPs' & patients' fear avoidance beliefs | M | |

Table 1 (continued)

| Study | Type | Country Setting | HCP speciality | Patient type | Attitude/belief of HCP (scale) | Results | |
|------------------------------|------|-----------------|--|---|---|--|---------------|
| | | | | | | Association with patient-related factor | Paper quality |
| Daykin and Richardson (2004) | SSI | UK 2° care | PT (n = 6) in NHS outpatients | Patients with chronic NSLBP (n = 12) | Attitudes to LBP patients & management Beliefs about & perceptions of chronic LBP | Patient attitudes & beliefs Beliefs about & change patient beliefs Patient management Education & guideline adherence: BM view reflected in structure orientated pain attributions, explanations & treatment strategies | H |
| Dean et al. (2005) | SSI | UK 2° care | PT (n = 8) in NHS outpatients | Patients with acute/ sub-acute NSLBP (n = 9) | Attitudes to LBP patients & management Attitudes to therapeutic exercise | Patient attitudes & beliefs PTs try & change patients' beliefs to promote adherence to an exercise regime. Patients accept their lack of adherence as reason for not improving | H |
| Houben et al. (2005) | C-S | NL Mixed | Paramedical therapists in PP (n = 295) | Three vignettes with chronic NSLBP ^a | Biomedical vs biopsychosocial orientation (PABS) | Patient management Work & activity recommendations: BM orientated therapists viewed activities as more harmful & advised patients to limit daily activity & work | M |
| Laekeman et al. (2008) | C-S | Germany Mixed | PT (n = 220) ^b | Three vignettes with chronic NSLBP ^a | Biomedical vs biopsychosocial orientation (PABS) | Patient management Work & activity recommendations: Correlated with BM orientation | M |
| Linton et al. (2002) | C-S | Sweden Mixed | GP (n = 60) PT (n = 71) | Reported behaviour | Fear avoidance beliefs (items from TSK, FABQ, PAIRS) | Patient management Work & activity recommendations: those with high levels of fear avoidance beliefs provided less instructions about activities Sickness certification: those with high levels of fear avoidance beliefs reported sick certificates to be a good treatment | M |

Table 1 (continued)

| Study | Type | Country Setting | HCP speciality | Patient type | Results | | Paper quality |
|---------------------------|----------|-----------------|----------------------------|--|--|--|---------------|
| | | | | | Attitude/belief of HCP (scale) | Association with patient-related factor | |
| McIntosh and Shaw (2003) | SSI & FG | UK 1° care | GP (n = 15) | Patients with LBP (n = 37) | Attitudes to LBP patients & management Information provision & <i>The Back Book</i> | Patient management Education: some GPs reluctant to distribute information materials resulting in inequalities for patients in terms of what materials they receive. Patients reported receiving little or no information from their GPs | H |
| Poiraudeau et al. (2006a) | C-S | France 2° care | RH (n = 266) | Patients with acute/sub-acute LBP (n = 443) | Fear avoidance beliefs (FABQ) | Patient attitudes & beliefs Fear avoidance beliefs: high RH FABQ Phys score significantly increased risk of the patient having high FABQ Phys | M |
| Poiraudeau et al. (2006a) | L | France 2° care | RH (n = 266) | Reported behaviour acute/chronic LBP Patients with acute/sub-acute LBP (n = 440) | Fear avoidance beliefs (FABQ) | Patient management High RH FABQ Phys associated with more bed rest prescription and more restrictive work & activity recommendations; less likely to consider main objective of physiotherapy for LBP was to reinforce muscle strength or endurance; did not differ in patient referral or sick leave prescription | M |
| Rainville et al. (2000) | C-S | USA Mixed | GP (n = 41) OS (n = 41) | Three vignettes with chronic NSLBP ^a | Fear avoidance beliefs (PAIRS) | Patient outcome No association between RH FABQ score & pain persistence at 3 months Patient management Work & activity recommendations: correlated with PAIRS scores | M |

