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Original Article

The beliefs and attitudes of UK registered osteopaths towards chronic pain and the management of chronic pain sufferers - A cross-sectional questionnaire based survey

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ABSTRACT

Objectives: This study investigated the beliefs and attitudes of UK registered osteopaths towards chronic pain and the management of chronic pain sufferers.

Methods: A cross-sectional questionnaire based survey of UK registered osteopaths was performed to test the hypothesis that osteopaths have a more biopsychosocial approach to treating and managing chronic pain patients than other healthcare professionals. Sociodemographic determinants of the participants were explored and the original HC-PAIRS and the PABS-PT used as measurement tools. They assess practitioners' attitudes and beliefs towards perceived harmfulness of physical activities for patients with cLBP and participants' knowledge of pain. International meta-analyses were performed with both measurement tools to allow comparison with other healthcare professionals.

Results: UK registered osteopaths (n = 216) had mean PABS-PT subscale scores of 31.37 ± 6.26 [CI95% 30.53–32.21] (biomedical) and 32.72 ± 4.29 [CI95% 32.14–33.29] (biopsychosocial). The mean HC-PAIRS total score was 45.45 ± 10.05 [CI95% 44.11–46.8]. These indicate a wide spread of beliefs and knowledge towards chronic pain with a tendency to agree that physical activity is not necessarily harmful for patients with cLBP. Post-graduate education had a significant positive effect on questionnaire results. Meta-analyses revealed that UK registered osteopaths have significantly better HC-PAIRS scores than most physiotherapy students, nurses and pharmacists, and had similar PABS-PT scores to most other healthcare professionals.

Conclusions: The hypothesis of UK registered osteopaths having a more biopsychosocial approach to treating and managing chronic pain patients in comparison to other healthcare providers has been rejected. This seems in contrast to the typically claimed unique concepts of osteopathy. Nevertheless, this study supports their ability to engage with psychosocial factors of the patients' pain experience, but shows that it can be improved. This paper suggests that training is needed to increase osteopaths' expertise in knowledge of chronic pain, and their attitudes towards the management of chronic pain sufferers.

1. Introduction

Over 5 million people per year develop chronic pain in the United Kingdom (UK) and only two thirds of those recover [1], leaving an estimated 28 million adults to live with chronic pain [2]. Osteopaths play an important part in providing musculoskeletal care in the UK [3] and are included in national guidelines for treatment of chronic low back pain (cLBP) [4,5].

There is some evidence to support the efficacy of manual therapy in the care of patients with cLBP [6,7]; however this seems to be influenced by the approach taken by a practitioner. Since pain is “an unpleasant sensory and emotional experience associated with actual or

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potential tissue damage, or described in terms of such damage" [8]; a biomechanical approach fails to explain its processes fully [9,10]. Furthermore, it fails to acknowledge the multitude of contextual factors within a patients' life that affect the personal pain experience [11,12]. In contrast, a biopsychosocial approach acknowledges the different aspects of a patients' life, emphasising the importance of psychology, sociology and their interaction with pathophysiology [13]. Similar to the systems theory introduced by Weiss and Bertalanffy in the 1920s [14].

In this context, it is important for a practitioner to understand that pain can be present without tissue damage [15]. Melzac [16,17] has conceptualised the process of pain experience with the neuromatrix model. It differentiates between different forms of input and output, pain being one of them. Patients are influenced by the attitudes and beliefs of the practitioner [18], therefore it is important to acknowledge what attitudes and beliefs are commonly held within a healthcare profession. For patients, these beliefs might act as barriers to recovery [19] and contribute to the development of persistent pain, by fostering negative thoughts [20] and fear avoidance behaviour [21]. The attitudes and beliefs of other healthcare professions have been widely assessed [19,22–26], but only one study investigated osteopaths [27].

In order to improve the comparability of osteopaths' attitudes and beliefs to other healthcare professions the aim of this study was threefold.

- Firstly, it explored the attitudes and beliefs of UK registered osteopaths towards chronic pain and the management of chronic pain sufferers in a quantitative survey study, using the original Health Care Providers' Pain and Impairment Relationship Scale (HC-PAIRS) [28] and the Pain Attitudes and Beliefs Scale for physiotherapists (PABS-PT) [29].
- Secondly, sociodemographic determinants of the practitioners' attitudes towards cLBP were explored.
- Finally, it gauged how osteopaths' attitudes compare to other healthcare practitioners.

Authors in the field have claimed that osteopaths integrate biopsychosocial aspects in their treatment plan and generally view illness taking many factors into account [30–32]. Since the biopsychosocial model putatively overlaps with the osteopathic principles [15], the authors of this survey hypothesised that osteopaths have a more biopsychosocial approach to treating and managing chronic pain patients.

2. Methods

2.1. Design

A cross-sectional quantitative questionnaire based survey has been conducted and reported following the STROBE statement [33].

