Title: Barriers and facilitators experienced by osteopaths in implementing a biopsychosocial (BPS) framework of care when managing people with musculoskeletal pain – A mixed methods systematic review

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Abstract

**Background:** Clinical practice guidelines commonly recommend adopting a biopsychosocial (BPS) framework by practitioners managing musculoskeletal (MSK) pain. However, it remains unclear how osteopaths implement a BPS framework in the management of MSK pain. Hence, the objective of this review was to systematically appraise the literature on the current practices, barriers and facilitators experienced by osteopaths in implementing a BPS framework of care when managing people with MSK pain.

**Methods:** The following electronic databases from January 2005 to August 2020 were searched: PubMed, CINAHL, Science Direct, Google Scholar, ProQuest Central and SCOPUS. Two independent reviewers reviewed the articles retrieved from the databases to assess for eligibility. Any studies (quantitative, qualitative and mixed methods) that investigated the use or application of the BPS approach in osteopathic practice were included in the review. The critical appraisal skills program (CASP) checklist was used to appraise the qualitative studies and the Mixed Methods Appraisal Tool (MMAT) was used to appraise quantitative or mixed methods studies. Advanced convergent meta-integration was used to synthesise data from quantitative, qualitative and mixed methods studies.

**Results:** A total of 6 articles (two quantitative, three qualitative and one mixed methods) were included in the final review. While two key concepts (current practice and embracing a BPS approach) were generated using advanced meta-integration synthesis, two concepts (barriers and enablers) were informed from qualitative only data.

**Discussion:** Our review finding showed that current osteopathic practice occurs within the biomedical model of care. Although, osteopaths are aware of the theoretical underpinnings of the BPS model and identified the need to embrace the BPS model, various barriers exist that stop osteopaths from using the BPS model in osteopathic clinical practice. Ongoing education and/or workshops may be necessary to enable osteopaths to implement a BPS approach.

Background

Musculoskeletal (MSK) pain conditions such as low back pain, osteoarthritis and tendinopathies have a substantial influence on quality of life (1, 2) and are leading (and growing) causes of disability internationally (3). The economic burden (direct and indirect costs) of MSK pain is significant due to its high prevalence and impact on employment. MSK pain is managed in primary care by a range of different healthcare professions including medical doctors, physiotherapists, osteopaths and chiropractors (4). There is evidence to indicate that many practitioners adopt a biomedical approach to MSK pain where the focus is to diagnose and treat 'patho-anatomical' structures as primary causes of patients' symptoms (5, 6). However, a biomedical model has been shown to be inadequate for managing many MSK pain conditions where no clear pathophysiological diagnosis can be reliably made and there is a complex and person-specific interaction of different factors (7). This approach has resulted in inappropriate usage of imaging and an overuse of costly care that delivers low beneficial value (3). Furthermore, a biomedical approach to MSK pain fails to give primacy to key psychosocial factors such as depression, anxiety, fear avoidance, social isolation and catastrophizing that have been shown to play important roles in the development and recovery of MSK pain and disability (8–10). Consequently, evidence-based clinical practice guidelines (CPGs) recommend that psychosocial factors be assessed and managed in addition to biological factors when treating patients with MSK pain (11, 12).

Osteopaths are one of the groups of primary healthcare professionals who manage MSK pain conditions via a range of conservative interventions including manual therapy, exercise therapy and self-management advice (13). Despite evidence emphasizing the assessment of PS factors in pain population, osteopaths may be inclined to have a greater orientation towards the biomedical rather than the biopsychosocial (BPS) model of care (14–17) and have a relatively low utilisation of CPGs in osteopathic practice (18–20). The reasons for non-adherence to CPG recommendations may include inadequate knowledge, perceived time, skills and confidence to incorporate a psychologically informed approach in people with chronic LBP (21, 22). Further, CPG's often recommend active interventions (e.g. exercise) over or in combination with passive interventions (e.g. manual therapy) the treatment of MSK pain (11, 12), which may be perceived to undermine hands-on manual therapy skills which, for some osteopaths are perceived as core skills which contribute to their professional identity, and may present a possible barrier to behaviour change so that psychologically informed treatment approaches are adopted (23). Factors influencing osteopaths use of BPS approach, has not been systematically reviewed (17). Understanding the enablers and challenges towards implementing BPS approach in osteopathic practice may help toward increased uptake and usage of this framework for optimal patient outcomes.

**Review Question(s)**

- What is the usage of the BPS framework in current osteopathic practice?
- What factors enable or prevent osteopaths to implement a BPS approach into their practice?
What types of interventions would facilitate osteopaths to implement a BPS framework into their practice?

**Methods**

This protocol for this review was published (24) and registered in the International Prospective Register of Systematic Reviews (PROSPERO). Findings are reported in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) guidelines.

**Study Selection**

Studies published from January 2005 onwards from any osteopathic setting (education, private practice, hospital or multi-disciplinary clinic) were included if they investigated the use or application of the biopsychosocial approach in osteopathic practice using quantitative, qualitative and mixed methods. Relevant thesis or dissertations that meet the inclusion criteria were included.

Studies were excluded if they were a previous review (systematic, scoping and narrative), expert opinion commentary, or were published in any language other than English.

