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Introduction

Global Burden of Disease data indicate that musculoskeletal conditions are among the greatest causes of years lived with disability [29; 72]. Between 1990 and 2016, disability-adjusted life years for musculoskeletal conditions increased by 61.6% (19.6% between 2006 and 2016) [9]. In spite of escalating health care costs, musculoskeletal pain is a problem that current management approaches have not been able to solve [39]. In our health care environment, physiotherapists are common primary care providers for people with musculoskeletal pain.

Most current clinical practice guidelines recommend managing musculoskeletal conditions from a biopsychosocial perspective [40; 55]. Whereas physiotherapy care has traditionally had a structural /biomechanical focus, more recently physiotherapist-led interventions have emerged that target the biopsychosocial components of an individual's pain experience, including physical, psychological, social and lifestyle factors [23]. Another term used in this context is psychologically informed physical therapy, described by Main and George [41] as a conduit between traditional biomedically-based, physical impairment-focused physical therapy practice and cognitive-behavioral approaches developed originally to treat psychological conditions. While some of these interventions delivered by physiotherapists show promise in the management of musculoskeletal pain conditions, their effect sizes generally remain small [61].

Physiotherapists have traditionally received biomedical training [21; 55], but recently there has been a shift towards more biopsychosocially-oriented training [41]. Training in biopsychosocial approaches often involves a change in physiotherapists' attitudes and beliefs. However, changing practice behaviors and patient outcomes seem to be more difficult to achieve and the implementation of new evidence-based methods and guidelines has been challenging [22; 32; 37; 53]. A finding of a recent systematic review was that many physiotherapists often do not follow guidelines for management of musculoskeletal pain [73]. For example, Stevenson et al. [62] found that physiotherapists' management of low back pain remained relatively unchanged after an evidence-based education program (5 hours). In contrast, a training intervention for physiotherapist-led training in pain coping skills, which resulted in excellent physiotherapist adherence and patient outcomes, was very time intensive, with each participant spending up to 150 hours training and supervision [7; 10]. This might not be feasible for wider implementation or, alternatively, may require recognition that long training might be required and therefore needs to be accommodated. Furthermore, despite the promising results, the participating physiotherapists had concerns about their scope of practice

and were not confident about delivering the more cognitive aspects of the program [48]. It has also been suggested that the factors behind the modest effect sizes of biopsychosocial physiotherapy interventions may be inadequate training and poor treatment fidelity [34]. Although a range of theories explain behavior change developed within the social and behavioral sciences, there is still a lack of understanding about how successful interventions work, that is, which behavior change processes are responsible for the change [45]. Subsequently, the optimal process of training physiotherapists in a way that leads to changes in clinical practices and patient outcomes remains unclear [21].

Although physiotherapists recognize the value of biopsychosocial interventions and some use them in practice [2; 18], they only partially recognize psychosocial challenges, and stigmatize patients who display these factors [64]. Furthermore, physiotherapists frequently lack confidence in this approach and do not feel adequately trained to deliver these interventions [2; 18; 64]. Driver et al. (2017) report several barriers to adopting these interventions in physiotherapy practice, such as lack of knowledge, time constraints, and traditional expectations of the physiotherapist's role [18]. They recommend further research to address how to overcome these barriers and effectively employ psychological techniques in clinical practice. Previous systematic reviews [2; 18; 64] have explored physiotherapists' views of psychological interventions in general, but have not related them to training interventions. It would be helpful to understand whether receiving training and implementing these interventions in clinical practice leads to a change in the challenges reported by previous reviews.

To better understand the difficulties that physiotherapists face while implementing biopsychosocial interventions, as well as the process of change physiotherapists go through while learning these approaches, it is important to gain insight into how, after participating in existing training, the physiotherapists (i) perceive the learning process during the training program, (ii) perceive integrating a biopsychosocial approach into their clinical practice, (iii) perceive the barriers they encounter while implementing biopsychosocial care in clinical practice, and how (iv) a shift towards a biopsychosocial approach changes how physiotherapists see their professional role. An increasing number of qualitative studies have explored physiotherapists' perceptions of learning and integrating these approaches into clinical practice; however, no review has systematically integrated these findings.

Qualitative syntheses are relatively new in field of physiotherapy and only one metasynthesis was conducted before 2011 [36]. Since then, a number of qualitative syntheses have been published (e.g.[11; 50]) as they are recognized as necessary tools to capture the increasing volume of qualitative

research [36; 38; 58]. Qualitative metasynthesis brings together primary qualitative research findings and examines them with a new question. Subsequent findings can prompt new understandings of clinical practice, identify research gaps, and contribute to developing new clinically-oriented theories and implementation interventions in health care [58].

Therefore, the aim of the study was to perform a systematic review and metasynthesis of qualitative studies that have explored physiotherapists' perceptions of learning and implementing a physiotherapist-led biopsychosocial intervention to treat musculoskeletal pain conditions.

Research question: What are physiotherapists' perceptions of learning and implementing biopsychosocial interventions to treat musculoskeletal pain conditions?

Materials and methods

This review was registered in the PROSPERO database (registration number: CRD42019127895, submitted for registration on 8 March 2019). The report of this review followed the guidelines of the ENhanced Transparency in Reporting the synthEsis of Qualitative research (ENTREQ) [69]. A number of approaches to synthesizing qualitative data have been proposed [36] such as metastudy [54], meta-ethnography [49] and metasynthesis [58]. We decided to conduct a metasynthesis based on principles described by Sandelowski and Barroso [58], since they have been used in our field previously [50] and this approach is suitable for synthesizing data from studies that have used a variety of methodologies [5]. Our process of conducting a metasynthesis included a systematic search strategy, a critical appraisal of the included studies, and classifying and synthesizing the findings [58].