Table 1 (continued)

| Study | Type | Country Setting | HCP speciality | Patient type | Results | | Paper quality |
|----------------------|------|-----------------|---|---|--|---|---------------|
| | | | | | Attitude/belief of HCP (scale) | Association with patient-related factor | |
| Sieben et al. (2009) | L | NL 1 care | GP (n = 42) | 3 vignettes with chronic NSLBP ^a 222 patients with acute NSLBP | Fear avoidance beliefs (PAIRS & TSK) | Patient management Work & activity recommendations: (vignette) higher PAIRS & TSK scores associated with restrictive activity recommendations Referral: (actual) no association between PAIRS/TSK scores & treatment behaviour (diagnostic tests, drug prescription, referrals) Patient outcome No association between GP PAIRS/TSK scores & long-term (mean 1.9 years) patient pain/disability | M |
| Watson et al. (2008) | C-S | UK 1° care | GP (n = 83) | Patients with NSLBP | Biomedical vs biopsychosocial orientation (PABS) | Patient management Sickness certification: no relationship between the BM or BPS score & the number of certificates issued for NSLBP | H |
| Werner et al. (2005) | C-S | Norway Mixed | GP (n = 193) PT (n = 255) CP (n = 21) | Members of the general public (n = 1502) | Attitudes to LBP patients & management Beliefs about back pain recovery & surgery amongst GPs, PTs & CPs | Patient attitudes & beliefs Beliefs about back pain: patient beliefs about back pain recovery correlated with beliefs of the HCP group with whom they had consulted | |

Key: 1, primary; 2, secondary; HCP, health care professional; C-C concurrent cohort; C-S, cross-sectional; FG, focus groups; L, longitudinal; SSI, semi-structured interviews; NL, The Netherlands; UK, United Kingdom; USA, United States of America; CP, chiropractor; GP, general practitioner; M/S, musculoskeletal; NHS, British National Health Service; OS, orthopaedic surgeon; PT, physiotherapist; RH, rheumatologist; LBP, low back pain; NSLBP, non-specific low back pain; CLBP, chronic low back pain; BM, biomedical; BPS, biopsychosocial; FABQ, Fear Avoidance Beliefs Questionnaire – Phys, physical subscale; PABS, Pain Attitudes & Beliefs Scale; PAIRS, Pain & Impairment Relationship Scale; TSK, Tampa Scale for Kinesiophobia; H, high; M, moderate; L, low.

^aIdentical set of vignettes developed by Rainville et al. (2000).

^bThis study also included 60 physiotherapy students, this is not reported as this review only related to qualified health care professionals.

chiropractors, rheumatologists, orthopaedic surgeons, and other paramedical therapists were investigated. These included biomedical vs biopsychosocial treatment orientation, fear avoidance beliefs, and attitudes to LBP patients and their management.

The association between HCP attitudes and beliefs and patient-related factors was investigated using HCP self-reported behaviour, patient vignettes, patient questionnaires or interviews, treatment observation or audit, or a combination of measures. The studies included acute, sub-acute and chronic LBP, as well as participants from the general population with previous experiences of LBP. No specific LBP diagnosis was reported by any study.

Results are described relating to the association between HCP attitudes and beliefs and (i) patients' attitudes and beliefs, (ii) patient clinical management, and (iii) patient outcomes (Table 2). Strength of evidence is reported according to the AHCPR system (Bigos et al., 1994) (GRADE quality of evidence rating in brackets (Guyatt et al., 2008)). Key findings are summarised in Fig. 2.

3.1 Patient attitudes and beliefs

There is strong evidence (GRADE low quality) that HCP beliefs about back pain are associated with the beliefs of their patients (Daykin and Richardson, 2004; Dean et al., 2005; Werner et al., 2005), and moderate evidence (GRADE high quality) that high levels of fear avoidance beliefs in HCPs are associated with high levels of fear avoidance beliefs in their patients (Poiraudau et al., 2006a; Coudeyre et al., 2007).