**Identifying relevant studies (search process)**

A systematic search strategy was developed to locate studies relevant to osteopathic practice and the biopsychosocial model. A combination of keywords such as ‘manual therapy’, ‘osteopath*’, ‘spinal manipulation’, ‘manipulation, osteopathic’, ‘thrust’, ‘OMT’, ‘biopsychosocial’, ‘BPS model’, ‘patient centeredness’, ‘patient centred approach’, ‘facilitators’, ‘enablers’, ‘challenges’, ‘barriers’, ‘usage’ and ‘implementation’ was used for this purpose. The Boolean operators “OR” and “AND” were used to combine the search terms within and between each of the subject areas, respectively. Table-1 demonstrates the complete search strategy used. The following electronic databases from January 2005 to August 2020 were searched: PubMed, CINAHL, Science Direct, Google Scholar, ProQuest Central and SCOPUS. A secondary search through ‘grey literature’ was also undertaken on ProQuest (Dissertations and Theses), Ethos, open grey, clinical trial registries such as ANZCTR and systematic review protocol registries such as PROSPERO. Further, forward and backward citation searches from included articles or relevant reviews was undertaken to retrieve additional articles (25). The primary investigator (K.S.K.) conducted the electronic search in the above-mentioned databases. All references were exported to Endnote (Version X7; Thomson Reuters, New York)

**Article selection**

Two reviewers (K.S.K. and M.H.) worked independently and screened the titles of the retrieved articles for relevance after removing the duplicates. Following this, K.S.K. and M.H. independently screened the abstracts and full texts of included articles. If a decision could not be reached, H.D. was available for consultation and consensus.

**Data Extraction**

Data were extracted from each study independently by two reviewers (K.S.K. and M.H.) using a standardised template. Extracted data included study aim(s), design, population, findings, and authors’ conclusions. The screening and extraction of data were conducted. Disagreements were resolved by discussion and consensus.

**Quality Assessment (including risk of bias)**

The critical appraisal skills program (CASP) checklist was used to appraise the qualitative studies (26) and the Mixed Methods Appraisal Tool (MMAT) (27) was used to appraise quantitative or mixed methods studies. Two reviewers (K.S.K. and M.H.) independently assessed the quality of each study. Both reviewers recorded their rationale in addition to study ratings to enable comparison. Disagreements were resolved through discussion and consensus. A third reviewer (H.D.) was available if required (though this step was not required for this review).

**Data Synthesis**

Data synthesis is comprehensively described in the published protocol (24). Briefly, meta-analysis was performed using Review Manager (RevMan 5.3) software where it was possible to pool data from two or more studies using the same measure. Thematic synthesis was used for synthesising qualitative data. Qualitative data were imported to NVivo (Version 11; QSR International, Victoria, Australia) and analysed in 3-steps: (1) line-by-line coding, (2) descriptive themes and (3) analytical themes. K.S.K. and H.D. coded all the included articles independently and discussed the synthesis of findings (descriptive themes) and examined the analytical themes from the analysis. An iterative approach was undertaken by moving between the raw data from the original articles to extract analytical themes emerging from the
synthesis. A combination of diagrams and mind maps were used to discuss, debate, and explain the analytical themes. The final analytical themes were derived by consensus among the research team.

Advanced convergent meta-integration was used to synthesise data from quantitative, qualitative and mixed methods studies as done previously (28). Briefly, this involved 5 steps: (1) categorise data sources (2) conduct intra-method analysis-synthesis and mindful comparison (3) conduct inter-method integration (4) organize results and assess fit and (5) draw final conclusions. Steps 2 to 5 were iterative and provided an overview of complex inter-relational connections about the emerging data. The GRADE-CERQual (29) (Confidence in the Evidence from Reviews of Qualitative research) approach recommended by the Cochrane Qualitative and Implementation Methods Group, was used to summarise the level of confidence in synthesised qualitative findings. After assessing each of the four components, overall confidence was graded as high, moderate, low or very low. KSK conducted the critical appraisal process of the review findings in an Excel spread sheet (Microsoft Corp, Redmond, Washington).

Results

Results of the search

Our electronic search yielded a total of 799 articles. Following the removal of duplicates, 549 articles were retained for further screening. After title, abstract, and full-text screening, 6 articles (14, 15, 17, 30–32) from studies were included for final synthesis (Fig. 1). There were no disagreements between the two reviewers (K.S.K. and M.H.). However, a third reviewer (H.D.) was consulted to ensure that one article did not meet inclusion criteria and had to be excluded.

Description of Included Studies

A summary of the included studies is presented in Table 2. In total, 405 osteopaths contributed to the findings, of which, 368 osteopaths responded to questionnaires and 37 osteopaths were interviewed. Studies were all conducted in high-income countries such as the United Kingdom (n = 5)(14, 15, 30–32) and Italy (n = 1) (17). There were 2 QUAN papers (14, 15) that covered attitudes and beliefs; 3 QUAL papers that covered current practice, barriers and enablers for utilizing BPS approach (17, 30, 31); and 1 MM paper that covered all these concepts (32).

Risk of bias in included studies

Two QUAL studies (31) met all of the 10 CASP appraisal items and one study (17, 30) met 8/10 criteria (Table 3).

The two surveys (14, 15) scored a total of 3 out 4 points (75%) on the MMAT tool, and the mixed methods study (32) scored 9 out of 11 points (82%) (Table 4).

Summary of advanced meta-integration synthesis:

Two key concepts (current practice and embracing a BPS approach) were generated using advanced meta-integration synthesis. The key themes, subthemes and variables that were part of the meta-integration are summarized in Table 5.