Inclusion criteria

Studies were included if they used qualitative methods for both data collection and analysis; were written in English; were peer-reviewed; included physiotherapists who had undergone training with a biopsychosocial approach and had started implementing it in practice to treat musculoskeletal conditions; and explored learning and implementing biopsychosocial interventions that inclusively target both physical and psychosocial factors, underpinned by an active physiotherapy intervention. The same criteria were used for the mixed method studies, but they were only included if qualitative data were analyzed separately and only that component was included in our analysis.

Search strategy and identification and selection of included papers

Two independent researchers searched the following electronic databases: MEDLINE, EMBASE, CINAHL, ERIC, PsycInfo, SportDiscus and Sociological abstracts (from inception to March 2019). In addition, we manually searched the reference lists of the identified studies. The comprehensive set of search strategies included both thesaurus terms and free-text terms, as recommended by Lachal et al. 2017, to maximize both sensitivity and specificity [36; 60]. The authors developed the strategy with support from a university librarian and adapted it to the search language and syntax of individual databases. Our search strategy used four groups of keywords: qualitative research methodologies, physiotherapists as the treating healthcare professionals, related to training or learning, and biopsychosocial or musculoskeletal pain as the condition of interest. To optimize the sensitivity and specificity of the search, two individual searches were combined because adding keywords related to the term biopsychosocial excessively restricted the sensitivity of the initial search. The full search strategy is detailed in Appendix 1.

All the results of the database searches were entered into bibliographic management software (EndNote X8, Thomson Reuters, New York, NY) to remove duplicates and screen the studies. Two authors (RH and PS) independently screened titles and abstracts and performed a full-text review to identify which studies met our inclusion criteria. Disagreements relating to the inclusion/exclusion of studies were resolved through discussion.

Methodological quality assessment

We chose the Critical Appraisal Skills Programme checklist (CASP) for qualitative studies [1] due to its extensive use in other qualitative systematic reviews in the field of physiotherapy [19; 50; 64] and because it addresses most of the principles and assumptions underpinning qualitative research. Two reviewers (RH & PS) independently appraised the included studies, and disagreements were resolved through discussion or by consulting a third reviewer. Articles were not rated numerically or excluded on the basis of the CASP criteria because no clear guidelines for excluding qualitative studies from synthesis have been developed or tested and some of the criteria are not relevant to all methodological approaches [38; 67].We conducted a sensitivity analysis showing the contribution of each of the included studies to each of the subthemes [67]. (Appendix 2)

Data Extraction

A data extraction form was developed on the basis of previous studies in the field, and the same information was extracted from each included paper: a description of the study population, year of publication, country, study setting, sample size, gender, age, years of experience as a physiotherapist, previous training, description of the training intervention, target population of the intervention, methods of data collection, methodological approach, aims of the study, and fulfillment of trustworthiness criteria.

Data analysis

We followed the process of thematic synthesis described by Thomas & Harden [67]. The first step of the process was to extract the data from the included studies and read this data several times to become familiar with the topics. Data from the results or findings sections of manuscripts, including descriptions of findings and quotations, were extracted and transferred onto a Microsoft Excel spreadsheet (Microsoft Corp, Redmond, Washington, USA) for qualitative metasynthesis. One study [34] had additional quotations as an appendix and we included these in the analysis. The original themes were not used in our analysis, but the quoted participant statements and descriptions of findings were used to formulate new themes from the data of all included studies instead. We only used data that considered physiotherapists' perceptions during and after the training, while the views that were collected before the training were not included from the studies that had interviewed physiotherapists at multiple time points. Subsequently, line by line coding was performed and each sentence was assigned one or multiple codes to describe the content of this finding. The initial coding of the data was conducted by the first author (RH) and cross-checked by the second author (PS). The derived codes were compared and contrasted to find similarities and differences and grouped where appropriate. The grouped codes were analyzed to find patterns and overlap, to form a set of themes capturing the content of all the findings and to describe and illuminate the physiotherapists' experiences of learning and integrating biopsychosocial interventions into their clinical work. All the stages were completed simultaneously in an iterative manner rather than sequentially [58]. All the authors reviewed, discussed and critiqued the groupings, to ensure the homogeneity of the codes and that the findings were consistent with the primary data. The presented quotations from the original studies enhance the reliability of this process.

RESULTS

Review identification and selection

A flow chart detailing the selection of studies for analysis in this review is presented in Figure 1. We found 3563 articles in the databases. After removing 1150 duplicates, we screened 2413 studies for titles and abstracts and removed 2390. Twenty-four studies were included for full text screening and twelve were excluded after this phase because they did not fulfil the inclusion criteria. Twelve papers fulfilled all the inclusion criteria and were included in the review [4; 16; 32; 34; 35; 37; 47; 48; 52; 56; 59; 65].

Description of included studies

A summary of the included studies is presented in Table 1 and more details on the training interventions in Appendix 3. The 12 selected articles were published between 2013 and 2019. All of them were conducted in western countries (Australia, UK, US, Sweden, Denmark, Belgium, Germany and Ireland), in private and public primary health care and hospital settings. A total of 113 physiotherapist participants were collectively involved in the 12 studies. Most participants had extensive work experience, although not all the studies reported this. In 9 of the studies the physiotherapists were trained to deliver treatment as part of an RCT or implementation study. Three of the studies used a mixed method design, one was an action research study and others were purely qualitative. Ten studies collected the data using semi-structured interviews (face-to-face or phone/videoconference), one study used email questions and one co-operative inquiry included focus groups, reflective sessions and reflective diaries. One study interviewed physiotherapists at four time points after the training, two studies interviewed physiotherapists before and after the training, and only the results from the interviews after the training were included in our analysis. Other studies had interviewed physiotherapists only once after the training period. Seven of the studies had analyzed their data using thematic analysis [8; 46; 66]. Other analysis methods or additions to thematic analysis were content analysis [24; 43], framework analysis [57], interpretive descriptive analysis [68] and constant comparison [6; 13; 63].