3.2 Patient management

3.2.1 Education

There is moderate evidence (GRADE low quality) that HCP attitudes and beliefs are associated with the type and content of education provided to patients (McIntosh and Shaw, 2003; Daykin and Richardson, 2004; Coudeyre et al., 2006).

3.2.2 Work and activity recommendations

There is moderate evidence (GRADE moderate quality) that HCPs with a biomedical orientation (Bishop and Foster, 2005; Houben et al., 2005; Bishop et al., 2008; Laekeman et al., 2008) or high fear avoidance beliefs (Rainville et al., 2000; Coudeyre et al., 2006; Poiraudau et al., 2006b; Sieben et al., 2009)

are more likely to advise patients with acute and chronic LBP to limit work and physical activities.

There is moderate evidence (GRADE moderate quality) that HCPs with high fear avoidance beliefs are more likely to recommend bed rest during sick leave for acute LBP (Coudeyre et al., 2006; Poiraudau et al., 2006b), and that a change in HCP beliefs following a media campaign is associated with them being less likely to prescribe bed rest (Buchbinder et al., 2001a, b).

There is moderate evidence (GRADE moderate quality) that high HCP fear avoidance beliefs are associated with increased reported sick leave prescription for acute and chronic LBP (Linton et al., 2002; Coudeyre et al., 2006). There is moderate evidence (GRADE low quality) that a biomedical orientation is not associated with the number of sickness certificates prescribed (Watson et al., 2008).

3.2.3 Referral

There is inconsistent evidence regarding the association between HCP attitudes and beliefs and patient referral, as outlined in Table 2 (Coudeyre et al., 2006; Poiraudau et al., 2006b).

3.2.4 Guideline adherence

There is moderate evidence (GRADE low quality) that HCPs with a biomedical orientation (Daykin and Richardson, 2004) or high levels of fear avoidance beliefs (Coudeyre et al., 2006; Poiraudau et al., 2006b) are less likely to adhere to LBP treatment guidelines.

3.3 Patient outcome

There is limited evidence (GRADE low quality) that HCP fear avoidance beliefs are not associated with the persistence of LBP at three months (Poiraudau et al., 2006b) or long-term pain/disability (Sieben et al., 2009).

3.4 Generalizability

Table S5, see the online version at 10.1016/j.ejpain.2011.06.006 summarises study design and population characteristics related to each finding.

4. Discussion

This systematic review demonstrates strong evidence that the attitudes and beliefs of patients with LBP are

Table 2 Summary of evidence.

| Hypothesis | Theme | Evidence | Strength of evidence ^a | Quality of evidence ^b | Studies |
|-------------------------------|-----------------------------------|--|-----------------------------------|----------------------------------|---|
| Patient attitudes and beliefs | Fear avoidance beliefs | <ul style="list-style-type: none"> High levels of FABs in HCPs associated with high levels of FABs in their patients | Moderate | High ^e | Coudeyre et al. (2007), Poiraudreau et al. (2006a) |
| | Beliefs about back pain | <ul style="list-style-type: none"> HCP beliefs about back pain are associated with the beliefs of their patients | Strong | Low | Daykin and Richardson (2004), Dean et al. (2005), Werner et al. (2005) |
| Patient management | Education received by patient | <ul style="list-style-type: none"> HCPs' BM orientation is translated into the explanation given to patients about the source of LBP | Moderate | Low | Daykin and Richardson (2004) |
| | | <ul style="list-style-type: none"> HCPs with low levels of FABs more likely to provide specific LBP information HCPs' negative attitude to information materials results in patients not receiving adequate information & being frustrated by this | Moderate | Low | Coudeyre et al. (2006) |
| | Work and activity recommendations | <ul style="list-style-type: none"> HCPs with a BM orientation appraise movement as being more harmful HCPs with high levels of FABs appraise movement as being more harmful | Limited | Low | McIntosh and Shaw (2003) |
| | | <ul style="list-style-type: none"> HCPs with BM orientation advise patients to limit work & physical activities | Moderate | Moderate ^c | Houben et al. (2005) |
| | | <ul style="list-style-type: none"> HCPs with high levels of FABs advise patients to limit work & physical activities | Moderate | Moderate ^c | Bishop and Foster (2005), Bishop et al. (2008), Houben et al. (2005), Laekeman et al. (2008) |
| | | <ul style="list-style-type: none"> HCP BM orientation not correlated with number of sickness certificates issued | Moderate | Low | Coudeyre et al. (2006), Poiraudreau et al. (2006b), Rainville et al. (2000), Sieben et al. (2009) |
| | | <ul style="list-style-type: none"> HCPs with high levels of FABs report issuing more sickness certificates (association not found by one study) | Moderate | Moderate ^d | Watson et al. (2008) |
| | | <ul style="list-style-type: none"> HCPs with high levels of FABs more likely to recommend bed rest during sick leave for acute LBP | Moderate | Low | Linton et al. (2002), Coudeyre et al. (2006), Poiraudreau et al., 2006b) |
| | | <ul style="list-style-type: none"> A change in HCP beliefs following a media campaign is associated with being less likely to prescribe bed rest | Moderate | Moderate ^d | Coudeyre et al. (2006), Poiraudreau et al. (2006b) |
| | | <ul style="list-style-type: none"> HCPs with high levels of FABs provide less instructions about activities | Limited | Low | Buchbinder et al. (2001 a,b) |
| | | | | | Linton et al. (2002) |