1: Current Practice

The QUAN variables included ABS-mp, PABS.PT and HC-PAIRS. Three studies (14, 15, 32) had utilised PABS.PT enabling pooling of PABS.PT data that indicated that osteopaths utilize a biomedical approach more (though not statistically significant) than the BPS approach in their clinical practice, refer Fig. 2.

These findings together with QUAL data indicated that the current osteopathic practice is anchored mainly in the biomedical model. Most osteopaths perceived that they were trained to deal with MSK pain and therefore had more confidence in dealing with MSK aspects of a patient’s presentation than non-MSK aspects (17). This led osteopaths to focus their treatment on BM factors rather than broader BPS factors. Some osteopaths explained this as ‘having a structural outlook’ to their treatment approach and efforts were made to identify the ‘tissue(s) causing’ symptoms (30, 33). Hence, for a ‘structural osteopath’ ruling out ‘structural issues’ was misconceived as utilizing a BPS approach, which lead structural osteopaths to believe that they were utilizing some aspects of BPS model and adopt a holistic approach to their treatment. However, the claimed holism was still rooted in biomechanics rather than including psychosocial factors (14, 33). Osteopaths also perceived BPS model as a ‘vague concept’ with a ‘non-specific approach’ because it did not sufficiently focus on structure (31). Furthermore, underestimating psychosocial factors as a reason for patient presentation led to frustrations as osteopaths were either unaware of objective tools to measure PS factors or had access to referral pathways to manage these patients (31). This in turn lead to confusions regarding their role/scope within the health system.

2: Embracing the BPS model
Osteopaths not only believed that the BPS model was ‘everywhere now’ but also believed that it will be the ‘futuristic’ model of care (32). This resulted in a perception that the osteopathic profession needs to catch up with the model as other health professionals such as physiotherapists already using the model. They also believed that public health bodies (e.g. NHS) may prefer practitioners using a BPS approach and therefore osteopaths must embrace it (32). Understanding patient’s perspective enabled the osteopaths to form a positive ‘patient practitioner’ relationship that was not only empowering the patient but also improve their self-efficacy (30). Osteopaths consistently reported that communication plays an important role in establishing a positive and empowering ‘patient-practitioner’ relationship (33). In this context, a good communication comprised of three key attributes (17, 30, 33) (1) listening to the patient’s story, (2) providing reassurance and (3) mindful conversations (17, 30, 33). Therefore, osteopaths were able to appreciate where the BPS model has brought much more to what they were doing in terms of patient management. For example, instead of ‘correcting’ or ‘fixing’ the body through mobilisation, osteopaths explored different aspects in one’s life that have an impact on their symptoms and stop them getting better (33). By understanding what symptoms means for someone and the context, osteopaths felt that their practice had completely changed and evolved towards a BPS approach (32).

Summary of qualitative synthesis:

Two concepts (barriers and enablers) were informed from QUAL only data (17, 30, 31) (refer Table 6), the level of confidence of which were synthesised using GRADE-CERQual. Evidence profile, which includes summaries of the review findings, information on the judgments for each CERQual component underlying the overall CERQual assessment as well as the overall assessment and its explanation have been presented in Table 7. Further, a summary of qualitative findings (SoQF) has also been presented in Table 8.

3: Barriers for implementing a BPS approach

Osteopaths identified several factors that were barriers in implementing a BPS approach. A key barrier was that the osteopaths felt that their undergraduate education was based on the biomechanical-tissue model and focused less on the BPS model (30, 31). Hence, these osteopaths were more confident in managing the biomechanical and postural aspects of the patient’s pain than dealing with patient’s context and situation (17, 30, 33). Lack of contemporary BPS education and resources left osteopaths to adapt an intuition-based approach with little or no clinical reasoning to determine when to/not to apply the BPS model. Without awareness of objective tools (e.g. STarT Back questionnaire) to measure PS factors, osteopaths either avoided or underdiagnosed PS factors as a cause of patient’s symptoms (31). This apparent inability combined with evidence based clinical practice guideline recommendations led osteopaths to perceive that the BPS approach devalues what osteopaths do, and therefore threatens their professional identity (30). The need for a professional identity in turn perpetuated a structural approach (even though osteopaths had a theoretical understanding of the BPS model) as BPS was believed to be ‘outside the scope of osteopathic practice’ (17, 31).

4: Enablers for implementing a BPS approach

Osteopaths identified several factors that enabled them to implement a BPS approach in their clinical practice. A key factor was acknowledging the relevance of assessing PS factors in patient presentation (31, 33). Assessing PS factors in patient presentation further enabled the osteopaths to utilize a broader approach that was patient-centred. Management strategies such as CBT, mindfulness and motivational interviewing facilitated osteopaths to make their clients become self-aware of their condition, thereby, trying not to create dependency on passive therapies (30, 31, 33). Finally, osteopaths reported that learning opportunities such as via continued professional development (CPD,) not only helped them to integrate the BPS model in their practice but also thought that ongoing education and/or workshops will be vital to facilitate osteopaths to implement a BPS approach (32). Osteopaths preferred to have more training in undergraduate or postgraduate, or in professional development courses to facilitate their understanding of PS factors and ability to assess these factors (32, 33). These workshops could even be in the form of weekend CPD’s that covers the basics of the BPS model.

Discussion

Summary

Our review suggests that, despite various guidelines recommending the use of BPS model in clinical practice, current osteopathic practice occurs within the biomedical model of care. Although osteopaths are aware of the theoretical underpinnings of the BPS model and identified the need to embrace the BPS model, various barriers exist that stop osteopaths BPS model use in osteopathic clinical practice. Ongoing education and/or workshops may be necessary to enable osteopaths to implement a BPS approach.