Methodological quality

Any CASP criteria of trustworthiness that were not met by each study are listed in Table 1. Four studies met all the methodological criteria and all others failed to fulfill at least one criterion. For example, eight studies failed to fulfil Criterion 6 due to a lack of researcher reflexivity, and five studies failed to fulfil Criterion 8 because the description of the data analysis was not reported in sufficient detail. The methodological quality of the three mixed method studies and one action research study was generally lower than that of other qualitative studies that used more conventional methods. Further details of the specific reasons why individual studies failed to meet the criteria are presented in Appendix 4. In addition to the CASP criteria, another noteworthy aspect of the quality of the selected studies was that many of them failed to report the demographic data of the participating physiotherapists, such as gender and years of work experience. We contacted the authors for the missing data: One author provided the missing data and two authors replied they had not collected the data. One author provided us with the missing data, and one did not reply. The sensitivity analysis shows the contribution of each of the included studies to each of the subthemes. Appendix 2 shows that the mixed method studies contributed minimally to the themes of this study (3%-4%). The contribution of the qualitative articles to the results varied between 7% and 15%, supporting that no single study dominated in its contribution to the results. No further conclusions about this can be drawn because the focus and the breadth of the interviews, as well as the analysis methods, varied between the studies.

Findings

The analysis process resulted in a total of 45 initial codes, which were reduced and organized into 4 themes and 16 subthemes, presented in Table 2. After the thematic synthesis was complete, sensitivity analysis examined the relative contribution of the studies to the final subthemes. Appendix 2 presents the number of times each subtheme was identified by a study and supported by a statement. A full description of the themes, subthemes, codes and underlying data is presented in Appendix 5.

The interventions in which physiotherapists were trained varied considerably among the included studies (Table 1, Appendix 3). Some were individualized, others group-based; most were delivered face-to-face, with one exception that used telephone consultations. Some of the interventions targeted the management of MSK pain, others focused more on lifestyle change. Most of the interventions focused on the management of low back pain (7). Other studies targeted the management of knee osteoarthritis (2), chronic pain (1), rheumatoid arthritis (1) and whiplash-associated disorders (1). In

one study the training of the physiotherapist targeted the management of acute pain, in 4 studies chronic pain and others did not specify the duration of pain. The training interventions were based on: cognitive behavioral principles [56], Acceptance and Commitment Therapy [4], Stress Inoculation Training [34], person-centered practice [37], behavioral change techniques [47], graded activity [35], Cognitive Functional Therapy [16; 52; 65], and the STarT Back approach [32; 59]. The duration of the training varied between 10 and 150 hours. One study used online training, two studies included just workshops and nine had additional mentoring and support. Despite these differences, many common themes were identified. Four key themes that describe the phenomenon of learning and implementing a biopsychosocial intervention in the management of musculoskeletal conditions emerged from the thematic synthesis: 1. changed understanding and practice, 2. professional benefits, 3. clinical challenges, and 4. learning requirements. The themes and subthemes are supported by quotations from the original studies, linked to the text.

Table 2 Overview of themes and subthemes

Themes	**Subthemes**
1. Changed understanding and practice	Biopsychosocial understanding and application
	Person-centered care
	Enhanced therapeutic alliance and communication
	Wider application of new skills
2. Professional benefits	Increased confidence as a result of new skills
	Effective practice
	Increased job satisfaction
3. Clinical challenges	Discomfort when dealing with psychosocial factors
	Consideration of professional role
	Resistance/questioning the new approach
	Overwhelmed by amount of new information
	Difficulty changing practices
	Patients' beliefs and expectations
	Time constraints
4. Learning requirements	Structured learning, diverse learning methods during workshops
	Ongoing process, support

Theme 1 Changed understanding and practice

In this theme, the physiotherapists reported that the biopsychosocial intervention training had changed the way they thought about musculoskeletal pain and its management, and reported changing at least some parts of their practice to a more biopsychosocial framework. They also reported that their ways of working had become more person-centered and that the training enhanced their skills in communication and building a therapeutic alliance.

a) Biopsychosocial understanding and application

The physiotherapists reported that they had started to understand musculoskeletal pain as multidimensional and the importance of psychological, social and lifestyle factors. For some, training enhanced their previous understanding and for others it meant new realizations, outside their previous biomedical understanding. This new understanding led to critical reflection of current practices and a changed view of how pain should be managed [4; 16; 34; 52; 65].

"The more you know about the link between [psychological factors and physical capacity], you can't separate them, you really have to go there." PT9 [34]

The importance of systematically identifying and targeting psychosocial factors early was stressed. For some physiotherapists, this was outside their usual scope of practice, but it made sense to them; for others, it was in line with their previous thinking [4; 16; 32; 34; 48; 52; 56; 59; 65].

"It might allow [us] to prevent the need, or decrease that progression into chronicity, [that may then] lead to depression and anxiety, bigger conditions. Whereas if we can catch it early ... that just makes total sense." PT1 [34]

Several physiotherapists reported regularly using validated screening tools to support the identification of psychosocial factors and barriers to recovery as well as to guide assessment and treatment choices.

"In general it's been really good, and I like the stratifying because then I can see that it's low risk, medium risk, or high risk, and then I really think of the low risk, that we really need to not treat so much, and the high risk, I've got to do a little bit more of the listening piece of it, all their stories.... I've been surprised sometimes to hear how afraid the patients are." (Clinic 1, PT1) [32]

Many stated that the training extended their previous skills and provided additional management strategies and confidence in targeting psychosocial factors [34; 48; 59; 65]. Starting to systematically

identify and address psychosocial factors required a clear understanding of role boundaries, knowing when their own skills were not enough and when patients needed to be referred to other professionals with specialized training [65].