2.2. Setting

The principal researcher (RJDM) distributed an email to potential participants using FirstClass MassMailer [34]. A generic link created with SurveyMonkey [35] was included next to a short introduction and a participant information sheet (PIS). It was made clear that participation was completely voluntary. A reminder was sent out two to four weeks after the initial distribution. Data collection started on the 02/09/15 and ended 02/11/15. No vignette was used in the current study since the authors hypothesised it might have altered the results by reminding participants of a specific patient. It was made clear that the wording *back pain* within the questionnaires did not include pain of pathological origin.

2.3. Participants

A convenience sample was used accessing a subset of the General Osteopathic Council's (GOsC) database of UK registered osteopaths. This database collects contact details of osteopaths who have agreed to be contacted for research. It did not distinguish if the participants were practicing in the UK or abroad, and this was not investigated during the survey. Access to the database was granted by the GOsC database manager. There were no exclusion criteria. The authors aimed for a sample size of 166 participants to reach a precision of ± 7.5 percent at a 95 percent level of confidence dichotomous variables with a 50% prevalence of positive answers. This level of precision was chosen since it corresponded with a sample size that seemed attainable. A prevalence of 0.5 was used [36].

2.4. Materials and instruments

This study mainly focused on attitudes towards cLBP. By this the authors mean practitioners' attitudes and beliefs towards chronic pain management, and towards perceived harmfulness of physical activities for patients with cLBP. This was achieved by using the HC-PAIRS and PABS-PT questionnaires. They are the recommended questionnaires to investigate attitudes towards cLBP [19,22–26]. The terms biomechanical and biomedical are being used interchangeably in this article, since biomedical education arguably informs a biomechanical approach [10]. The terms behavioural and biopsychosocial are also used interchangeably, since a behavioural orientation indicates a biopsychosocial approach [37].

2.4.1. HC-PAIRS

The HC-PAIRS assesses practitioners' attitudes and beliefs towards perceived harmfulness of physical activities for patients with cLBP [28]. Both the original developer and a further study have recommended altering the original scale by removing two items (10 and 13) [24,28]. This amended version consists of 13 statements with a corresponding 7-point Likert scale ranging from 0 (totally disagree) to 6 (totally agree). The total score was calculated by summation of the points from the 6-point Likert scales, and reverse scoring items 1, 6 and 14. This results in a range of 0–78. A high score indicates an increase in false beliefs about rest and reduced activity. A low score indicates a positive attitude towards physical activity which is more in line with current guidelines [4,38,39]. Previous factorial analysis identified 4 factors accounting for 56% of the variance. Internal consistency of the modified HC-PAIRS by Houben et al. [24] is high (Cronbach's α ranged from 0.78 to 0.83 [24,28]). However, the reliability of the overall score might be limited (test-retest correlation r = 0.64 [40]). In order to compare the scores of osteopaths with studies using the original 15 item HC-PAIRS [28], questions 10 and 13 were surveyed as well.

2.4.2. PABS-PT

The PABS-PT was originally developed by reviewing existing questionnaires measuring patients' attitudes and beliefs towards cLBP, which then where amended and recompiled by Ostelo et al. [41]. This instrument has commonly been used to assess attitudes towards chronic pain management. Houben et al. [29] reduced the original 31 item questionnaire by Ostelo et al. [41] to 19 items. Each statement has a corresponding 6-point Likert scale from 1 (totally disagree) to 6 (totally agree). The PABS-PT has two subscales; the biomedical subscale measures attitudes about false knowledge of pain, with a high score indicating an increase in false beliefs; the biopsychosocial subscale measures beliefs about true knowledge of pain, with a high score indicating an increase of knowledge on the complexity of pain. The scores are calculated by summation of ten items for the biomedical subscale, and nine for the biopsychosocial subscale. Internal consistency for the PABS-PT biomedical factor was high (Cronbach's α = 0.84) and satisfactory for the amended version of the biopsychosocial factor

(Cronbach's α = 0.68) [29].

2.4.3. Selection of published articles

Recent studies for interprofessional comparability have relied on the described questionnaires [24,42,43]. A systematic search was performed in order to identify previously published articles for international comparison of scores (see Table 3 for additional information).

2.4.4. Sociodemographic determinants

Determinants considered to be potentially associated to attitudes towards cLBP were undergraduate and post-graduate education, years in practice, working hours per week, gender, and previous experience of pain, and were included in the questionnaire [10,37,44–46].

2.5. Statistical methods

Raw data was exported from SurveyMonkey into an Excel file [47]. Missing data was not replaced and scores were calculated only when full data was available. SPSS v22 [48] and STATA [49] were used for statistics. Measures of attitudes towards cLBP were calculated and presented with means and confidence intervals (CI) of 95%.

