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1 **An Evaluation of a Pain Education Programme for Physiotherapists in Clinical Practice**

2

3 **Abstract**

4

5 Objective: The present study evaluated the implementation and acceptability of a pain education  
6 programme delivered to physiotherapists in clinical practice.

7

8 Methods: A pre test post test design with ten physiotherapists was employed. Descriptive and inferential  
9 statistics were used for outcome measure data. Focus groups were carried out with seven physiotherapists  
10 within one month post intervention. This data was analysed using the Framework Approach.

11

12 Results: Ten musculoskeletal physiotherapists were recruited. It was possible to develop and deliver the  
13 intervention and this was found to be acceptable to physiotherapists within clinical practice. The study  
14 explored trends within outcome measures; and one was considered appropriate. The focus groups yielded  
15 three interlinked themes, which related to the impact of the programme: “providing a context for pain  
16 education”, “influence on aspects of the patient-therapist encounter” and “logistics of the education  
17 programme in clinical practice”.

18

19 Conclusion: A pain education programme delivered to physiotherapists in clinical practice was both  
20 possible to deliver and acceptable to participants. A key strength of the programme was the applicability  
21 to real life practice, and something which physiotherapists valued. Whilst physiotherapists felt pain  
22 neurophysiology education was important, physiotherapists reported lacking confidence in implementing  
23 their pain neurophysiology knowledge with patients. Thus more time is needed to focus on pain  
24 neurophysiology education with the aim to increasing confidence with application of this approach in  
25 clinical practice.

26

27 **Key words:** musculoskeletal, pain, physiotherapy

28

29

30 **Introduction**

31

32 Globally, low back pain (LBP) is a common problem and will increase due to the aging population (Hoy  
33 *et al.* 2012). Self-management is encouraged for LBP (Balague *et al.* 2012) with physiotherapists playing  
34 a pivotal role in management, (Foster *et al.* 2011a) including self-management. Self-management  
35 involves the individual, with support if required in managing the biopsychosocial impact of a condition  
36 (Stewart *et al.* 2014) and physiotherapists are in an optimal position to utilise a biopsychosocial approach  
37 in the management of LBP (Foster *et al.* 2011b). However healthcare professionals (HCP) can have  
38 biomedical beliefs regarding pain (Nijs *et al.* 2013) with studies reporting that physiotherapists' attitudes  
39 and beliefs can influence the care they provide (Bishop *et al.* 2007; Daykin *et al.* 2004). Physiotherapists  
40 have displayed concerns regarding their skills to support people living with LBP to manage some of the  
41 biopsychosocial aspects of a pain experience (Sanders *et al.* 2013). This demonstrates the need for  
42 educational support in this area (Sanders *et al.* 2012; Snelgrove *et al.* 2013).

43 To make the biopsychosocial model relevant for clinicians, education that emphasises the  
44 neurophysiological aspects of pain to illustrate integration of psychological influences has been advocated  
45 (Darlow *et al.* 2012). Pain neurophysiology education (PNE) is encouraged for a clinical population to  
46 reduce the threat associated with pain and to improve attitudes and beliefs (Nijs *et al.* 2013). However,  
47 there is the need to focus on physiotherapists' attitudes and beliefs with PNE being a means to influence  
48 these (Darlow *et al.* 2012). One study comprising 288 participants evaluated the efficacy of a three-hour  
49 seminar regarding PNE for HCP. The study reported an increase in pain neurophysiology knowledge  
50 measured by a standardised questionnaire (Moseley, 2003). However, the influence of education on HCP  
51 attitudes and beliefs or exploration of the value for clinical practice was not explored. Whilst educational  
52 programmes exist that measure attitudes and beliefs tailored for physiotherapists, their focus has not been  
53 specifically PNE (Overmeer *et al.* 2009; O'Sullivan *et al.* 2013). It should be noted that the timing,  
54 content and length of courses were different, with one being an intensive course over two full days  
55 (O'Sullivan *et al.* 2013) and the other being delivered weekly over eight weeks in a university setting  
56 (Overmeer *et al.* 2009). There is the scope to develop a shorter course, requiring less time commitment,  
57 over a period of time to allow for reflection and implementation.