"If someone has a post-traumatic stress disorder or had been abused, some of those instances are extremely depressing for patients and may be beyond our professional boundaries to be managing... so I would refer onto someone with more specialised training." (P12) [65]

The importance of managing pain individually from a biopsychosocial perspective was stressed [4; 16; 32; 34; 48; 52; 59]. Breathing and relaxation exercises were reported as easy to adopt and they worked as a bridge between the physical and psychological [34; 48]. The physiotherapists' ability to identify and challenge patients' unhelpful beliefs and thoughts increased. In two studies, the physiotherapists reported behavioral experiments as an effective way of highlighting discrepancies between beliefs and pain responses [16; 65]. In addition, observing functional behaviors worked as a tool for gaining insight into psychological factors and increasing patients' awareness of these factors [65].

"So, if you can show that you can modify their symptoms for the better, then you change their belief system; it gives you the right to go there and it changes the patient's belief, which changes their behaviour." (P02)[16]

b) Person-centered care

The physiotherapists reported improved understanding of person-centered care and a shift towards a more person-centered way of working. This meant identifying patients' valued goals [4] and making physiotherapy more individualized and related to the patient's everyday life. For this to be possible, the physiotherapists needed to let patients voice their agenda and collaborate in decision-making. Many changed their practice and became less prescriptive and directive [16; 34; 37; 52].

"I think one of the most important factors is making sure they feel involved in the process, involved in the decision making as well, and again, as I mentioned before, that understanding of why we want them to do certain things I think is so important, not just handing over a sheet or piece of paper saying 'do these', it's an understanding and that communication 'ok, this is what we're trying to achieve, what are your goals?', setting goals with people and just how we're going to get there, and this is why you need to be doing certain things." [37]

The role of physiotherapists changed into more of that of a coach. This required being flexible and helping patients arrive at their own solutions, supporting their active role, gradually giving them more responsibility, and helping them accept ownership of their problem [16; 35; 37; 47; 48; 59].

D: "One has grown into the role of coach I think, more and more. I mean, you get experience just like the participants do. So after a while you can relax a bit in your role and let the participants take over." [47]

c) Enhanced therapeutic alliance and communication

Enhanced therapeutic alliance, better communication and listening skills as a result of the training was another common theme across the studies [4; 16; 32; 34; 37; 48; 52; 59; 65].

"I thought [the training] was really good from that point of view, as far as improving the verbal communication, which obviously when it's over the phone that's the key bit" [37]

The physiotherapists reported changing their communication style towards being more compassionate and validating [4], as well as collaborative and patient focused. This included asking more open-ended questions [16; 48] and being more 'quasi-conversational', unrestrictive and adaptable instead of using the usual structured approach of physiotherapists [16; 34; 65]. The importance of actively listening to patients was stressed and physiotherapists reported it as an important factor in enhanced therapeutic alliance and facilitating patients' trust and disclosure. This in turn helped them understand each patient and to identify pain drivers better, especially the cognitive, psychological and social dimensions. [16; 32; 34; 48; 52; 59].

"I've got to do a little bit more of the listening piece of it, all their stories.... I've been surprised sometimes to hear how afraid the patients are." (Clinic 1, PT) [32]

In addition to enhanced communication, both behavioral experiments and individualized treatment were seen as facilitators of good therapeutic alliance and trust [16; 65].

"So, the behavioural experiments ... if you can get to the heart very quickly of what somebody is fearful of or avoiding or having difficulty with, and you can change that in one session, often that'll be the first time in years that they've done that one particular movement, and that helps to build that alliance and build the trust." (P05) [16]

a) Wider application of new skills

The physiotherapists reported that they had planned or already started to use their newly learned skills outside of the research context [34; 37; 47; 48; 56] and were applying them in different patient populations [16; 34; 35; 59].

"And it's really interesting in that it's not just with back pain patients either; it's actually transferable across any patient. Neck pain, shoulder pains, any chronic pain patient or even a patient who's in an acute episode of something, it makes you think differently to what those patients are telling you." (P1). [59]

Theme 2 Professional benefits

The physiotherapists reported more confidence in treating people with musculoskeletal pain in a research context and greater confidence in managing musculoskeletal pain in general. They also felt that their practice had become more effective and some reported that their work had become more rewarding.

a) Increased confidence as a result of new skills

The physiotherapists reported that their confidence in managing musculoskeletal pain increased, and they felt that they were better able to manage more complex health problems [4; 16; 34; 52; 59; 65]. They reported that the training and mentoring had equipped them with new skills that formed the basis of their increased confidence [34; 59]. They reported that shifting away from trying to fix patients to supporting them made them feel more robust as clinicians [4]. When their confidence grew, the physiotherapists were also able to manage service constraints better, such as lack of time [16]. More confidence was expressed in delivering parts of the intervention in which the physiotherapists or patients had previous experience, such as abdominal breathing [34].

"I would have thought, I'm not sure if I can get you better, whereas now, I think more often, I'm confident in saying, I think I can change this person. I feel much less likely to fail these people now." (P09) [16]

In most of those studies in which they were trained to deliver a biopsychosocial intervention as part of a research project, the physiotherapists expressed that they felt satisfied that the training had helped them feel confident and prepared to effectively deliver at least some parts of the intervention. However, they still saw room for improvement [32; 34; 35; 37; 47; 48].

"I do feel confident. To answer your question, I do feel confident. I feel ready to go." [37]

b) Effective practice

The physiotherapists felt better able to help their patients and reported superior results with the new approach [16; 34; 35; 48; 56; 65]. Some physiotherapists reported seeing results more quickly with the new approach, and noticed that the improvements were also more long-lasting [16; 34].