Modelling determinants of appropriate attitudes towards cLBP was done using logistic regression. The significance level for retaining determinants for multivariable analysis was set at $\alpha < 0.1$. Correlations between determinants were evaluated using Spearman's rank correlation test. Factors with a correlation coefficient ≥ 0.8 and the lowest coefficient of determination in the univariate regression analysis were removed. The remaining determinants entering all factors were then modelled and backward stepwise procedure was used until all factors were significant for alpha < 0.05. Normality of the data were assessed by visual inspection of histograms, calculations of skewness, kurtosis and the Shapiro-Wilks test. Non-parametrical regression analysis was used to confirm results from parametrical analysis if assumption of normality was not met.

The 13 items of the amended HC-PAIRS [24] were supplemented with two items (1 and 13) from the original study [28] and then recalculated using a 7-point Likert scale ranging from 1 (totally disagree) to 7 (totally agree). This resulted in a possible range of 15–105.

Confirmatory factorial analysis with the same statistical approach as Houben et al. [24,29] was used to verify the construct of the instruments with an osteopathic population. Cronbach's α was calculated for both questionnaires and reported according to Bonett and Wright [50]. Reliability ratings (Cronbach's α) were based on Briggs and Cheek [51] and Lance et al. [52].

For the meta-analysis combining results from studies on attitude towards chronic low back pain from different health professions, we used the DerSimonian & Laird method for computing random effects. Estimates of heterogeneity were calculated using the Mantel-Haenszel model.

2.6. Ethics

Ethical approval for the cross-sectional survey was granted by the British School of Osteopathy's Research Ethics Committee (BSO REC). The systematic search did not require ethical approval since it did not include any direct intervention with human subjects. The PIS informed participants that submission of the completed survey would be understood as consent to take part in the study. This point was reiterated at the end of the survey, explaining that there would be no possibility of withdrawal after submission. This was due to the impossibility to identify which participant had filled in which survey.

Table 1
Detailed description of participating osteopaths (n = 216).

Sex; male (%)	54.63
Institution; BSO (%)	54.17
Post-graduate education; (%)	
Chronic pain management courses	37.04
Biopsychosocial workshops	16.67
Experience of chronic pain[a] (%)	
Themselves	37.04
Someone they know	63.43
Years of practice; mean (SD)	16.62 (± 10)
Working hours per week; mean (SD)	30.95 (± 12.08)

[a] Chronic pain was defined as 3 months or more.

3. Results

3.1. Response

The response rate was 278 (14.7%) of 1893 contacted osteopaths. Of these participants 216 completed the whole survey which resulted in a precision of ± 6.53% [36] with a population size of 5122 registered osteopaths [53]. Sociodemographic determinants are displayed in Table 1.

3.2. Missing data

It was not investigated how osteopaths who did not take part in the survey, differed from those who took part. This was not possible since the authors were only presented with minimal data from the GOsC. Participants who did not complete all questions from the HC-PAIRS and the PABS-PT (n = 62), did not differ from those who did, regarding gender, years of practice, having trained at the BSO, post-graduate education and history of low back pain.

3.3. Psychometric analysis

Cronbach's α scores were 0.81 (HC-PAIRS), 0.8 (PABS-PT biomedical subscale) and 0.57 (biopsychosocial subscale).

The PABS-PT questionnaire was analysed and completed by the authors by answering all questions using current knowledge of pain. Even though this instrument has commonly been used to assess attitudes, all questions seem to assess the participant's knowledge of pain instead. The authors noticed that 13 of the 19 questions asked, can be answered very clearly (e.g. "*Pain is a nociceptive stimulus, indicating tissue damage - no*" or *"Mental stress can cause back pain even in the absence of tissue damage - yes"*). The answer to most of the biomedical subscale questions should be a clear "no", and the answer to most of the biopsychosocial subscale questions a clear "yes". This explains the negative correlation between the two subscales.

3.4. Observed HC-PAIRS and PABS-PT scores

UK registered osteopaths had a mean HC-PAIRS score of 45.45 [CI95% 44.11–46.8] excluding items 10 and 13, and 55.95 [CI95% 54.53–57.38] (n = 213) including all items. They had a mean PABS-PT biopsychosocial score of 32.72 [CI95% 32.14–33.29] and a mean biomedical score of 31.37 [CI95% 30.53–32.21]. The spread of the results indicated a wide range of beliefs and knowledge held within the osteopathic profession in the UK (Figure 1). Median values for the scores were not significantly different.

3.5. Univariate and multivariate analyses of sociodemographic determinants

Univariate analysis showed that sociodemographic determinants had an effect on the questionnaire scores (Table 2). Sensitivity analysis