58            In order for education to change attitudes, the educational programme should consider real world  
59 application and give time for implementation (Ferris *et al.* 2001). Making education relevant to practice is  
60 imperative in HCP education (Holland, 2011). A study is proposed that aims to design and implement an  
61 education programme for physiotherapists focusing on PNE and application of this to practice. The aim  
62 of this study is to assess the development, delivery and acceptability of this education programme for  
63 physiotherapists in clinical practice. The study also sought to assess the appropriateness of two outcome  
64 measures, the Physiotherapist Attitudes and Beliefs Scale (PABS-PT) (Houben *et al.* 2005) and Health  
65 Care Providers Pain and Impairment Relationship Scale (HC-PAIRS) (Rainville *et al.* 1997), to measure  
66 attitudes and beliefs of the physiotherapists. Trends were analysed and differences compared between the  
67 pre and post intervention scores.

68

## 69 **Methods**

70

### 71 ***Study Design and Recruitment***

72 This study used a pre-test post-test design and focus groups following the intervention to explore  
73 acceptability and implementation in clinical practice. The study was part of a Doctoral study which  
74 received University Ethical Approval, National Research Ethics Service approval and NHS Trust R&D  
75 approval.

76            Focus groups with participants following the intervention allowed for understanding of the  
77 acceptability of the intervention, alongside the capability of delivering this intervention with clinical  
78 practice. A generic qualitative approach was used, which was appropriate for this study as it does not  
79 align to a traditional qualitative methodology, and is appropriate for use with a study gathering mixed  
80 methods data (Percy, Kostere & Kostere, 2015). The outcome measures were taken before and after the  
81 intervention to consider their suitability for a future study.

82            Physiotherapists were eligible if they worked within musculoskeletal outpatients and worked  
83 with people with LBP in the last six months. Participants were recruited from two outpatient clinics  
84 within one NHS Trust. Eligible participants were provided with a participant information sheet and  
85 informed JM if they were interested to take part.

86

87 **Intervention**

88 The intervention was a pain education programme for physiotherapists within clinical practice. The  
89 programme included three sessions, which lasted approximately 2½ hours, once per month and was  
90 delivered by JM. JM is a physiotherapist and worked within the same Trust as the participating  
91 physiotherapists. The ‘Explain Pain’ paradigm (Butler *et al.* 2003) focusing on PNE guided the  
92 philosophy of the focus on PNE. Implementing a course over time, rather than a one-time delivery allows  
93 for application of skills and discussion at the returning session (Chipchase, *et al.* 2012). Three separate  
94 sessions were conducted monthly based on pragmatic issues of in service training timing. The application  
95 of a proposed model of presenting and understanding pain science to physiotherapists was utilised  
96 (Moseley, 2007). The content of the sessions was as follows:

97           Session one: Pain models including Descartes, the Gate Control Theory, Neuromatrix theory and  
98 the biopsychosocial model were discussed (Gatchel *et al.* 2007; Moseley, 2007; Wall, 2000; Melzack,  
99 1999;). Pain neurophysiology, including pain mechanisms and descending control were included (Woolf,  
100 2011; Nee *et al.* 2006; McMahon *et al.* 2005; Apkarian *et al.* 2005; Butler *et al.* 2003; Butler, 2000) and  
101 discussion of the integrated nature of the biological and psychological aspects of pain (Tracey *et al.*,  
102 2007; Flor *et al.* 2005).

103           Session two: Studies concerning the application of pain neuroscience (Moseley, 2007) and  
104 communication and assessment (Goldingay, 2006a; Goldingay, 2006b) informed this session. Extracts  
105 from three patient interviews lasting between three and five minutes from qualitative interviews in an  
106 earlier study preceding this programme were chosen relating to the person’s understanding of their  
107 problem, the influence of LBP on daily life, experience of physiotherapy and thoughts and beliefs  
108 regarding LBP. Persons unrelated to the study provided the voice for these anonymised extracts.  
109 Physiotherapists listened to the extracts once and used this as part of an activity to discuss what may be  
110 influencing that person’s pain experience.

111           Session three: A range of evidence regarding PNE was discussed within the group. Studies  
112 focusing on PNE were examined during this aspect of the programme (Louw *et al.* 2011; Clarke, *et al.*  
113 2011; Moseley, *et al.*, 2004; Moseley, 2002).

114

115 **Quantitative data**

116

117 *Data Collection*

118 Participants provided written informed consent before the intervention commenced. Participants were  
119 asked to complete two outcome measures, the PABS-PT (Houben *et al.* 2005) and the HC-PAIRS  
120 (Rainville *et al.* 1995) immediately before and after the intervention.