Comparison with existing literature

To our knowledge, this is the first systematic exploration of current use of the BPS model by osteopaths in clinical practice. Our findings suggest that most osteopaths considered acknowledgement patients’ psychosocial concerns to be important and recognised the
importance of managing these because their influence recovery. However, despite having a theoretical understanding of the BPS model, osteopaths struggled to find strategies to incorporate the BPS model into clinical practice. This transitional challenge from theory to practice is consistent with previous findings (30, 34) and across profession such as physiotherapy (21, 35).

Our findings indicate that the current osteopathic clinical practice is largely rooted in the biomedical model of care and aligned with the biomedically orientated views of the body held by some osteopaths (14, 19). These structure dominated concepts highlight the importance that osteopaths ascribed to structural features and things they felt they could measure (36). Osteopaths relied on their gut feeling following observation of non-specific patient behaviours such as posture or the way they talk to assess PS influences and appeared to be unaware of tools for assessing PS factors such as questionnaires or specific questioning. This approach may result in under/overidentification of PS features and missed management opportunities. As a growing body of evidence clearly indicates the role psychosocial factors play in a patient's presentation and/or recovery; it is imperative that they are addressed effectively (5, 37). This can only be possible if these factors are appropriately identified and assessed in the clinical setting (38).

A unique finding of our review was that some osteopaths believed that the BPS model may become the dominant approach in osteopathic practice in future and therefore thought it should be embraced now. These osteopaths believed that working within the BPS model enabled them to use more impactful patient management strategies. Further, osteopaths identified that understanding various psychological approaches such as CBT and mindfulness enabled them to understand the importance of psychological factors and the need to address these factors effectively in their clinical practice. This understanding about various strategies is crucial as a Cochrane review has clearly highlighted that patients with chronic LBP receiving multidisciplinary biopsychosocial rehabilitation programs are likely to experience less pain and disability than those receiving usual care or a physical treatment (39). It is important to note that the psychological care was provided by psychologists in the Cochrane review. However, these findings may be considered as an emerging evidence signalling a paradigm shift from a ‘tissue-causing symptoms’ model towards a ‘person-centred’ management in osteopathy.

A key barrier in utilizing the BPS model was that the model was perceived as a threat to ‘professional identity’ by osteopaths. Several osteopaths (30) considered that their current practice was holistic and therefore consistent with the BPS approach. However, these ‘holistic’ models were ‘biomechanical’ in nature and grounded in a BM paradigm questioning the understanding some osteopaths may have regarding ‘patient centredness’ as identified previously (40).

Consistent with previous findings, osteopaths felt that they had receiving inadequate undergraduate and/or postgraduate training to effectively assess PS factors (30, 31). On the other hand, however, ongoing education and/or workshops may be a facilitator for incorporating the BPS model in clinical practice, which is in line with previous findings (17, 41). Preliminary evidence suggests that an 8-hour e-learning program reduced the osteopaths’ biomedical score and increased the behaviour score of the PABS questionnaire (32). However, it has to be noted that such educational/CPD strategies can be expensive and time consuming, which can deter practitioners from attending such courses (41). There has been an increasing call for incorporating learning about the assessment of PS factors as part of graduate level osteopathic programs (30, 31). However, for successfully incorporating the BPS model into curriculum, it may be important to have structures put in place at undergraduate level and may be important for undergraduate/new graduates to observe patient centred practice/behaviours modelled in professional practice.

Strengths and Limitations

This review had several strengths. We used a comprehensive search strategy that included grey literature to maximise chances of locating all relevant studies representing the phenomena of interest. We published our protocol in advance to promote transparency and adhered closely to this protocol. Two authors independently conducted each major review process to reduce bias and error. We used advanced meta-integration synthesis to enable combination of QUAN and QUAL data and greater confidence in our findings and GRADE CERQual to explain the confidence we had in our review findings.

A key limitation was that our findings are based on a total of just six included studies (14, 15, 17, 30–32). We downgraded confidence in some of our findings for several reasons. In terms of relevance, we had ‘moderate concerns’ as despite being conducted in various settings, all studies were conducted in Europe. Consequently, the relevance of findings for practitioners in other countries and different settings is unknown. In terms of adequacy, we located quotes relevant to the concepts that provided rich data. However, it has to be noted that only 3 QUAL studies (17, 30, 31) contributed to the data that reduces the confidence in our findings. We included studies with osteopaths and osteopathic students. Although questions could be raised, the themes that emerged from the studies were consistent and may improve the coherence of the findings. Another limitation is that we only included English language studies leading to language bias. One member of the current review team was part of authorship of 2 studies included in the review, though did not have any role in the data extraction and
critical appraisal process. Furthermore, most QUAL studies were done in only one institution (UCO) which may limit the generalisability of our findings.

**Implication for practice**
Though our findings provide evidence of an emerging acknowledgement of the importance of BPS model of care, the biomedical model seems to still dominate osteopathic clinical practice. Hence, osteopaths may miss opportunities to enhance health of their clients by not being able to identify and manage PS factors. A paradigm shift therefore may be necessary as clinical practice guidelines (11, 12) commonly recommend assessment and treatment of physical and psychosocial factors. An important finding from this review was a lack of understating of psychosocial factors and their assessment by osteopaths which was in turn associated this with lack of education at an undergraduate level. Importantly, osteopaths who participated in online education and/or had exposure to the BPS model felt that they had access to more treatment strategies (32). Hence, there is a pressing need for osteopathic education of psychosocial assessment to be reviewed and strengthened including research that may review the core curricula of osteopathic educational programs across various countries.