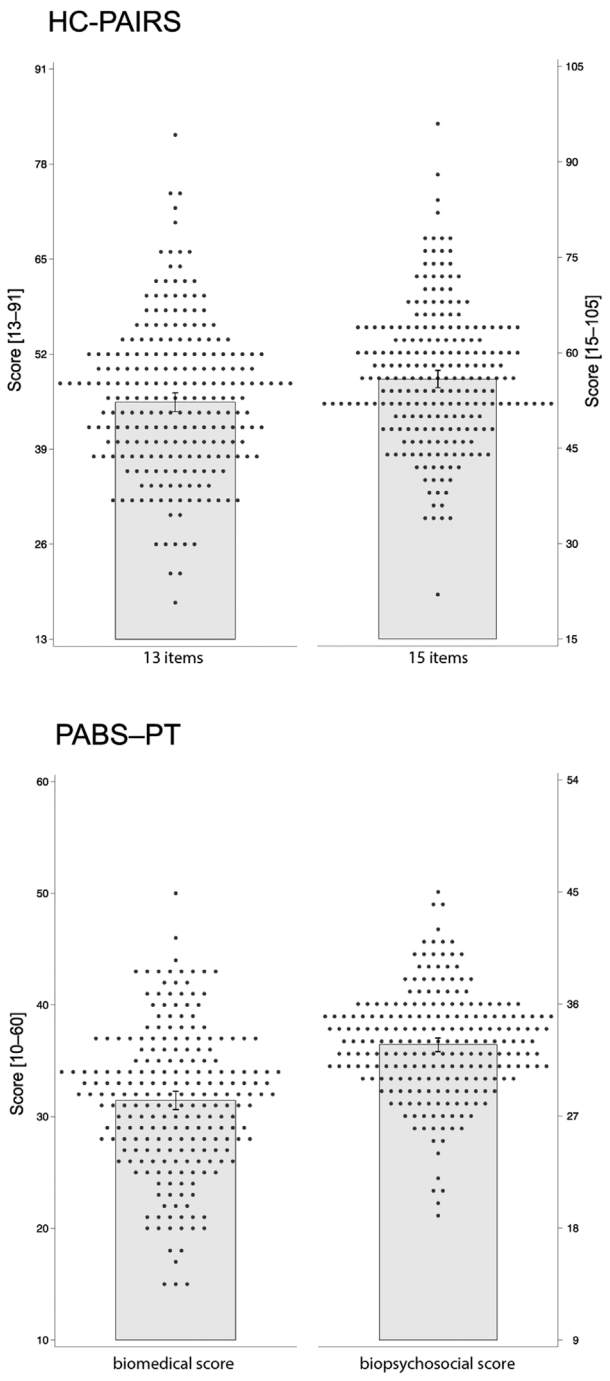

Fig. 1. PABS-PT and HC-PAIRS scores.

showed that the central estimate of the outcome measures was not influenced through grouping by institution.

Multivariate analyses revealed that years of practice (2.1 per 10 years [CI95% 0.8 to 3.4]; p = 0.001) and having followed a biopsychosocial workshop (−4.74 [CI95% −8.24 to −1.23]; p = 0.008) were independently associated to HC-PAIRS score. This indicated that osteopaths who had been in practice for less time, tended to have a more positive attitude towards cLBP. No outliers were detected. It also indicated that attending biopsychosocial workshops was associated with an improvement in attitudes towards cLBP. Only attending chronic pain treatment management courses seemed to have affected the PABS-PT biomedical subscale score positively (−1.89 [CI95% −3.62 to −0.17]; p = 0.032). This indicated that these workshops decreased false beliefs towards knowledge of pain. Only attending biopsychosocial workshops seemed to have affected the biopsychosocial subscale score (3.17 [CI95% −1.69 to 4.66]; p < 0.001). This indicated that these workshops resulted in increased correct beliefs towards knowledge of pain.

3.6. Correlations and associations between scores

Correlations and associations were visualised using scatter-plots. Pearson's correlation showed participants scoring lower on the HC-PAIRS, scoring higher on the biopsychosocial subscale of the PABS-PT (r (214) = −0.174, p = 0.01). A low HC-PAIRS score indicated a positive belief towards cLBP. This corresponded with a higher PABS-PT biopsychosocial subscale score. Participants scoring lower on the HC-PAIRS, scored higher on the biomedical subscale of the PABS-PT (r (216) = 0.534, p < 0.001). A high HC-PAIRS score indicated the belief of cLBP being a disabling condition. This corresponded with a higher PABS-PT biomedical score. There was a negative correlation between the biomedical and biopsychosocial subscales of the PABS-PT (r (214) = −0.424, p < 0.001).

3.7. International comparison

PV conducted the initial search for papers and selected 49 articles for comparison. These where then reviewed by RJDM. RJDM and PV agreed to exclude a further 19 articles based on the selection criteria. The results of the systematic search are provided in Table 3. Sample sizes for Bishop et al. [37] were provided by A. Bishop.

Since different versions of the questionnaires existed, the scores for the HC-PAIRS and the PABS-PT subscales where normalised to a 0–100 scale. Sample sizes ranged from 6-602 and studies were very heterogenous on many aspects. Meta-analysis of the HC-PAIRS showed that UK registered osteopaths scored significantly lower than most physiotherapy students, nurses and pharmacists. Indicating a decrease in false beliefs of osteopaths towards rest and activity. Osteopaths had comparable scores to medical doctors and chiropractors (Figure 2).