121

122 *Outcome measures*

123 The PABS-PT consists of 19 items and is measured using two factors. Factor 1 is biomedical orientation  
124 and factor 2 is biopsychosocial orientation. Scoring highly on factor 1 would indicate a more biomedical  
125 orientation whilst a higher factor 2 score demonstrates a more biopsychosocial treatment orientation  
126 (Houben *et al.* 2005). Scores for factor 1 are added together and the same for factor 2 to produce a  
127 biomedical and biopsychosocial score (Ostelo *et al.* 2003). The 19-item version PABS-PT was utilised for  
128 this study (Houben *et al.* 2005). The items in each factor are rated on a 6 point likert scale from totally  
129 disagree to totally agree (Houben *et al.* 2005). A systematic review (Mutsaers *et al.* 2012) investigating  
130 the psychometric properties of the PABS-PT found this measure to be responsive to educational  
131 interventions.

132         The HC-PAIRS consists of 15 items and is measured using a 7 point Likert scale (Rainville *et al.*  
133 1995). Response anchors are bipolar ranging from ‘completely disagree’ to ‘completely agree’, with  
134 questions 1, 6 and 14 reverse scored. A lower score is associated with less likelihood of associating  
135 impairment to pain (Bishop *et al.* 2007). The 15-item HC-PAIRS has 4 factors which are ‘functional  
136 expectations’, ‘need for a cure’, social expectations’ and ‘projected cognitions’ (Bishop *et al.* 2007). It  
137 has been proposed that items ten and thirteen can be removed from the HC-PAIRS questionnaire and to  
138 have a thirteen item one factor questionnaire due to uncertainty regarding if ‘cognitions’ measures the  
139 targeted belief (Houben *et al.* 2004). Analysis of this pre and post outcome measure explored the 15 item  
140 total score and a 13 item total score.

141

142 *Data Analysis*

143 Descriptive statistics including the median and interquartile range of the outcome measures for pre and  
144 post intervention were calculated. Changes between the pre and post intervention scores for the PABS-PT

145 and HC-PAIRS were analysed using Wilcoxon Signed Ranks Test. Data were analysed using SPSS  
146 (IBM Corp).