"The person I saw responded very, very well … I mean magnificently well compared to what I thought … because of her pain presentation … her work and being bullied at work … I was thinking, 'This is going to be a nightmare!'" PT11 [34]

The physiotherapists in the studies that utilized stratified care also reported that the new approach had helped improve the efficiency of their service. They reported that they were able to discharge patients sooner, use the appointment time better, and manage clinical caseloads more efficiently. They reported that using a subgrouping tool helped patients access appropriate treatment more quickly [32; 59].

"I think, well, I think that as a result of my increased confidence that I'm discharging sooner because I'm discharging knowing that I've done everything I need to do, I'm not going to get this one hundred per cent better if they've got lots of degenerative changes..." (P7). [59]

c) Increased job satisfaction

Some physiotherapists reported new, biopsychosocially-oriented ways of working as being professionally rewarding and as leading to increased job satisfaction [4; 59; 65].

"If you are trying to get [someone] better in terms of pain control, and that is not possible, you feel like you have failed in your work … Whereas in a pain management … they know straight away the expectation is not necessarily to eradicate pain but to improve mood and function and quality of life and, so it's more fulfilling because those goals are more likely to be achieved." [4]

Theme 3 Clinical challenges

In contrast to the previous themes reporting changes in practice, the third theme describes the clinical challenges that the physiotherapists encountered during the training and implementation of the biopsychosocial interventions, and the barriers to learning and implementing the new approach in clinical practice.

a) Discomfort when dealing with psychosocial factors

Despite the training, many physiotherapists reported discomfort when dealing with psychosocial factors and extending their traditional scope of practice [4; 16; 34; 37; 48; 56; 59]. First of all, many were concerned about the professional role boundaries related to psychosocial factors and about asking questions in psychosocial domains because they considered it outside a physiotherapists' scope of practice, different to their normal way of working and this was a barrier to the implementation of the new approach [4; 56].

"I think my main concern is that I'm not sure where the boundary is. . .I'm quite happy to have extra skills. . . but I'm not sure that we've got enough skills to deal with some of these patients in a complete sense. . .I don't know that it's appropriate that then physio just takes on this sort of realm completely. . . I'm not sure that it's necessarily quite right." ID08 [56]

One reason for this insecurity among many physiotherapists was that the training was not sufficient to fully equip them with skills in this domain. They found addressing psychosocial factors distressing and it took them out of their comfort zone [16; 34; 48; 56; 59].

"... probably a more expert area than the small amount of training that we had... . I don't think I had the skills to do a really good job of it." [P8] [48]

They were afraid of opening "Pandora's box" or a "can of worms" of difficult issues in their patients' lives that they did not feel prepared to deal with [4; 56].

"Someone bringing out a lot about their past or perhaps a very complex situation … we don't want to say the wrong thing and it be to someone's detriment … you don't want to open this can of worms … you can't put any of those worms back again. It's quite a long way from physiotherapy." [4]

b) Consideration of professional role

The physiotherapists stated that the new approach required a paradigm shift and that it was very different from their previous training, regular practice and the traditional role of the physiotherapist. This created challenges in learning and implementing a new approach in their clinical practice [4; 16; 32; 35; 37; 47; 48; 56; 59; 65]. The traditional role of physiotherapists was that of a "doer", fixing patients' problems and being an expert in the physical aspects of the patient's condition and writing prescriptions, whereas the new approach required renegotiating the physiotherapist's role as one that included more person-centered practice with shared decision-making; that of a coach [4; 37; 47; 48; 56; 59]. Practicing according to the new approach made them feel they had failed in their professional role [4], and some physiotherapists felt there was limited support for this transition [32].

"Because physios are trained to do things and if they're sitting and talking, as it feels like, they're not doing something. And that's a bit of an issue from some sort of previous work that I've been involved in and that's quite challenging I think, you know, people sitting talking to patients, rather than doing things to them, that's a sort of struggle for them at first." (P9) [48]

c) Resistance/questioning the new approach

One physiotherapist reported that he had abandoned the new approach and that he did not intend to incorporate it in his clinical practice, because it did not suit his personality [37]. Other physiotherapists seemed to accept the new approach, but there was a lot of resistance and questioning along the way of barriers to the implementation of the new approach.

Firstly, terms such as acceptance [4] and negative thinking caused tension among their patients, and physiotherapists did not want to use them because of the their patients' negative reactions.

"I would say 10 out of 10 people, as soon as you mention the words 'negative thinking,' the shutters come down ... for them negative thinking meant, oh, I'm creating my problems . . . that's kind of like a societal failure, and those people weren't willing to go there." [Pll] [48]

Many studies also reported that the physiotherapists went through a process of appraising whether the new approach was worth implementing in their clinical practice [4; 37; 48; 56; 59]. They found it difficult to understand how the principles of the new approach and some of the techniques could be applied during standard consultations [37] and had doubts about whether the new approach would be the right way to treat their patients in comparison to their old style of practice [4; 59].

". . .it's a lot of time invested. . . So I think just a bit, just a bit concerned that it will be effective. . . And that they won't just end up coming back into the system again." ID08 [56]

Besides a few exceptions, the physiotherapists also resisted or found it difficult to fully follow the protocol of the new approach, partially because they felt it was too recipe focused. They stated that flexibility was needed, and they found ways to adapt the new approach to suit their own skill set, context and patients. They used the components of the approach selectively, tailored the interventions individually, and combined new skills with their previous ways of practicing [16; 32; 34; 35; 37; 47; 48; 56; 65]. In some cases, the use of the new tools relied more on the physiotherapists' memories than being part of a standardized workflow [32]. Some techniques were used more because the physiotherapists noticed they had good treatment success with them and felt more comfortable using them, or that they were more accepted by patients. Other, usually more complex, techniques that

physiotherapists found difficult to implement and were less confident about, were used less [34; 37; 47; 48].