The meta-analyses of both PABS-PT subscales showed that UK registered osteopaths did not differ by score significantly to most other studies. Some physiotherapists and medical doctors had significantly higher scores on the biopsychosocial subscale. This indicates that they have an increased understanding of the complexity of pain. (Figure 3).

4. Discussion

4.1. Observed scores

This study assessed attitudes and beliefs of UK registered osteopaths towards chronic pain and the management of chronic pain sufferers. The results showed that there was a wide spread of beliefs held within the profession, with a tendency to agree that physical activity is not necessarily harmful for patients with cLBP. Beliefs towards current knowledge of pain were also widely spread. The approaches of early osteopaths in the UK described that *"… osteopathy may be all inclusive, including means and methods of dealing with the entire organism of body and mind."* [54]. This is supported by Pincus et al. [27] reporting that osteopaths generally have a psychosocial approach when treating LBP. It could be argued that there is a strong tradition of understanding anatomy and physiology within UK osteopathy. This is reflected in osteopaths recommending restriction of daily activities and still believing that there is an underlying structural cause for the pain [27]. Additionally, Pincus et al. [55,56], found that osteopaths believe that absence from work is needed for LBP recovery and perceive that work is a threat to some of their patients. Arguably, this can be also be considered more biomedical, since Ostelo et al. [41] described the biomedical approach endorsing the belief that pain is linked to injury and activity should be ceased as a consequence.

The PABS-PT scores of UK registered osteopaths showed that there

Table 2
Determinants of attitudes towards chronic LBP (univariate analysis; N = 216).

	HC-PAIRS$_{new}$		PABS-PT (BM score)		PABS-PT (BPS score)	
	Mean diff. (CI95%)	p-value	Mean diff. (CI95%)	p-value	Mean diff. (CI95%)	p-value
Sex; male	−0.18 (−2.89 to 2.54)	0.897	−0.4 (−2.09 to 1.29)	0.645	−0.35 (−1.5–0 to 81)	0.553
Institution; BSO	−1.36 (−4.07 to 1.34)	0.322	−0.18 (−1.87 to 1.51)	0.831	−0.47 (−1.62 to 0.69)	0.428
Post-graduate education						
Chronic pain management courses	−2.47 (−5.25 to 0.31)	0.081	−1.89 (−3.61 to −0.17)	0.032[a]	1.58 (0.41–2.75)	0.009[a]
Biopsychosocial workshops	−4.44 (−8.02 to −0.87)	0.015[a]	−2.47 (−4.71 to −0.24)	0.03[a]	3.17 (1.69–4.66)	< 0.001[a]
Experience of chronic pain						
Self	−0.84 (−3.64 to 1.96)	0.554	−0.56 (−2.3 to 1.18)	0.526	0.51 (−0.68 to 1.7)	0.401
Someone they know	0.42 (−2.39 to 3.22)	0.77	1.08 (−0.67 to 2.82)	0.225	−0.27 (−1.46 to 0.93)	0.662
Years of practice; per year	0.21 (0.07–0.34)	0.003[a]	0.06 (−0.02 to 0.15)	0.145	−0.03 (−0.09 to 0.03)	0.274
Working hours per week; per working hour	−0.02 (−0.14 to 0.09)	0.707	> 0.01 (−0.07 to 0.08)	0.947	−0.03 (−0.08 to 0.02)	0.214

HC-PAIRS: Years of practice was associated with an increase of 2.1 points for every 10 years. Training in chronic pain treatment management or attending biopsychosocial workshops were associated with reduced total scores.
PABS-PT_BM: Years of practice was associated with an increase of 0.6 points for every 10 years. Post-graduate education in chronic pain treatment and management or attending biopsychosocial workshops were associated with lower scores.
PABS-PT_BPS: Post-graduate education in chronic pain treatment and management or attending biopsychosocial workshops were associated with higher scores.
[a] Indicates significant p-value.

was potential for them to improve their expertise in pain. It is necessary for clinicians to recognise the complexity of chronic pain beyond the biomedical domain, and how psychosocial factors might influence patients' pain experience. A biopsychosocial approach, paired with current knowledge of pain processing neurophysiology [57–59] and the ability to recognise peripheral and central sensitisation in patients with musculoskeletal pain [60,61], would arguably enable osteopaths to further improve their treatment and management plans in order to optimise treatment outcomes and patient care [62,63] (see Refs. [10,64,65] for details of this argument). This would potentially improve patients' management of chronic pain and influence treatment adherence [18,66], if the clinicians are able to appropriately communicate with their patients. Nijs and colleagues [64,67] emphasize the importance of pain neuroscience education (PNE) [57,59,68,69] as a tool for communicating with patients and describe it as a necessary step in facilitating patient recovery [63]. Since PNE can be integrated into clinical practice without great effort, it might serve as a tool for osteopaths to broaden their patients' knowledge of their pain experience.