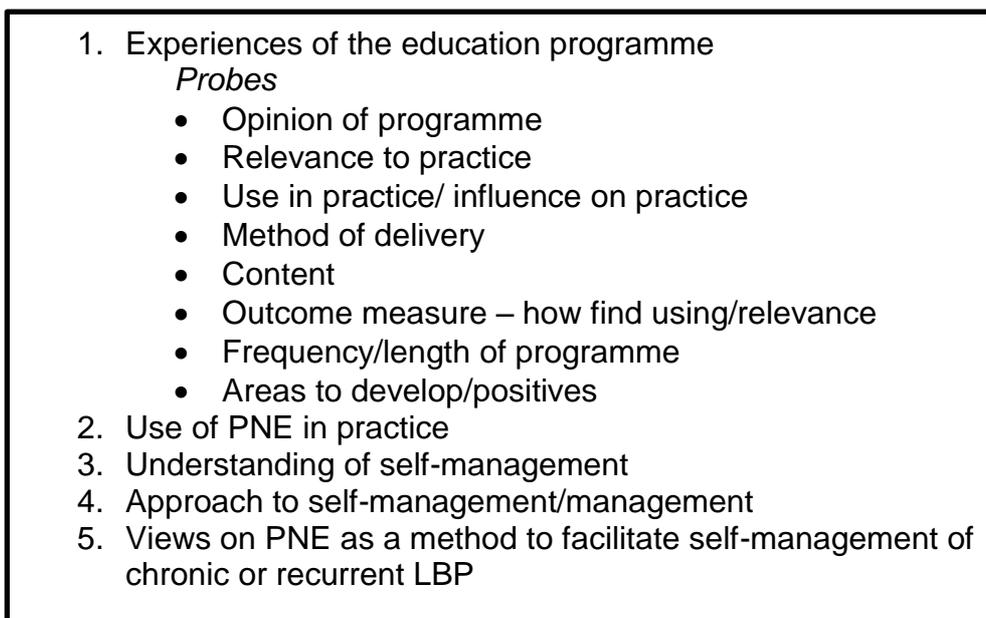
147

148 *Qualitative Data*

149

150 *Data collection*

151 JM facilitated two focus groups with physiotherapists who had taken part in the intervention. Two focus  
152 groups were used due to availability of clinicians and each lasted under one hour. The focus groups were  
153 carried out on NHS premises. Given that JM had facilitated the intervention this allowed for natural  
154 discussion. The topic guide was prepared alongside the research team to guide the focus group, which is  
155 detailed in figure 1. The questions were subject to discussion between JM and NA, who is a  
156 physiotherapist and psychologist, with questions being amended and revised based on discussions. The  
157 questions were informed by the focus of the study to explore feasibility and acceptability of the education  
158 programme in clinical practice. Questioning opened with a general statement encouraging participants to  
159 speak freely about their experiences of the education programme. Questions exploring self-management  
160 were informed by a preceding study in this Doctoral programme that explored physiotherapist  
161 understanding and support in self-management. The PNE programme was developed to help support  
162 physiotherapists with self-management.

- 
1. Experiences of the education programme
    - Probes*
    - Opinion of programme
    - Relevance to practice
    - Use in practice/ influence on practice
    - Method of delivery
    - Content
    - Outcome measure – how find using/relevance
    - Frequency/length of programme
    - Areas to develop/positives
  2. Use of PNE in practice
  3. Understanding of self-management
  4. Approach to self-management/management
  5. Views on PNE as a method to facilitate self-management of chronic or recurrent LBP

163 **Figure 1:** Topic Guide for Focus Groups  
164

165 Following the first focus group being conducted, the research team reviewed transcripts. The use of more  
166 probing and elaboration of physiotherapist experiences of the content of the programme was required. JM  
167 reflected on the interview technique after the first focus group to develop the second focus group. JM was  
168 aware of her own position in relation to this topic and influence of this in conducting interviews. Part of  
169 the process of this programme of research was to engage in frequent discussion with the research team  
170 that prompted on-going reflection about the topic and relationship to the research.

171

### 172 *Data analysis*

173 The Framework approach (Ritchie *et al.* 1994) was used to guide the analysis of the qualitative primary  
174 data within this study. Framework analysis utilises interrelated steps to facilitate the management of  
175 qualitative analysis (Ritchie *et al.* 2002). Framework analysis is a credible approach, demonstrating a  
176 clear audit trail of the steps of data analysis and how raw data became the final themes (Gale *et al.* 2013).  
177 Framework analysis has five connected steps, which include familiarisation; identifying a thematic  
178 framework; indexing; charting, and mapping and interpretation (Ritchie *et al.* 2002). During  
179 familiarisation, JM read transcripts and listened to audio recordings. This facilitated the development of a  
180 thematic framework through noting recurrent and key themes within the data. This framework was  
181 applied to all transcripts in a systematic way, termed ‘indexing’ (Ritchie *et al.* 2002) with the framework  
182 being developed and refined throughout this process. Following indexing, data was summarised into a  
183 matrix based chart for each theme and sub theme. This ‘charting’ stage involves examining the charted  
184 data to uncover elements and dimensions (Spencer *et al.* 2014). Elements are concise statements present  
185 in the responses from individuals; these elements are then grouped into a dimension, which differentiates  
186 the focus of the elements (Spencer *et al.* 2014). The dimensions are then grouped into categories,  
187 allowing refinement of the overall final themes (Ritchie *et al.* 2003). This process facilitated  
188 interpretation and exploring connections within the data (Spencer *et al.* 2014) in order to develop the final  
189 themes. JM conducted the analysis, and gained peer checks from MF and NA.

190

### 191 **Results**

192

### 193 *Sample characteristics*

194 Ten musculoskeletal physiotherapists were recruited from two musculoskeletal outpatient clinics in one  
 195 NHS trust. This number is comparable to Simpson *et al.* (2015) who also explored the acceptability of an  
 196 intervention. There were two male and eight female physiotherapists with a mean of 10.6 years of clinical  
 197 experience. Eight of the physiotherapists attended three sessions, with two of the physiotherapists  
 198 attending two sessions. Seven physiotherapists took part in one of two focus groups following the  
 199 education programme, with this sample containing a range of clinical experience. Studies focusing on  
 200 physiotherapists' views of managing back pain have recruited fewer than ten individuals with valuable  
 201 findings (Singla *et al.* 2014; Wynne-Jones *et al.* 2014). Table 1 details the characteristics of the  
 202 physiotherapists.