Table 2 (continued)

| Hypothesis | Theme | Evidence | Strength of evidence ^a | Quality of evidence ^b | Studies |
|-----------------|---------------------|--|-----------------------------------|----------------------------------|--|
| | Referral | <ul style="list-style-type: none"> HCP FABs are not associated with actual patient referral for diagnostic tests /therapy/specialists HCPs with low levels of FABs reported being more likely to refer chronic LBP patients to specialists or back school in one study, but HCPs with high levels of FABs did not report increased referral in another A change in beliefs following a media education campaign is associated with decreased reported patient referral for tests/imaging/specialists for acute/sub-acute LBP & increased reported referral to physiotherapy for sub-acute LBP | Limited | Low | Sieben et al. (2009) |
| | Guideline adherence | <ul style="list-style-type: none"> HCP BM orientation associated with not adhering to guidelines HCPs with high levels of FABs are less likely to adhere to guidelines A change in beliefs following a media education campaign is associated with being more likely to adhere to guidelines | Moderate | Low | Daykin and Richardson (2004) |
| | | <ul style="list-style-type: none"> HCP FABs are not associated with pain persistence at three months HCP FABs not associated with long-term pain/disability persistence | Limited | Low | Coudeyre et al. (2006), Poiraudreau et al. (2006b) |
| Patient outcome | | | Limited | Low | Buchbinder et al. (2001a,b) |
| | | | Limited | Low | Poiraudreau et al. (2006b) Sieben et al. (2009) |

Key: BM, biomedical; FAB, fear avoidance belief; HCP, health care professional; LBP, low back pain.

^aAgency for Healthcare and Policy Research rating.

^bGrading of Recommendations Assessment, Development and Evaluation rating.

^cDose-response relationship.

^dOdds ratio P ≥ 2.0 (≤0.5).

^eOdds ratio P ≥ 5.0 (≤0.2).