As the name implies, a biopsychosocial approach includes the biomedical view. It does not oppose the biomedical approach, but emphasises the importance of psychology and sociology on the patients' perception of their situation [13]. This is supported by current guidelines [4,38,39] which recommend a multi-disciplinary biopsychosocial approach, since a solely biomedical approach fails to meet the expected results.

4.2. Sociodemographic determinants

Demographics of participants in this study were similar to data collected by the GOsC [53] and the Institute of Osteopathy [70]. This indicates that the sample was likely to be representative of the general population of practising osteopaths registered with the GOsC, but might not be generalisable to other osteopaths. A higher selection bias from institutions other than the BSO could have existed. This would have meant that their outcome measures had been significantly different, but this did not show up during analysis.

Postgraduate education had a positive effect on the attitudes of the participants. According to Nijs et al. [10], short training programmes do not elicit the desired long term change in approach with regards to chronic pain management. However, a one-day biopsychosocial workshop evoked more positive beliefs towards lumbopelvic pain in Australian physical therapists [71]. Informational packages only seem to have a weak effect on practitioners' reported behaviours and beliefs about acute LBP [72].

Since post-graduate education was not clearly defined and short courses do not seem to have an effect [10], the observed change might be a result of long-term courses.

4.3. International comparison

Although authors in the field of osteopathy claim that osteopaths use unique concepts in their approach, the current study cannot support this, since osteopaths' beliefs and attitudes have shown to be very similar to other healthcare professionals. This might be since some

Table 3
Results of systematic search.

Date of search: 06.01.2017

Database searched	Terms used	Articles extracted	Duplicates	Retained	Selected
PubMed	HC-PAIRS OR PABS-PT OR “pain attitudes and belief scale” OR “Health care provider's pain and impairment relationship scale”	144	78	324	30
EmBase	'hc-pairs' OR ’pabs-pt' OR ’pain attitudes and belief scale' OR ('health care provider' AND ’pain and impairment relationship scale')	41			
Web of Science	HC-PAIRS OR PABS-PT OR (pain attitudes and belief scale) OR (Health care provider's pain and impairment relationship scale)	217			
Selection criteria	- original article - surveyed health care professionals - inclusion of scores of HC-PAIRS or PABS-PT - specified what version used - concerning LBP				