203 **Table 1:** Participant characteristics  
 204

Physiotherapist	Gender	No. of years Qualified	Attended all 3 sessions	Taken part in a focus group
PHY1	Male	8	Yes	Focus group 1
PHY2	Female	17	Yes	No
PHY3	Female	5	Yes	Focus group 2
PHY4	Female	14	No, missed session 3	No
PHY5	Male	3	Yes	Focus group 1
PHY6	Female	19	Yes	Focus group 2
PHY7	Female	18	Yes	Focus group 2
PHY8	Female	8	No, missed session 2	No
PHY9	Female	10	Yes	Focus group 1
PHY10	Female	4	Yes	Focus group 1

205

206

207 *Quantitative Results*

208 Data from pre and post outcome measures were included if a physiotherapist attended a minimum of two  
 209 sessions. One HC-PAIRS questionnaire had one question left blank; a 'neutral' score of four was used as  
 210 recommended with HC-PAIRS when less than 10% of the measure had a missing value (Houben *et al.*  
 211 2004b). Within group differences for the two outcome measures are presented in table 2. The median and  
 212 interquartile range pre and post intervention and the change scores are detailed. None of the outcome  
 213 measures showed a statistically significant change in median scores.

214

215 **Table 2:** Median PABS-PT and HC-PAIRS pre and post intervention scores

Outcome measure	Baseline score median (range, IQR)	Post intervention score median (range, IQR)	Change in median score	z statistic	p value
<b>PABS-PT Factor 1</b>	29 (19-34, 22.5-33.5)	25 (16-32, 19.5-29)	4	-1.694	0.09
<b>PABS-PT Factor 2</b>	37 (33-41, 34.5-39.5)	37.5 (35-42, 35-40.5)	0.5	-.409	0.68
<b>HC-PAIRS 15 item</b>	47.5 (33-58, 36-52)	45 (35-58, 37-55)	2.5	-.205	0.84
<b>HC-PAIRS 13 item</b>	36 (24-40)	32 (26-42.5)	4	.000	1.00

216

217

218 The median change in this sample for the PABS-PT factor 1 was a reduction of 4 points post intervention.

219 Post intervention a higher proportion of scores concentrated around lower end of the scale with nine

220 scores of 30 and below in comparison to the pre outcome measure, which had six. The PABS-PT factor 2

221 showed a small increase in score from 37 to 37.5.

222 The HC-PAIRS 15 item median score demonstrated a reduction of 2.5 points from 47.5 pre

223 intervention to 45 post intervention. The 13 item HC-PAIRS median score showed a reduction in 4

224 points from 36 pre intervention to 32 post intervention. As can be seen from table 2 IQR, a range of

225 lower and high scores were gathered for this small group.

226

### 227 *Qualitative Findings*

228 The two focus groups contained four and three physiotherapists respectively. The analysis yielded three

229 interlinked themes. Figure 2 illustrates the development of these themes through Framework Analysis.

230

**INITIAL THEMATIC FRAMEWORK**

- 1. Theory content**
  - 1.1 Theoretical knowledge gave background
  - 1.2 Application of theory
  - 1.3 Difficult language
  - 1.4 Lot of theoretical content
- 2. Application to practice**
  - 2.1 Linking theory to practice
  - 2.2 Case studies
  - 2.3 Using skills already have
  - 2.4 Influence on own practice
  - 2.5 Having a tool
  - 2.6 Appropriateness for practice
- 3. Subjective assessment**
  - 3.1 Listening
  - 3.2 Time for subjective assessment
  - 3.3 Limitations of set assessment sheets
  - 3.4 Factors that influence pain
- 4. Pain education**
  - 4.1 Use of pain education in practice
  - 4.2 Challenges with pain education
- 5. Outcome measure applicability**
  - 5.1 Usable outcome measure
  - 5.2 Difficulty interpreting outcome measure
  - 5.3 Influences on outcome measure
- 6. Recommendations for development of the education programme**
  - 6.1 Directed study
  - 6.2 Split theoretical content
  - 6.3 Provide hand outs
  - 6.4 Provide a test
  - 6.5 Success stories
  - 6.6 Frequency of programme
- 7. Aspects involved in managing LBP**
  - 7.1 Physiotherapist role
  - 7.2 Patient understanding
  - 7.3 Realistic expectations
  - 7.4 Important for patient to accept pain
  - 7.5 Support
  - 7.6 Goal setting
  - 7.7 Functional tasks
  - 7.8 Self-management patient responsibility
  - 7.9 Patient having control