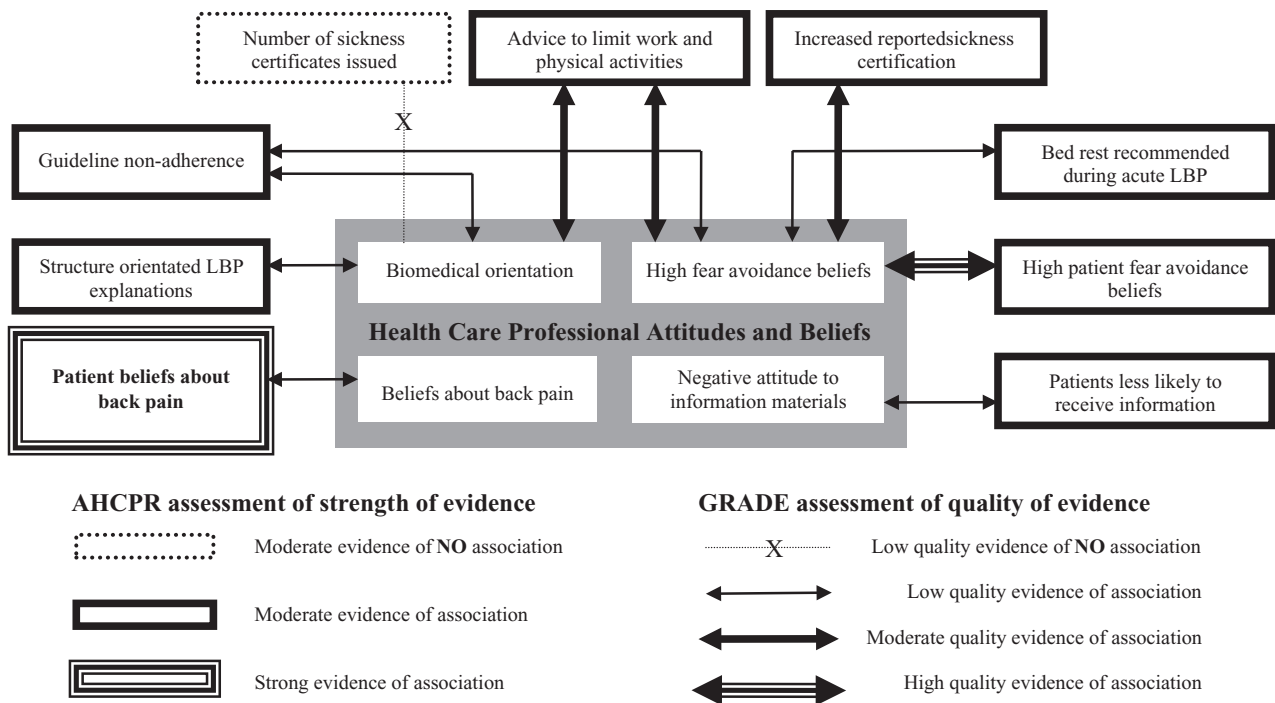


Figure 2 Summary of strong and moderate evidence of the association between HCP attitudes and beliefs and patient-related factors for LBP.

associated with the attitudes and beliefs of the HCP with whom they have consulted. This finding comes from consistent evidence from varied research methodologies, primary and secondary care, and a range of specialities, geographical locations, and cultures. It is demonstrated in participants with acute, sub-acute, chronic, and previous experiences of LBP.

There is also moderate evidence that patient education, work and activity recommendations (including bed rest), and guideline adherence are associated with HCP attitudes and beliefs. Finally, there is moderate evidence that HCP fear avoidance beliefs are associated with reported sick leave prescription, whereas HCP biomedical orientation is not associated with the number of sickness certificates issued to patients with LBP.

Parsons et al. (2007) found that GPs provided pathology-based explanations for patients' chronic musculoskeletal pain which were grounded in a biomedical model, and that the education provided to patients was influenced by the beliefs of the GP. The current study demonstrates similar influences on the education provided to LBP patients and that these influences are consistent across HCP disciplines.

Studies included in this review demonstrate that many HCPs hold elevated fear avoidance beliefs (Linton et al., 2002; Coudeyre et al., 2006; Poiraudeau

et al., 2006b; Sieben et al., 2009), and that these beliefs are associated with higher levels of fear avoidance beliefs in their patients, but not persistent pain and disability. A systematic review has found patient fear avoidance beliefs to be independently associated with persistent disability, but not pain (Ramond et al., 2011). Poiraudeau et al. (2006b) investigated only pain persistence, while Sieben et al., 2009 investigated pain and disability persistence as a unidimensional construct. It must also be noted that Sieben et al., (2009) excluded 25 patients with the highest fear-avoidance scores and calculated Graded Chronic Pain Scale scores based on other measures taken at baseline, rather than using the scale itself (Sieben et al., 2005). This raises questions about the suitability of the outcome measure, especially as it is designed and validated in populations with chronic pain (Underwood et al., 1999; Elliot et al., 2000), as opposed to their very acute sample. It is also possible that HCP fear avoidance beliefs may influence the degree of these beliefs in their patients, but the strength of this association may not be sufficient to produce a significant effect on patient outcome, or that such an association does not exist.