**Implication for research**
There is dearth of osteopathic research related BPS aspects of practice, particularly outside of the UK. Therefore, it may be of important priority for research on BPS model of care in osteopathic practice to be undertaken in other countries. This may help us to identify unique factors such as culture, patient demographics, health policies, etc that may influence osteopaths to using BPS model in their clinical practice. Future research may also identify the most effective ways to teach osteopaths/students about PS assessment and management in osteopathic clinical practice.

**Conclusion**
Our review findings suggest that osteopaths are aware of the theoretical underpinnings of the BPS model and identified the need to embrace the BPS model. Despite the understanding of the BPS model, biomechanical/biomedical model of care still predominated osteopathic clinical barriers. Various barriers exist that stop osteopaths BPS model use in osteopathic clinical practice. Therefore, ongoing education and/or workshops may be necessary to enable osteopaths to implement a BPS approach.

**List Of Abbreviations**
ABS-mp – Attitudes to Back Pain Scale for musculoskeletal practitioners
BM – Biomedical
BPS – Bio-Psycho-Social
CASP - Critical Appraisal Skills Program
CPG - Clinical Practice Guidelines
HC-PAIRS – Health Care Providers’ Pain and Impairment Relationship Scale
MMAT - Mixed Methods Appraisal Tool
MSK - Musculoskeletal
NSLBP – Non-Specific Low Back Pain
PABS – PT - Pain Attitudes and Beliefs Scale for Physiotherapists
PRISMA - Preferred Reporting Items for Systematic reviews and Meta-Analysis
PROSPERO - Prospective Register of Systematic Reviews
PS – Psychosocial
QUAN - Quantitative
QUAL - Qualitative
UK – United Kingdom.

**Declarations**

**Ethics approval and consent to participate**

Not required as this was a systematic review

**Consent for publication**

Not applicable. No individual data used

**Availability of data and materials**

Not applicable

**Competing interests**

The author’s declare no competing interests.

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**Authors’ contributions**

KKS conceived the design/need for the review, collected data, analyzed data (including coding and thematic analysis) and took the lead in writing the manuscript. OT and BD provided critical inputs on the design of the review and helped develop the research questions. MH was the second reviewer. HD was the third reviewer, coded and generated themes. WS and ST provided critical feedback. All authors discussed the review structure, reviewed, contributed, and approved the final manuscript.

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Not Applicable

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Tables

Table 1

| Search strategy (used for CINAHL database) |
|-------------------------------------------|
| Phase 1 | Phase 2 | Phase 3 |
|------------------------------------------------|
| p. Osteopath* | 1. Exp. BPS Model | 1. Usage |
| p. Manual therapy | 2. Biopsychosocial* | 2. Implementation |
| Osteopathic Manipulative Treatment (OMT) | BPS Framework/care | 3. Facilitator |
| Manipulation | 4. Patient centeredness | 4. Enabler |
| Rust | 5. Patient care | 5. Barrier |
| Mobilization | 6. Patient centered approach | 6. Challenges |
| / 1-6 | 7. Clinical Practice Guidelines | 7. Attitudes |
| 8. Musculoskeletal Pain/therapy [Mesh] | 9. Or/18-24 | 9. Randomized clinical trial/ |
| 9. Or/8-15 | 10. Controlled clinical trial/ | 11. Qualitative Study |
| 10. 7 AND 16 | 11. Mixed Methods Study | 13. or/26-29 |
| | 14. 25 AND 30 | 15. 17 AND 31 |

**Filters:** The following filters were applied: **Year:** Jan 2005 to August 2020; **Language:** English.

Table 2
| Study (Country) | Methods/Study Type | Study Settings | Participants | Outcome measure/method of analysis | Main findings |
|----------------|-----------------|----------------|--------------|-----------------------------------|--------------|
| (14) (UK)      | Cross-sectional Survey | Online questionnaire (National level) | UK Osteopaths N = 107 M = 51 F = 56 | PABS-PT (BM and BPS scores) Descriptive and inferential statistics | UK osteopaths hold strong BM beliefs about pain, however, with an acceptance of the BPS approach |
| (15) (UK)      | Cross-sectional Survey | Online questionnaire (National level) | UK Osteopaths N = 216 M = 118 F = 98 | PABS-PT HC-PAIRS Descriptive statistics | Osteopaths have skills to engage with psychosocial factors of the patients' pain experience. However, training is required to increase their expertise in knowledge of chronic pain and its management. |
| (30) (UK)      | Semi-structured interviews (individual) | Osteopathic educational institution | UK Osteopaths N = 8 M = 4 F = 4 | Constructivist grounded theory | Osteopaths viewed BPS model as essential in navigating a person's experience of pain, however, the integration of the BPS model into clinical practice is fraught with obstacles. |
| (17) (Italy)   | In-depth semi-structured interviews (individual) | Controlled interview setting | Italian Osteopaths N = 11 M = 9 F = 2 | Grounded theory | Italian osteopaths displayed a greater orientation towards the biomedical dimension of chronic pain |
| (31) (UK)      | Semi-structured interviews (individual) | Teaching centre (university) | UK Final Year Osteopathic Students N = 6 M = 3 F = 2 | Constructivist grounded theory | Osteopathic students assessed for PS factors throughout the case history and tend to rely on instincts. However, barriers exist for managing PS factors when treating patients with NSLBP. |
| (32) (UK)      | Mixed Methods Study | Online e-learning program Educational institution | Quantitative Strand N = 45 Qualitative Strand N = 9 | PABS ABS-mp Thematic Analysis | A 6-week e-learning programme was feasible. The BPS approach was not structural enough. |