**GROUPING ELEMENTS AND DIMENSIONS TO FORM CATEGORIES**

- The value of pain theory
- Application and relevance to practice
- Taking time for the patient story
- The value of listening for management
- Roles and self-management
- Pain education
- Structured study
- Clarity of outcome measure
- Fit of programme into practice

**ARRIVING AT THE FINAL THEMES**

- Providing a context for pain education**
  - The value of pain theory
  - Application and relevance to practice
- Aspects of the patient-therapist interaction**
  - Taking time for patient story
  - The value of listening for management
  - Roles and self-management
- Logistics of the education programme in practice**
  - Structured study
  - Clarity of outcome measure
  - Fit into practice

**Figure 2:** The process of developing final themes through Framework Analysis

233 *Theme 1: Providing a context for pain education*

234 Physiotherapists who had taken part in the education programme valued the theoretical aspect.

235 Physiotherapists found the theory regarding pain physiology useful to include providing a foundation.

236 Although they may have covered pain neurophysiology in the past, they appreciated revisiting this area.

237

238 I really liked it because I haven't touched on it since I finished uni so I was in need of a refresher

239 certainly, it was really in depth, and aimed at the right level. I think too much deeper and I'd

240 have struggled a bit, to be honest with you (PHY5).

241

242 It's nice to go over the physiology and anatomy... once you're out in clinical practice you don't

243 get that anymore... so actually all that information is really useful (PHY7).

244

245 This theoretical aspect of the programme allowed physiotherapists to link this to the presentation

246 of pain in clinical practice. In some cases, this understanding of pain enhanced the credibility given by

247 physiotherapists to people living with pain. Through understanding the physiology physiotherapists could

248 appreciate why pain persisted. It was of value to be able to see the physiological processes occurring

249 during a pain experience.

250

251 I also thought just kind of having a better understanding, oh yeah right, that is going on, so

252 there's actually something physically chemically happening (PHY10)

253

254 They're not just making it up (PHY9)

255

256 Although physiotherapists found the theoretical aspect of the programme valuable; to develop

257 understanding and gain the most from the programme, they suggested splitting the theoretical aspect into

258 two or more sessions. Alongside finding the theoretical aspect useful, albeit with some challenges,

259 physiotherapists attributed value to linking the theoretical aspect to the clinical setting. It was important

260 that physiotherapists could see how to apply this information and use this in clinical practice. Linking the

261 programme to the physiotherapists' specific context allowed associations to be made with their clinical

262 practice and consider the relevance and application of this. Contextualising the course through extracts  
263 was felt to be beneficial. However, two physiotherapists felt some positive extracts would have added to  
264 the course, rather than the focus being people who were finding day to day with LBP difficult.

265

266 Where you can see how to apply it, whereas often, I feel those skills are taught as a different  
267 skill and then it's like it doesn't fit in to what we do, so we can't do it, so if you're getting  
268 trained part of you is switching off because you know you can't apply it (PHY1)

269

270 Even some success stories, people saying what has helped them and what gained a bit more  
271 positive (PHY6)

272

273 Physiotherapists appreciated the course was not intended to provide a range of new skills, but to  
274 be able to effectively use the skills they already have. The links between understanding of pain and day  
275 to day practice allowed physiotherapists to consider how they could support someone with LBP in their  
276 clinical practice. Physiotherapists recognised their position as having the potential to positively influence  
277 and support someone with LBP.

278

279 I think the focus on, the bits that physio can use that you could bring to it, I suppose the way you  
280 sort of reminded that actually, don't throw your hands up as much or say I don't know how to  
281 help this person, but recognise that you're in a position to try, that's in my mind a bit more based  
282 on that (PHY1)

283

284 In a nutshell I think you have made me aware of what we do on a daily basis without going  
285 outside of the norm, just by sitting and listening to people...I didn't think I had the tools...we've  
286 all got the tools we maybe don't realise and do we put them into practice enough (PHY7)

287

288 *Theme 2: Influence on aspects of the patient-therapist encounter*

289 A prominent element of the education programme discussion concentrated on physiotherapists reporting  
290 change in their practice. Specifically, this included spending more time listening to the patient during the

291 subjective assessment and how this influenced subsequent management. These discussions led on to the  
292 wider clinical encounter and management approaches, in particular self-management, which was  
293 specifically explored.

294 Taking time to listen to the patient story during the subjective assessment was something the  
295 physiotherapists placed more emphasis upon following the education programme. This included  
296 spending more time allowing the patient to discuss what they felt was relevant and verbalise their  
297 thoughts and concerns, rather than having a predefined agenda.