"If you said to me, 'You've got to apply this as a complete program to any patient you think has stress involved in their [presentation]', I'd be like, 'Nah I don't'. I'd apply what I thought was relevant" PT11 [34]

d) Overwhelmed by amount of new information

Some physiotherapists stated that the training was stressful because there were so many new things to learn: Some felt overwhelmed by the amount of new information [16; 37; 47].

"Very overwhelming would be my description of it…I went home from that first day of training very confused and a bit disheartened to be honest because I've never felt so confused when trying to a learn a new content of any kind." [37]

e) Difficulty changing practices

Many physiotherapists also reported that implementing the new approach was difficult because it was hard to change their practices. They reported easily falling back into their old habits. This was because the new approach was very different from their usual practice and it was hard to go against their previous experience; it took time to change [37; 56].

"Certainly trying to [change my practice]. It's definitely hard to change your habits. Once you're in a familiar environment, you do tend to fall back into old behaviours, but certainly keen to have an influence." [37]

It was also suggested that a biopsychosocial approach should be taught early in physiotherapists' professional careers, because once you have learned a way of practicing it is hard to change [34].

"They should probably learn this stuff right from the scratch … The problem solving is the hardest and that's probably for all the old people who have been doing it the other way. You could probably change the new [graduates] before you could change the old people" PT8 [34]

f) Patients' beliefs and expectations

A further challenge reported by physiotherapists in adopting a biopsychosocial approach was patients' beliefs and expectations of physiotherapy and the role of the physiotherapist. Challenging patient's biomechanical / structural pain beliefs was considered difficult and many patients expected "quick fixes" in forms of passive treatment or exercise, instead of what was offered by the new

approach [16; 34; 47; 48; 56; 59; 65]. Sometimes it troubled the physiotherapists to choose between what their patients wanted and what the physiotherapists thought they needed or was the right thing to do according to treatment protocol. Not all patients were easily convinced by the benefits of the new approach [16; 59].

"There would be a barrier, I think, in people thinking, well, I didn't really come to have my thinking challenged or changed or anything, I just came to get the exercises." [P8] [48]

Solutions to overcome these challenges were suggested, such as incorporating biopsychosocial approaches into the entry-level training of physiotherapists and changing public expectations of physiotherapy [48], combining psychological components with usual physiotherapy management, giving individual explanations of the program's purpose, and using multiple different patient resources to promote the new approach [32; 34].

"They can have [SIT information] in print. They can have a website that they can go to ... The more often the patient sees [and] hears the correct and similar message the more often they're likely to believe that that might be a realistic thing." PT10 [34]

g) Time constraints

For some physiotherapists, one of the biggest barriers to implementing a biopsychosocial approach was that they felt they needed more within-session time to use the new strategies and techniques effectively. This was needed for asking open-ended questions, for exploring the psychosocial elements and for letting patients voice their agendas [16; 37; 47; 48; 56; 59].

". .to do any of these exploratory questions, you just think, "When am I ever going to ask an open ended question?" Because I just can't cope with the time constraints to get the answer." ID226 [56]

A longer first patient session was considered necessary [16; 35] as well as regular follow-up sessions [16], but physiotherapists were concerned about the capacity to cover the costs of using more time [48]. On the other hand, some physiotherapists started feeling more comfortable with the time constraints once they gained more confidence in using the new approach, and actively tried to find additional time for patients [16].

"I feel more confident now if it was a half-hour slot and I was starting to explore these things and then picking it up the next time, it would still work." (P04)[16]

Theme 4 Learning requirements

Overall, the physiotherapists reported that they were fairly satisfied with their training. Different studies utilized different kinds of training methods, and the physiotherapists supported variation in training methods. Workshops alone were seen as insufficient for learning and combining them with ongoing support was seen as necessary.

a) Structured learning, diverse learning methods during workshops

Training days were important to enable familiarization with the theory behind the approach, laying the foundations for learning [35; 37; 48]. The physiotherapists in one study stressed the importance of the presentation of convincing scientific evidence [52] and others saw trying out the new methods on themselves as beneficial [4].

Many studies incorporated a structured protocol that physiotherapists were to follow with their patients. This approach, often including a treatment manual, was beneficial for learning and building confidence in delivering the new approach. If the training lacked structure, the physiotherapists called for it [34; 35; 47; 48; 56]

F: "So maybe we should have had a bit more of the big picture, 'this is how we work,' in the beginning. 'This is what we do at the group meetings.'" [47]

The physiotherapists in one study partially learned together with physicians and found this beneficial for improving their collaboration [32].

"It was really nice to meet with the physicians—I think maybe a month later or something—just to hear what they learned and see what they were saying, and that they could learn what we were saying, and I think on both sides we were kind of surprised about what each other had been doing and will be doing." (Clinic 1, PT) [32]

Patient demonstrations and role-play were valued as learning methods even though role-play felt uncomfortable in the beginning [16; 34; 47; 48; 52]. Just observing clinicians was not sufficient; this needed to be followed by analyzing and discussing the patient interaction together [16].

H: And a role play, even if I think it's the worst thing I know …. Yes, I think it's very uncomfortable and cannot be myself, even so I can see certain weaknesses in myself …. Those things I have thought about afterwards. So I think that has been great." [47]

b) Ongoing support

The learning and implementation process was supported by many different methods: small group meetings, mentoring, study materials, recording and watching one's own work and reflecting on it,

receiving feedback, and working with pilot patients. Small group meetings were considered important - they facilitated discussion and the problem-solving around more difficult components of the intervention and challenging patient cases, and provided interpersonal support [16; 48].

Video reviews enabled self-reflection and feedback. This was seen as especially useful for developing communication skills and for knowing that they were moving in the right direction with their learning [16; 47]. Working with pilot patients seems to have served a similar function [37].