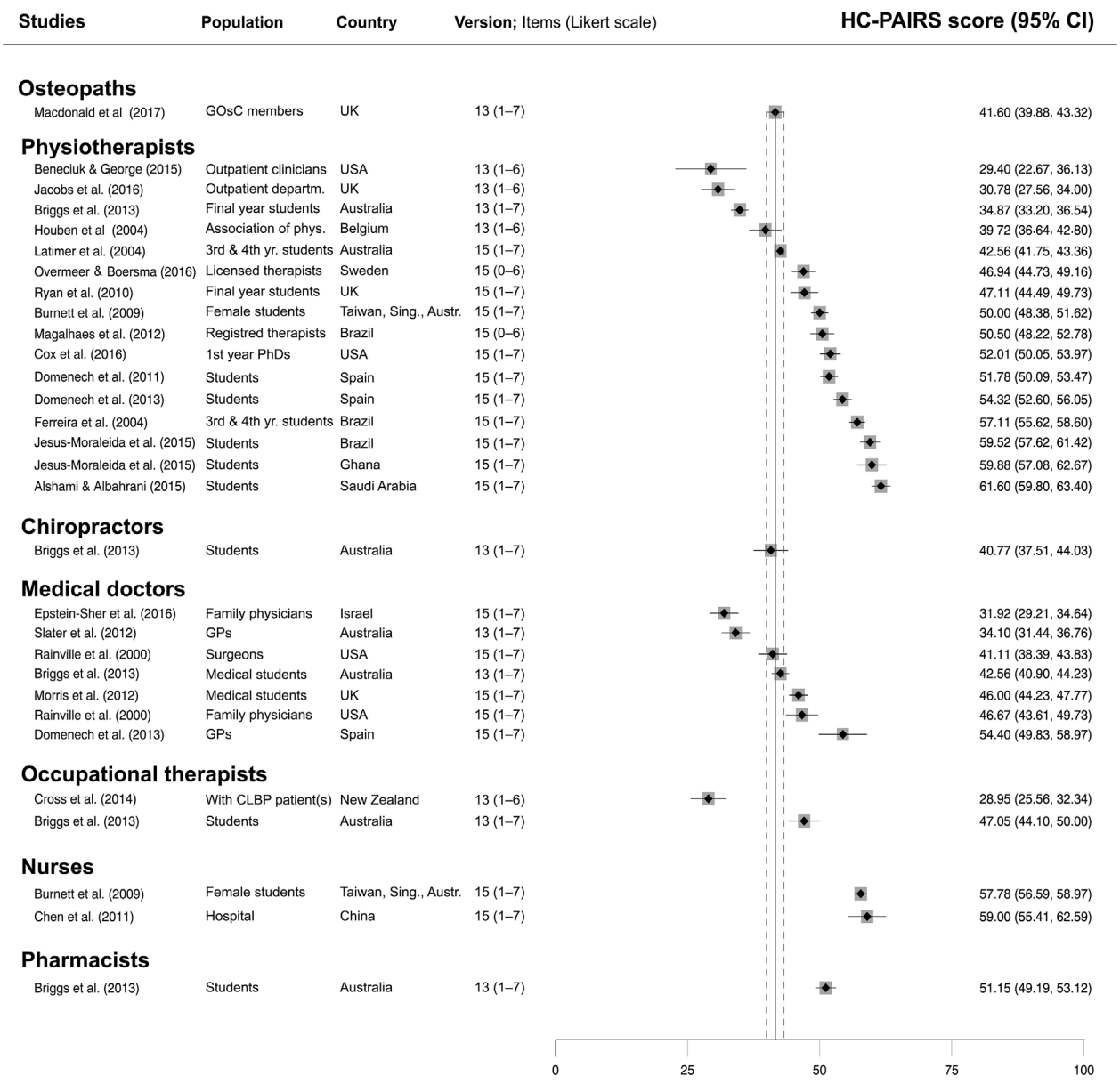

Fig. 2. HC-PAIRS scores.
A higher score indicates an increase in false beliefs on rest and reduced activity.

osteopaths believe that a biopsychosocial approach is too evidence-based and could therefore limit the philosophical aspects of osteopathy [73].

4.4. Limitations

A larger sample size and a higher precision would have made the results more reliable and might have changed the outcome measures significantly. Furthermore, the period when the study was conducted might have influenced the results. The low response rates in comparison to other studies [27] might be due to the participants having received invitations from up to 20 other studies which were run during the same timeframe. This is due to all masters projects at the BSO having the same data collection timeframe. Selection bias, due to low response rate, cannot totally be ruled out. Given response rates are commonly just as low in most other studies we compared our results to, we could be analysing differences in reasons for participating between professionals, rather than differences in perception of pain management.

If the participants would have received a postal invitation, response rates might have improved significantly [74]. Due to lack of funding this was not possible. This study did not account for the possibility of recent changes in osteopathic pre-registration curricula. Only limited data were available from recent graduates and no analysis of curricula content was performed.

Even though the Cronbach's α scores of both instruments were similar to previous studies, the design fault of the PABS-PT reduces its value as a measurement tool for attitudes towards chronic pain management and explains the unsatisfactory Cronbach's α for the biopsychosocial subscale.

The ethnicity of the participants and the timeframe of the studies used in the meta-analyses might have influenced the results and explain some of the variance. The variance might have been influenced even more by participants responding differently to 7-point Likert scales and 6-point Likert scales, since they might have been biased towards choosing a neutral mid-point [4]. The normalisation which was necessary due to the different versions might have influenced the interpretation of the meta-analyses.