298

299 If we're spending a session talking, then we're spending a session talking (PHY1)

300

301 I think it's made me more aware of listening subjectively...I tend to try and put stuff in the  
302 boxes and if it doesn't go in the box I'm quick to disregard it but now I certainly am more  
303 considerate of everything else that may be going on as well so I do certainly give them more  
304 time, listening with regards to their pain (PHY5)

305

306 If you give people more time you will find they tell you things they wouldn't have... the  
307 problem is we have these set assessment sheets and you have to follow them and I think  
308 sometimes it might not be a bad idea if we had a blank piece of paper (PHY9)

309

310 Physiotherapists demonstrated an appreciation of the multidimensional nature of pain and the  
311 factors that can influence this experience. Throughout the patient therapist encounter, physiotherapists  
312 were actively considering what might be influencing someone's pain. Unhelpful beliefs regarding pain  
313 were considered and targeted.

314

315 I spend more time treating patients targeting their beliefs about you know using words like  
316 crumbling spine; I'll end up in a wheelchair, actually targeting that (PHY3)

317

318 Understanding the patient's condition and associated pain was seen as essential regarding future  
319 management, including self-management. Pain physiology education was discussed and considered as

320 valuable, following specific questioning on this topic. There was a change with how physiotherapists  
321 reported explaining pain with less focus on structure. Physiotherapists discussed their wider role  
322 providing advice; tools and a source of support making people feel valued and understood. Pain  
323 physiology education posed a challenging task as physiotherapists found it difficult to implement in terms  
324 of gauging the right level. Whilst the value was certainly recognised, physiotherapists reported  
325 hesitations in utilising this based on their own confidence and understanding.

326

327 I've went down the being more chemicals at the end of the nerves in the skin...then you're not  
328 saying it's in their head, you're saying physically (PHY10)

329

330 I have gone through a very careful explanation in the past and then they didn't want to come in  
331 anymore as they thought I'd effectively just told them it's all in their head, which isn't what I  
332 said at all (PHY1)

333

334 You've obviously got some patients who are going to come in and are not ready to accept  
335 they've got chronic pain which means some of the things you might try and use from the training  
336 you're actually going to come across a brick wall (PHY3)

337

338 The outcome of the patient therapist encounter concentrated on the physiotherapists advocating  
339 patient responsibility, the need for acceptance and having control in the management of LBP.

340 Physiotherapists also viewed themselves as having an important role in supporting people living with  
341 pain to be able to manage and discussed an active partnership and people knowing when to seek help.

342 Goal setting, exploring expectations and fitting management into and around functional tasks were also  
343 considered important.

344

345 *Theme 3: Logistics of the education programme in practice*

346 The physiotherapists felt the education programme regarding the structure, delivery and relevance for  
347 musculoskeletal physiotherapy was appropriate to deliver in clinical practice. Delivery by a

348 physiotherapist was valued and was viewed as adding positively to the programme enhancing  
349 engagement and application.

350

351 I think its feasible... frequency gave time to apply clinically (PHY6)

352

353 I think had you been a nurse or somebody telling it to us I don't know if I'd have been slightly  
354 less, not believing, but... less engaging if you weren't a physio because you know our situation  
355 and time constraints, setting and all that stuff, had you been someone from management level  
356 coming down I'd be slightly less willing to take it on board (PHY9)

357

358 Physiotherapists felt the outcome measures mapped with the programme and that two were  
359 adequate. There were some points raised regarding the difficulty of interpreting some of the questions  
360 and one physiotherapist reported experiencing their own back pain at the time, which they reported might  
361 have impacted upon their answers

362

363 A development to consider for future implementation of the programme would be more  
364 structured directed study. Regarding the theoretical aspect of the programme, physiotherapists  
365 commented that they would have valued more structured directed study and providing of materials related  
366 to pain neurophysiology. This was viewed as helping to prepare for the theoretical session.

367

368 If we can do something to prepare to get our heads into the language of it (PHY1)

369

370 Maybe group sessions and going through some work talking about it or you could even  
371 recommend a paper or something (PHY9)

372

373 **Discussion**

374

375 This study has demonstrated that it was possible to develop and deliver a pain education programme for  
376 physiotherapists in clinical practice that was acceptable to participants. The intervention was able to

377 recruit participants from two clinics in a timely manner. 80% of participants attended the three sessions,  
378 with two participants attending two sessions due to work commitments. The logistics of working hours  
379 influenced some participants being able to attend.