ABS-mp – Attitudes to Back Pain Scale for musculoskeletal practitioners, BM – Biomedical, BPS – Bio-Psycho-Social, F = Female, HC-PAIRS – Health Care Providers’ Pain and Impairment Relationship Scale, M = Male, NSLBP – Non-Specific Low Back Pain, PABS – PT – Pain Attitudes and Beliefs Scale for Physiotherapists, PS – Psychosocial, UK – United Kingdom.

Table 3
Risk of Bias of Included Studies Using Critical Appraisal Skills Program (CASP) Checklist
| Study          | Aims | Method | Research Design | Sampling | Data Collection | Reflexivity | Ethical Issues | Data Analysis | Findings | Value of Research |
|---------------|------|--------|-----------------|----------|-----------------|-------------|----------------|---------------|----------|-------------------|
| Abrosimoff, 2020 | Y    | Y      | Y               | Y        | Y               | CT          | Y              | Y             | Y        | Y                 |
| Delion, 2018   | Y    | Y      | Y               | Y        | Y               | Y           | Y              | Y             | Y        | Y                 |
| Formica, 2017  | Y    | Y      | Y               | Y        | Y               | Y           | Y              | Y             | Y        | Y                 |

Y - Yes; CT - Can’t Tell.

**Table 4**

Risk of Bias of Included Studies (CASP and MMAT scores)
| Qualitative Strand | Draper-Rodi (2016) | MacDonald et al. (2018) | Bar-Zaccay et al. (2018) |
|--------------------|--------------------|------------------------|-------------------------|
| 1.1. Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)? | Yes | N/A | N/A |
| 1.2. Is the process for analysing qualitative data relevant to address the research question (objective)? | Yes | N/A | N/A |
| 1.3. Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected? | Yes | N/A | N/A |
| 1.4. Is appropriate consideration given to how findings relate to researchers’ influence, e.g., through their interactions with participants? | Yes | N/A | N/A |

| Quantitative Strand | | | |
|--------------------|------------------------|-------------------------|
| 4.1. Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)? E.g., consider whether (a) the source of sample is relevant to the population under study; (b) when appropriate, there is a standard procedure for sampling, and the sample size is justified (using power calculation for instance). | Partially yes (no power calculation) | Yes | Yes |
| 4.2. Is the sample representative of the population understudy? E.g., consider whether (a) inclusion and exclusion criteria are explained; and (b) reasons why certain eligible individuals chose not to participate are explained. | Yes | Yes | Yes |
| 4.3. Are measurements appropriate (clear origin, or validity known, or standard instrument)? E.g., consider whether (a) the variables are clearly defined and accurately measured; (b) measurements are justified and appropriate for answering the research question; and (c) the measurements reflect what they are supposed to measure. | Yes | Yes | Yes |
| 4.4. Is there an acceptable response rate (60% or above)? The response rate is not pertinent for case series and case report. E.g., there is no expectation that a case series would include all patients in a similar situation. | No (response rate - 8%) | No | No |

| Mixed methods | | | |
|----------------|------------------------|-------------------------|
| 5.1. Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)? | Yes | N/A | N/A |
| 5.2. Is the integration of qualitative and quantitative data (or results*) relevant to address the research question (objective)? | Yes | N/A | N/A |
| 5.3. Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results*) in a triangulation design? | Yes | N/A | N/A |
| Total score | 9/11 (82%) | 3/4 (75%) | 3/4 (75%) |