D: "Being video recorded was a new experience; in hindsight it was pretty good. Even though it is not that fun when you are doing it .... It has been good to get feedback on how you think and how you progress as coach and group. That you know you are moving in the right direction, that you are following the phases." [47]

The physiotherapists reported long-term support and mentoring as being particularly valuable in reinforcing knowledge transfer in most of the studies that contained this component, and the physiotherapists who did not receive it wanted it [16; 32; 34; 37; 47; 48; 56]. Booster sessions at the end of the training period were also seen as useful [37]. Some physiotherapists stated that support from the research project leader [47], supervisors and peers [48; 56] was important. The value of having a psychologist as a mentor throughout the program was also highlighted [48].

" [The workshop] was the tip of the iceberg ... it set the ground-work or sort of gave us a taste of it, but then it was the weekly meetings we had with the psychologist that really concreted everything for us." [P6] [48]

A common theme among many of the studies was that learning and adopting the new role took time and practice [4; 16; 34; 37; 47; 48; 59].

F: "It was difficult at the beginning before I got it, the way we should work . . . should they work in groups, large group, and should I be included? There were a lot of those thoughts at the beginning, that maybe took a lot of time for me, before I found my way." [47]

Discussion

The primary aim of this study was to investigate physiotherapists' perceptions of learning and implementing a biopsychosocial intervention to treat musculoskeletal pain conditions. Four main themes emerged from the data: changed understanding and practice, professional benefits, clinical

challenges, and learning requirements, which describe the phenomenon of cultivating expertise as a result of training in biopsychosocial interventions.

Based on the results of this study, learning and implementing a biopsychosocial approach can be seen as a combination of constructivist and transformational learning. Constructivism states that learning happens when individuals create new knowledge by linking past experiences and new information, whereas transformational learning is a process that goes beyond acquiring knowledge and supports critical processes involved in the creation of new meanings. [14; 17]. Physiotherapists described the process as a powerful experience that challenged and, for some of the physiotherapists, changed the way in which they saw their professional identity and their work. This shifted their practice towards being more biopsychosocially-oriented and person-centered. These results support the understanding of professional knowledge as being contextual and embedded in practice [15]. The new knowledge and skills taught during the training programs did not seem to directly transfer into practice [20], but instead involved a transformational learning process of questioning and reflexive monitoring, with the testing of new skills in practice to gain validation of the new perspective [42; 44]. This was seen in the perceptions of the physiotherapists as they questioned the new approaches and tried to establish coherence [42], and was a frequent subtheme supported by a large amount of statements within the studies (Appendix 2). The participants also engaged in a process of reconstructing the meaning of being a physiotherapist within their clinical community, critically reflecting on the boundaries of their profession and their professional identity when they realized the new approach was a long way from the traditional role of a physiotherapist [17; 27].

It has been recognized that successful implementation of new knowledge takes place at the individual, group and organizational level [74], requiring complex changes in clinical routines, collaboration among disciplines and changes in the organization of care or even in cultural beliefs and attitudes [26]. Despite this, most interventions to improve healthcare, including those reported by the studies included in this review, are targeted at the skills and knowledge of individual professionals [25]. However, the training itself is not individualized, even though physiotherapists come from different backgrounds, with different beliefs, knowledge, skills and capacity to learn, and therefore experience learning transitions in very different ways. The interventions we reviewed often also lacked development of professional practice communities and consideration of organizational factors such as time constraints and clear referral pathways.

Previous systematic reviews suggest that physiotherapists often feel they have not received sufficient psychological training, and therefore lack confidence in addressing psychosocial issues [2; 18; 65].

Our results show that, despite undertaking a biopsychosocial training intervention and that fact that most studies included a mentoring program, the physiotherapists often reported feeling insecure about this domain or that they were struggling with some of the techniques. Furthermore, the fear of opening "Pandora's box" prevented some physiotherapists from asking open-ended questions and thereby obtaining a deeper understanding of their patients' situations. On the other hand, some physiotherapists reported confidence and improved outcomes, and that the training made their work more rewarding and increased their work motivation. Most studies reported both confidence and insecurity, indicating that the differences were not so much between contrasting approaches and training interventions, but more about individual physiotherapists. Herschell et al. [30] conclude that examining therapist characteristics is a missed opportunity within existing implementation research and should be one focus of future studies.

In many of the included studies, the physiotherapists were expected to follow a structured protocol and they reported appreciating the structure because it helped them learn. Structured approaches in learning are also recommended by previous research, together with the assessment of treatment fidelity [71]. However, simultaneously, most of the approaches seem to have led physiotherapists towards more person-centered, individualized care, based on letting patients voice their agendas. Furthermore, despite appreciating the structure, the physiotherapists rebelled against the protocols and, as a result, most reported mixing and matching new learned skills and old ways of working. These contradictions, together with the appraisal of whether the new approach was worth implementing, and the consideration of their professional role, seem to have created a dilemma for the physiotherapists – whether to work according to the protocol or to apply the approach flexibly and modify their physiotherapy based on their patients' individual needs. There is growing evidence for individualizing patient care. Patients prefer their interventions to be individualized [31; 50] and a systematic review of psychological interventions delivered by physiotherapists [61] suggests better outcomes for individualized interventions. In support of this view a recent RCT [51] demonstrated individualized care was more effective in reducing disability at medium and long term follow-up than group-based care for people with chronic disabling low back pain. Therefore, it may be beneficial if physiotherapists modify their approach to reflect this.

Treatment fidelity is clearly an issue that warrants more attention in physiotherapy research. Without addressing fidelity, it is impossible to determine whether study outcomes are a result of the intervention being investigated or due to variability in its implementation; for example elements that are accidentally or intentionally added [12]. There is no consensus on the best practice for the assessment and maintenance of fidelity. Therapist drift is a phenomenon described in psychotherapy

literature [70], highlighting that despite participating in training for a therapy approach, clinicians do not always deliver therapy according to its intended principles. Ongoing support is needed to monitor and prevent drift and to facilitate ongoing learning.