The contrasting findings with regards to sickness certification may be due to this behaviour being associated with fear avoidance beliefs rather than a biomedical treatment orientation, or a difference between

reported and actual behaviour. Actual treatment behaviour may be influenced by case specific factors, such as patient preferences, relationship maintenance, time pressure, and funding issues, or the GP's general propensity to issue sickness certificates, thus masking any association with HCP attitudes and beliefs (Watson et al., 2008; Sieben et al., 2009).

4.1 Strengths and limitations

A strength of this study is that it included studies of both quantitative and qualitative methodologies. This approach provided a much richer perspective, and has previously been used in a related systematic review (Fullen et al., 2008). High quality quantitative and qualitative studies were considered to contribute equally to the evidence (Tomlin and Borgetto, 2011). The two methodologies produced consistent conclusions, and therefore strengthened the study's conclusions. Although qualitative research is often not performed with the aim of generalising to other populations, by reporting the characteristics of study populations and setting, judgements can be made as to whether the findings are applicable to another setting (Lincoln and Guba, 1985). Similar to the findings of Fullen et al. (2008), the majority of the quantitative studies included were only of moderate methodological quality. In general the findings were consistent across studies of different quality, however, the strength of evidence generated was diminished by the modest overall quality. Three studies were excluded based upon their low quality rating; these studies did not contradict the review's conclusions and had low external validity.

This review used the AHCPR strength of evidence assessment as the primary outcome measure as it allowed the integration of quantitative and qualitative research evidence (Bigos et al., 1994). This grading system has also been utilised in three recent LBP systematic reviews (Fullen et al., 2008; Bigos et al., 2009; Kelly et al., 2011). The GRADE quality of evidence assessment was used as a secondary outcome measure to provide consistency with Cochrane reviews (Guyatt et al., 2008). The GRADE rating was generally lower than the AHCPR rating due to there not being a mechanism to increase the GRADE based upon consistent findings across multiple high quality observational studies.

We took several steps to minimise potential sources of bias in this review. We explicitly stated our hypotheses at the outset, allowing the influence of any possible preconceptions to be evaluated. Two reviewers independently completed each stage of the review

process, notably article screening, data extraction, quality appraisal, and thematic analysis. This review was also conducted by a collaboration of reviewers from a number of institutions, countries, and backgrounds with different research interests, experience, and funding sources.

In this review we combined findings from studies using the Fear Avoidance Beliefs Questionnaire (FABQ), Tampa Scale of Kinesiophobia (TSK) and Pain and Impairment Relationship Scale (PAIRS) into the category of Fear Avoidance Beliefs. This is analogous to the composite survey tool created by Linton et al. (2002). This allowed us to combine several related studies when making strength of evidence assessments. These instruments provided consistent findings while measuring slightly different aspects of the same construct, thereby increasing the external validity of the review's conclusions.

Studies included in this review used a variety of methods to measure the association between HCP attitudes and beliefs and patient-related factors. These ranged from HCP reported behaviour, to patient vignettes, measures taken directly from patients or their notes, and direct observation of the treatment interaction. Patient vignettes are easy to manipulate, and there is a reduced impact of social desirability, observer bias and Hawthorne effect; however, they may elicit attitudes and opinions rather than actual behaviour in real situations (Bishop and Foster, 2005). Measures taken directly from patients may be more relevant to clinical situations; however, as patients were recruited by participating HCPs in the studies of patient outcome, this may have introduced a source of bias. A major limitation of this review is that although it demonstrates a strong association between the attitudes and beliefs of patients with LBP and those of the HCP with whom they have consulted, a causal link cannot be implied due to the observational nature of the majority of studies included. An alternate explanation may be that patients choose their HCP according to beliefs they have already (Werner et al., 2005).