**Table 5: Advanced meta-integration: Synthesis of QUAN, QUAL and MM data**
| Concept | Quan (variable) | Qual (sub-theme) | Supporting quotes from included studies | MM-Quan (Variable) | MM-Qual (sub-theme) | Integration Concepts (with Themes and subthemes contributing) |
|---------|----------------|----------------|----------------------------------------|-------------------|--------------------|-------------------------------------------------------------|
| **Current Practice (Attitude/Belief towards BPS)** | PABS.PT | Strong BM Belief | *And I felt my training was very much like that [mechanically focused] ....I can’t say we weren’t taught these things [BPS model]* | PABS.PT | BPS was not structural enough | **Concept 1:** Current Practice - Rooted in BM Model | **Theme 1:** Anchored in BM model
Trained to deal with MSK pain Structural Outlook **Theme 2:** BPS - non specific approach Vague and non-specific concept definition Underestimating PS factors |
| **Towards a BPS model of care** | HC-PAIRS | Pain education Pain neuroscience Patient empowerment Embrace BPS - Aligning with contemporary practice Patient empowerment | “so with the journey of gaining health ... it is to empower people so that they can take charge and control of their bodies and their health and their life” “It seems to be absolutely everywhere at the moment. It seems to be the way the NHS is going in this country, the way physios are going in this country so I think it’s something we | Knowledge about BPS was a transformative experience | **Concept 2:** Towards a BPS Model of care | **Theme 3:** Embrace the BPS approach Futuristic model Foundational Knowledge - pain and neuroscience **Theme 4:** Therapeutic |
| Improve self efficacy | need to embrace - that we need to be very aware of”
| Understanding patient perspective | “And also trying to move away from, you know, ‘Once your right SIJ is going to move well, you are going to feel much better’, sort of thing,
| Listening to patient stories | having a, sort of, more context, more talk around their context, rather than just their body’”
| Providing reassurance | “The skill to reassure and keep patients calm is very important, and represents also a starting point in the management of chronic patients, especially if they are anxious or depressed”
| BPS-Added Value Changed Practice | “We osteopaths are very different from the allopathic doctor; we establish with the patients a more superior verbal relationship”
|  | “We have a verbal and nonverbal conversation with the patients, especially through the touch and correct use of the words. The communication and the words have to be weighed and carefully evaluated”
|  | “I think that the therapeutic relationship is fundamental when I approach chronic patients. In any case, there are a lot of jobs to do, especially while searching to share outcomes with patients”
|  | “Listening, querying, questioning patients- in a way I’m questioning their beliefs, their thoughts in a way that they may think actually, ‘why am I doing that?’ I then offer them different approaches”
|  | “I think it could affect it in terms of their pain perception, so the pain processing, so where they interfere with kind of sensitisation, or altering descending inhibition within the central nervous system, or really focusing on pain, which can change their experience of it”
|  | “The patient's active role is essential, because they are the main actors of this therapeutic relationship. I can help them with my treatments, but they are living in pain, and it is a partnership that we have”
|  | “I think one of the biggest skills is being able to sync...”

**Themes:**

- **alliance**
- **patient empowerment**
- **improve self-efficacy**
- **understanding patient perspective**

**Practice**

- **Communicate as a key role**
- **BPS-Added Value Changed**
with the patient regardless of who they are and how they are and just work it out together”

BM – Biomedical, BPS – Bio-Psycho-Social, HC-PAIRS – Health Care Providers’ Pain and Impairment Relationship Scale, NSLBP – Non-Specific Low Back Pain, PABS – PT - Pain Attitudes and Beliefs Scale for Physiotherapists, PS – Psychosocial.

Table 6:
Qualitative Thematic Synthesis
| Concept | QUAL - (Sub-themes) | Concepts (with Themes and subthemes contributing) | Supporting quotes from included studies |
|---------|---------------------|--------------------------------------------------|-----------------------------------------|
| Barriers | Undertrained/underprepared Lack of clinical reasoning Threat to professional identity Intuition based approach to PS factors Lack of tools to measure PS factors Avoid/underdiagnose PS Factors Discordant with osteopathic beliefs Not within my professional scope Lack of resources Listen but still do bio Lack of contemporary BPS Education | Concept 3 - Barriers for implementing a BPS approach **Theme 7:** Undertrained to apply BPS model Lack of contemporary BPS education Intuition based - lack of clinical reasoning Lack of resources **Theme 8:** Inability to diagnose Lack of tools Avoid/underdiagnose PS Factors **Theme 9:** Threat to professional identity Discordant with osteopathic philosophy Not within scope Listen but still address biomechanical issues | “And I felt my training was very much like that [mechanically focused] I can’t say we weren’t taught these things [BPS model]. We were exposed to them but I think almost too early in the course. So by the time you come to third/fourth year in clinic [exams], it’s all in the background, it’s all gone” “My undergraduate training paid little attention to this [BPS] model. I feel more comfortable to manage biomechanical and postural aspects of the patient’s pain. I think that BPS model is valid with respect to the chronic pain management, but I have no competence and knowledge to apply this model in my practice” “Osteopathy is removing barriers to function in the classical osteopathic sense ... we've lost the way trying to be what people expect; respectable, acceptable, payable by the state we don't put our foot down and stand for the principles of osteopathy” “I have 4 boxes which I tick one or more of these [pain mechanisms], of which I think is going on with that patient, and by this time I am past the psychosocial, I’m on to bio now” “I have a little knowledge of this [BPS] model. I have no competence to evaluate other patient's context. Of course I think that such factors are important in the presentation but I do not have the confidence to manage these situations” “I leave the assessment for BPS to my own understanding and my own perception of the person as a whole; I don’t think I have any structured way of assessing for BPS factors.” “you could say the profession is in an identity crisis because we're told we can be the practitioner we want to be ... It’s very broad which makes me excited” “We have to take into account also the lack of training in pain management and communication inside the undergraduate curricula in Italy. In fact, some aspects are poorly covered and under explored” “I initially look for those body language cues and how they present themselves, then how they verbalise, what they are feeling in term of what it feels like to them” “I don't particularly have a guide, I mean you do have screening tools, which are probably efficient, like STarT Back, which are effective, but I don't use it” “the whole structure governs function thing, ...., unfortunately that seems to be the one mantra that everyone knows and it's probably the worst because it’s, it sets everything up to become dualist so that, you know, there's no room for psychosocial stuff” “I'm really questioning myself about which tools a student or a qualified osteopath has to assess for biopsychosocial symptoms?” |
Enablers
- CBT/Motivational interviewing/mindfulness
- Funding and EBP
- Adopting a blended approach
- CPD
- Opportunities/workshops
- Implementing BPS-exemplars
- Self-awareness of clients
- Superior to GP
- Palpation skills

Concept 4: Enabler for implementing a BPS approach

Theme 10: Acknowledging and managing PS factors
- Acknowledge PS factors
- Management strategies
- Self-awareness of clients