The physiotherapists in the reviewed studies seemed to appreciate varying training methods. Structured training with practical tools as well as long-term training, mentoring and support were seen as important. Just attending a workshop was not seen as sufficient for cultivating expertise and gaining confidence in the new approach. The best way of mentoring and supporting physiotherapists is also unknown and, to our knowledge, there has been no research in the field of physiotherapy on how to train mentors. Critical reflection and feedback are important for learning, since they help people better understand their practices and their own assumptions [28]. Furthermore, it is suggested that people cannot learn through only their own experiences, and that observing others' work is important, which suggests that patient demonstrations and role play are needed [3]. Previous implementation research recommends active, multi-component interventions [33; 74], but it is still unclear which components are the most effective, and this might also vary between different contexts [74]. The feasibility of the training interventions is also an important issue, as despite a great deal of time and money being invested, the results of the training interventions are variable. Continuing education in the field of physiotherapy is currently dominated by weekend workshops that have been not proven to be sufficient to upskill physiotherapists to change their practices. The studies included in this review mostly concerned physiotherapists' views of learning in a research setting, but more research is needed on the efficacy of continuing education outside research settings.

Addressing physiotherapists' concerns about dealing with psychosocial issues and the boundaries of their professional role, and acknowledging the phenomenon of therapist drift, are of great importance in improving the dissemination of biopsychosocial interventions. The challenges that physiotherapists report indicate that future studies and implementation interventions related to biopsychosocial approaches should: (i) ensure that physiotherapists receive a sufficient amount of training and support related to engaging with patient's psychosocial issues; (ii) better recognize the interaction between the intervention and the context in which it is used and the individual needs of the participants. The challenges faced during the training clearly vary between participants and workplaces, therefore teaching everybody the same way is unlikely to lead to sufficient competency in all participants; (iii) include physiotherapist participants in the planning of the intervention, as they have the best knowledge of local organizational practices and therefore can provide insights into ways to overcome organizational barriers; (iv) in workshops, include discussions about the scope of physiotherapist practice, as they renegotiate their professional identity to include engagement with patient's

psychosocial issues. Also, teach physiotherapist's how to best manage patients' expectations about physiotherapist scope of practice; and (v) provide physiotherapists clear, locally matched guidelines on when to refer for co-care.

Strengths and limitations

The heterogeneity of the included studies, as well as the limitations of the individual studies (Table 1 and Appendix 4) must be taken into account when interpreting these results. The quality of the included studies was fair, and the studies of lower quality seem to have contributed less to the themes (Appendix 4, Appendix 2). In many of the studies, the participants had previously undergone training, were participating in the study because they had an interest in psychological interventions and were trained to deliver treatment as part of a study. Therefore, these results cannot be directly transferred to training physiotherapists who have no previous training in biopsychosocial approaches, who are initially skeptical or who are trained outside a research context. More research is also needed in contexts other than western cultures and on exploring the perceptions of physiotherapists who have less experience and interest in biopsychosocial approaches. Based on the data extracted for the scope of this review, it was not possible to determine whether the participating physiotherapists really changed their practices or whether the treatment outcomes really changed.

Our team was composed of researchers with diverse professional backgrounds in physiotherapy, psychology and medicine, from Finland and Australia, and from a number of institutions. They also had extensive qualitative and quantitative research skills, and a strong background in biopsychosocial approaches within research, education and clinical practice. Several steps were taken to minimize sources of bias in the review. An *a priori* review protocol was developed and registered in PROSPERO and we followed the ENTREQ guidelines for reporting.

We used a broad search strategy with wide search terms. Two researchers independently completed the searches, article screening, quality appraisal and data extraction, and the whole study group participated in a reflexive analytical process while conducting the thematic synthesis. The inclusion of only peer-reviewed and English language publications is a potential limitation of this article.

A general limitation of qualitative metasynthesis is that the review process removes the data from their original context because the analysis is based on the primary research reports, not the original data [58].

Conclusions

Clinical practice guidelines for the management of musculoskeletal conditions recommend screening for psychosocial factors and management within a biopsychosocial framework. However, the results of this study indicate that even though the physiotherapists reported many positive changes towards using the biopsychosocial approach as well as professional benefits as a result of the training, current training approaches seem to be insufficient for helping all physiotherapists gain confidence in delivering a biopsychosocial intervention. Many physiotherapists struggle to deal with psychosocial issues and have concerns about professional boundaries. This study provides insights into the individual clinical challenges that physiotherapists face when trying to change their practice behaviors. However, to gain a better understanding of the individual processes of transforming expertise, more research is needed to shed light on the individual narratives of physiotherapists, covering the whole training and implementation process. Furthermore, there is an urgent need to discuss the scope of practice and the role boundaries of physiotherapists, as well as what constitutes competency in delivering biopsychosocial interventions. Adequate training and individualized mentoring related to psychosocial issues, discussion of patients' expectations, and consideration of organizational factors such as time constrains and referral pathways, as well as fidelity checking to ensure competency and prevent drift, should be considered when planning future implementation interventions and training for physiotherapists in biopsychosocial interventions.

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Conflict of Interest

Peter O'Sullivan, Jaro Karppinen and Riikka Holopainen receive fees for speaking at conferences and providing clinical workshops for health care professionals in the management of musculoskeletal disorders. Jaro Karppinen is a member of a scientific advisory board: Axsome Therapeutics Inc. and

has received lecturing reimbursements from MSD, Pfizer and Orion Pharma Ltd. Arja Piirainen, Anne Smith, Phoebe Simpson, Rob Schütze and Peter Kent have no conflicts of interest to declare.

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Figure legends.

Fig. 1. Prisma flow diagram