4.2 Practice and research implications

The biopsychosocial model was proposed over 30 years ago (Engel, 1977), and is the basis of many LBP treatment guidelines (Koes et al., 2001), however, a number of relatively recent studies found that many HCPs continue to manage their patients within a biomedical framework. A biomedical orientation has a negative association with patient education, adherence to treatment guidelines, and reported work and activity recommendations. Physiotherapists often

recommend activity and exercise programmes that fit well within the biopsychosocial model; however, they justify these recommendations using a tissue-based (biomedical) explanatory model (Daykin and Richardson, 2004; Dean et al., 2005). GPs acknowledge the importance of psychosocial factors, but feel they must prioritise screening for medical pathology, and that they lack the time and training to integrate psychosocial assessment (Crawford et al., 2007; Parsons et al., 2007). It appears that biomedical and psychosocial factors are often viewed as being from separate schema, rather than being part of the same model. Patients experience similar difficulties to HCPs in reconciling the two explanatory models; they desire a medical diagnosis despite understanding that psychosocial factors influence their pain (McIntosh and Shaw, 2003; Toye and Barker, 2010). Pain of psychosocial origin is often seen as being not real or the patient's fault (Toye and Barker, 2010). The challenge is to make the biopsychosocial model more relevant to HCPs, and less stigmatising to patients, without unhelpfully reinforcing the already strong biomedical beliefs and related behaviours of HCPs. One way would be to place more emphasis on the *bio*-component of the model and the biological (neurophysiological) processes by which psychosocial factors influence pain perception and disability.

The finding that HCPs with a biomedical orientation are less likely to adhere to treatment guidelines may be unsurprising given their biopsychosocial basis (Koes et al., 2001). The finding that HCPs with elevated fear avoidance beliefs are less likely to adhere to these guidelines is more novel and important. HCP behaviour is often inconsistent with LBP treatment guidelines (Foster et al., 1999; Swinkels et al., 2005; Somerville et al., 2008) despite evidence that guideline adherence improves outcomes and decreases health care utilisation (Rutten et al., 2010). Changing HCP behaviour is a difficult and complex task; the association between attitudes and beliefs and behaviour demonstrated by this review may provide a foundation for the development of complex cognitive-behaviour interventions for HCPs, similar to those being developed for patients with LBP (Ammendolia et al., 2009). Given the association between HCP attitudes and beliefs and patient attitudes and beliefs, such interventions may have a double benefit of optimising management of patients with LBP as well as positively influencing the attitudes and beliefs of these patients.

The two higher quality quantitative studies included in this review were differentiated from the other studies by the participation rates they achieved, their

consideration of losses and unavailable records during analysis, their reporting of outcomes relative to exposure level and the applicability of their findings (Table S2). We recommend that further longitudinal studies be performed to investigate the association between HCP attitudes and beliefs and persistent LBP disability, using appropriate standardised outcome measures and researcher recruitment of patient participants. Developing a causal model for such an association would be challenging, although it may be possible to pre-screen HCPs for attitudes and beliefs, and then randomly allocate patients. Further qualitative research may also be useful to investigate causal links.

4.3 Conclusions

This review demonstrates that HCP attitudes and beliefs are associated with those of their patients, as well as their clinical management of patients with LBP; HCPs need to be cognisant of this during consultations. The findings of this review may help inform the development of cognitive-behaviour change interventions for HCPs involved in the management of LBP.

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Supporting information

Additional Supporting Information may be found in the online version of this article:

Table S1 Medline via Ovid Search Strategy.

Table S2 Quality appraisal of quantitative studies using the Epidemiological appraisal Instrument (Genaidy et al., 2007).

Table S3 Quality appraisal of qualitative studies using the Critical Appraisal Skills Programme (CASP) system (Public Health Resource Unit, 2006).

Table S4 Extended summary of included studies.

Table S5 Summary of findings including external validity information.

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