Theme 11: Education/CPD
- Ongoing education
- Workshops
- e-intervention

“Our job is to understand their reality, the patient reality, and find out how they come to that point”
“If we are talking about stress, I might suggest mindfulness, if we are talking about depression, I will push my patient to go out with friends and I will tell the patient to do activities very good for the LBP, to try to engage the patient in the treatment with me in the room, but also engage the patient outside with a personal social life, aiming at doing what the patient likes”
“[on my desk] ‘I’ve got a note which says, ‘tell me your story’’”
“Introduce them to pain education, educate them through kind of pain is not equal to tissue damage, and stuff like that, I think it’s a good way of managing it … talk about stress and its effect on the nervous system, kind of using analogy to make in a way this is easy to understand as possible”
“So, for that patient, strongly nociceptive patient, I would probably offer hands-on because there might be some sort of nociceptive input from somewhere, but I would also provide some form of, CBT or motivational interviewing or something for these psychosocial factors to try to decrease the risk of developing chronic pain for that patient”
“I use mindfulness techniques, box breathing techniques, advice on lifestyle, and advice on exercises, anything that is relevant, that can influence the social side or the psychological side, that would then be beneficial, impact on the LBP”
“I’m interested in the crossover between psychotherapy and body work, getting through the layers of the body … working with the mind through that hands-on approach”
“[The course] has changed in some of the language maybe that I would use with patients and just re-emphasizing thought positives and maybe not using quite so much medicalised language”

BM - Biomedical, BPS - Bio-Psycho-Social, CBT - Cognitive Behavioural Therapy, CPD - Continuous Professional Development, EBP - Evidence Based Practice, GP - General Physician, LBP - Low Back Pain PS - Psychosocial, UK - United Kingdom.

Table 7
CERQual Evidence Profile
| Summary of review Finding | Studies Contributing to the review finding | Methodological Limitations | Coherence | Adequacy | Relevance | CERQual assessment of confidence in the evidence | Explanation of CERQual assessment |
|---------------------------|------------------------------------------|---------------------------|-----------|----------|-----------|-----------------------------------------------|---------------------------------|
| Barriers for utilizing the BPS model in clinical practice: Osteopaths working in Europe identified key barriers in utilizing the BPS model that included lack of education and/or diagnostic tools. Some osteopaths perceived the BPS model as a threat to their professional identity. | (17, 30, 31) | No or Very Minor Concerns | Moderate Concerns (only three studies offering thin data) | Moderate Concerns (partial relevance as studies were done only in Europe and varied settings including regulation) | Moderate Confidence | Three studies with no methodological limitations, no concerns about coherence, limited, thin data from 2 countries, moderate concerns about adequacy and relevance. |
| Enablers for utilizing BPS model in clinical practice: factors that may enable/facilitate the use of BPS model by osteopaths include acknowledging PS factors, management strategies and CPD courses | (30, 31) | No or Very Minor Concerns | Moderate Concerns (some concerns about fit between the data from primary studies and the review finding) | Moderate Concerns (only two studies offering thin data) | Low Confidence | Two studies with minor methodological limitations, minor concern about coherence, limited, thin data from 2 countries, moderate concerns about adequacy and relevance. |

Table 8
CERQual Summary of Qualitative Findings

| Summary of review Finding | Studies Contributing to the review finding | CERQual assessment of confidence in the evidence | Explanation of CERQual assessment |
|---------------------------|------------------------------------------|-----------------------------------------------|---------------------------------|
| Barriers for utilizing the BPS model in clinical practice: Osteopaths working in Europe identified key barriers in utilizing the BPS model that included lack of education and/or diagnostic tools. Some osteopaths perceived the BPS model as a threat to their professional identity. | (17, 30, 31) | Moderate Confidence | Three studies with no methodological limitations, no concerns about coherence, limited, thin data from 2 countries, moderate concerns about adequacy and relevance. |
| Enablers for utilizing the BPS model in clinical practice: European osteopaths identified various factors that may enable/facilitate the use of BPS model in clinical practice including acknowledging PS factors, management strategies and CPD courses | (30, 31) | Low Confidence | Two studies with minor methodological limitations, minor concern about coherence, limited, thin data from 2 countries, moderate concerns about adequacy and relevance. |
Figures

Figure 1
PRISMA flow diagram of included studies

| Study or Subgroup | BM Mean | SD | Total Mean | SD | Total Weight | N, Fixed, 95% CI | BM Mean | SD | Total Mean | SD | Total Weight | N, Fixed, 95% CI |
|-------------------|---------|----|------------|----|--------------|-----------------|---------|----|------------|----|--------------|-----------------|
| Bar-Jaccay 2018   | 33.4    | 6.3| 125        | 31.9        | 4 | 125 | 35.4% | 0.50 [0.01, 1.01] |
| Dagee-Rodi 2018   | 35.3    | 6.67| 23 | 29.86      | 5.02 | 23 | 5.9% | 5.44 [2.22, 8.66] |
| McDonald 2018     | 31.37   | 7.148| 278 | 32.72      | 4.9125 | 278 | 58.7% | -1.35 [-2.37, -0.33] |

Total (65%) (CI)
Heterogeneity Chi² = 17.75, df = 2 (P = 0.001); I² = 69%
Test for overall effect Z = 0.75 (P = 0.45)

Figure 2
Meta-analysis of BM vs BPS approach adopted by osteopaths as indicated by PABS.PT scores.