It still remains unclear how changes of the scores reflect in

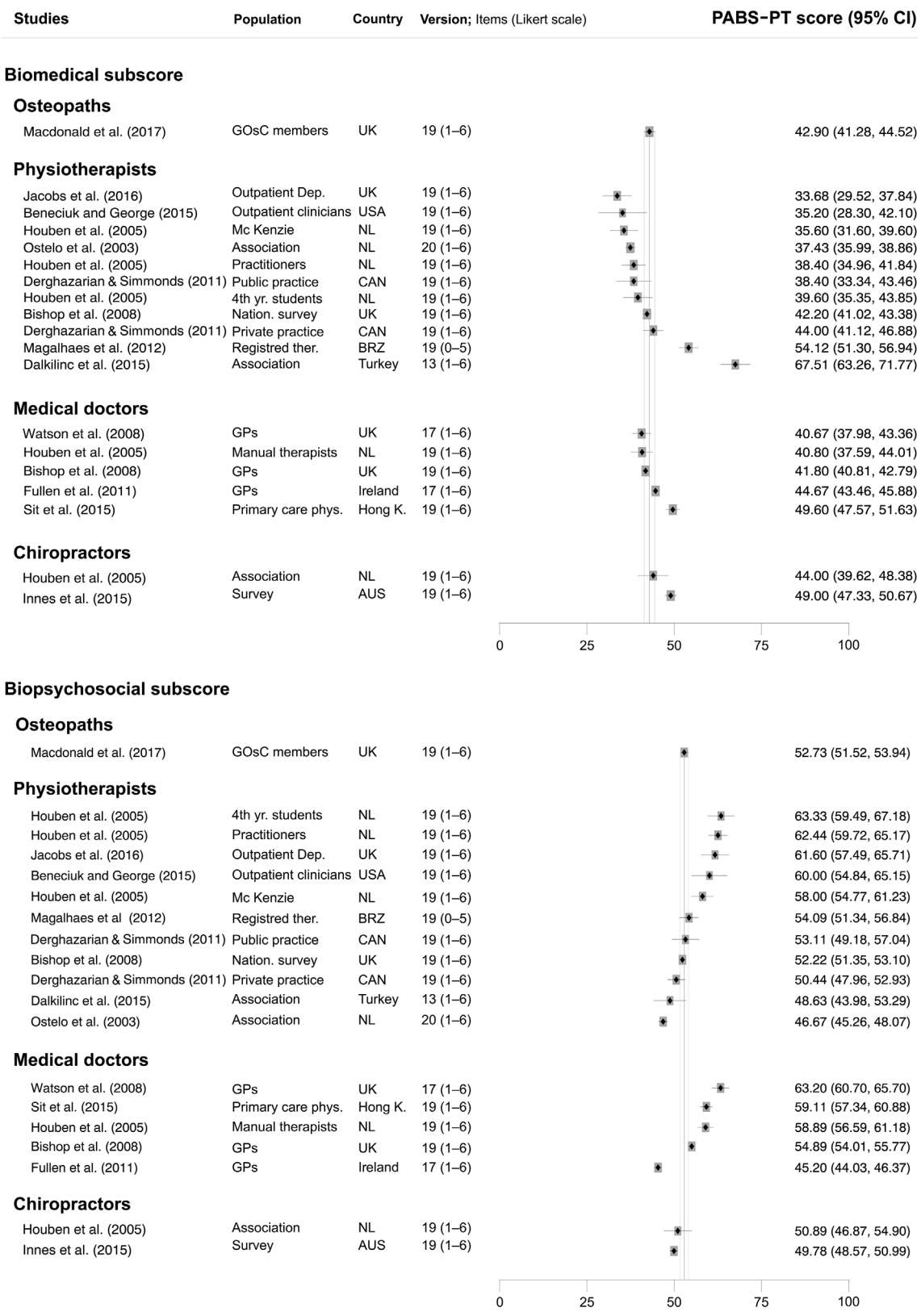

Fig. 3. PABS-PT Biomedical and Biopsychosocial subscores.
- higher scores in the biomedical subscore indicate a lack of knowledge on current pain neurophysiology.
- higher scores on the biopsychosocial subscore indicate increased knowledge on the complexity of pain.

behaviour during clinical encounters, since the results only relate to attitudes and what the practitioners intend to do but not to actual behaviour [28,41]. The results did not provide any indication on clinicians' skills in transposing their knowledge to their patients and what is necessary to shift the beliefs about their personal pain experience, since this was not investigated. Houben et al. [29] recommend

this to be investigated in future studies.

4.5. Suggestions for research

Some questions of the PABS-PT might have to be replaced in future studies in order to improve the psychometrics. Researcher might also want to consider using the ABS-mp developed by Pincus et al. [75]. By separating the PABS-PT into two subscales they might be interpreted as being opposites of each other. This might promote the problem of clinicians perceiving that the biopsychosocial model opposing the biomedical approach.

Future studies should investigate if changes in pre-registration curricula have an effect on the attitudes and beliefs of osteopaths. These studies might indicate that modern pain education is being taught more thoroughly in current osteopathic pre-registration education. This might explain why osteopaths who had graduated more recently, had a decrease in false beliefs towards rest and reduced activity.

Research is needed to investigate what type of education is the most effective and has long term outcomes [10,71,72,76,77]. Further research is needed to evaluate what changes in the scores are necessary to measure clinically significant changes in the behaviour of practitioners and how this affects their patients' attitudes, beliefs, behaviour and recovery times.

5. Conclusion

This study rejects the hypothesis of UK registered osteopaths having a more biopsychosocial approach to treating and managing chronic pain patients in comparison to other healthcare providers. Osteopaths seem to agree that chronic pain is not solely due to physical changes, but are still strongly biomedical in their approach in some aspects of treatment and management. This study supports their ability to engage with psychosocial factors of the patients' pain experience, but shows that it can be improved. Since UK registered osteopaths have a strong tradition of understanding the biomedical domain, and they show potential in providing psychosocial care, they seem to be ideally situated to provide over-arching biopsychosocial care to patients. An increased knowledge of pain would potentially enable osteopaths to bridge the gap between these two seemingly separate domains and help patients understand why they still have their pain and what they can do to improve their lives.

Other information

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Suggested reading

- www.noigroup.com
- www.pain-ed.com
- www.knowpain.co.uk
- www.nhs.uk/Livewell/Pain/Pages/Painhome.aspx
- http://www.physio-pedia.com/Pain_Neuroscience_Education_(PNE)
- A mixed methods evaluation of a third wave cognitive behavioural therapy and osteopathic treatment programme for chronic pain in primary care (OsteoMAP) (https://doi.org/10.1016/j.ijosm.2017.03.005)

Ethical approval

Ethical approval was granted by the British School of Osteopathy's Research Ethics Committee (BSO REC).

Conflict of interest statement

We report a competing interest as JEE is on the editorial board of the International Journal of Osteopathic Medicine. However he had no role in the review or decision making associated with this manuscript.

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