380 The outcome measures used within the study did capture some change, and followed similar  
381 trends to current studies in this area. The current study follows the trend of a study in which an eight day  
382 biopsychosocial pain management university course delivered (Overmeer *et al.* 2009). The findings  
383 showed greatest improvement on the PABS-PT biomedical scale factor one, with the biopsychosocial  
384 factor two showing less change. For the physiotherapists in the current study, there was a trend in change  
385 in biomedical beliefs indicated by PABS-PT, demonstrating the potential impact of a less intensive course  
386 focusing on PNE on this aspect. Currently, the PABS-PT provides no indication of what would be  
387 classed as a high or low score and thus no consensus of what score would demonstrate a clinically  
388 relevant change (Mutsaers *et al.* 2012). The current study was carried out within a UK NHS setting. In  
389 comparison, a survey based study conducted with a sample of physiotherapists from the UK completed  
390 the PABS-PT, with over half being based within the NHS (Bishop *et al.* 2008). The scores in this latter  
391 study were 5 points lower on PABS-PT factor two than baseline of this study and biomedical orientation  
392 two points higher. Thus, in comparison to this UK based study of physiotherapists (Bishop *et al.* 2008),  
393 the physiotherapists recruited for the current study appear more biopsychosocially orientated at baseline,  
394 thus this may be the reasoning to have demonstrated a small change in factor 2, biopsychosocial factor.

395 A study with physiotherapists using the HC-PAIRS, demonstrated higher baseline scores than  
396 the current study with the median score indicating a stronger belief of impairment associated with pain  
397 (Slater *et al.* 2014). Studies that explored the 13-item HC-PAIRS show a considerable difference between  
398 the current study scores. The baseline median for this study was 36 whereas the score is higher for other  
399 studies using this outcome (Slater *et al.* 2014; Houben *et al.* 2004). In a study that followed an evidence  
400 based pain management intervention, the HC-PAIRS score was found to be 37 (Slater *et al.* 2014)  
401 whereas in this current study it was 32. However, it showed a large variation in the range of scores,  
402 which is consistent with previous studies, which have also noted a large variation. Therefore, as the  
403 current study has a small sample size it is difficult to draw conclusions due to the impact of variability in  
404 a small sample.

405           The focus groups following the education programme allowed for detailed insight into the  
406   acceptability of the programme whilst identifying areas for future development. The study demonstrates  
407   that physiotherapists valued the intervention due to the relevance to clinical practice. The  
408   physiotherapists who participated in the current study reported listening to the qualitative extracts  
409   valuable to link the PNE to identify potential influences on their pain experience in a real world setting.  
410   This shares some similarities with a previous study, which developed a pain film based on findings from  
411   a qualitative synthesis that focused on experiences of chronic musculoskeletal pain (Toye *et al.* 2015).  
412   Moreover, it should be noted that this latter study mainly recruited general practitioners and it only  
413   included one physiotherapist who valued listening to the film. Thus, the current study has demonstrated  
414   the value physiotherapists specifically place upon application to practice.

415           A workshop exclusively delivered to physiotherapists that used patient case studies in real life  
416   format and scientific evidence was evaluated through the Back Beliefs Questionnaire before and after the  
417   workshops (O’Sullivan *et al.* 2013). Although this programme was of an intensive delivery and  
418   incorporated functional movement the study shares similarities with the current study combining a  
419   theoretical aspect and patient extracts. Feedback regarding these aspects is similar to the current study  
420   with physiotherapists finding scientific information useful and the value of listening to patient case  
421   studies. O’Sullivan *et al.* (2013) provides a brief overview of what physiotherapists valued using email  
422   feedback however these exclusively discussed positive aspects of the programme, which is highlighted by  
423   the authors. In contrast, the current study highlights some challenges physiotherapists face alongside  
424   developing depth through focus groups. The current study has identified that physiotherapists are less  
425   confident regarding their knowledge of pain science and utilising this as an educational approach.  
426   Moreover, in relation to self-management, physiotherapists feel the patient’s own understanding of this  
427   concept is vital. Therefore, a focus is required to support physiotherapists to overcome these challenges  
428   to enhance implementation of this approach within clinical practice.

429           The qualitative aspects of this study provide valuable findings regarding PNE. Although  
430   physiotherapists reported an increased confidence regarding eliciting unhelpful beliefs during a subjective  
431   assessment, they discussed a lack of confidence regarding specifically explaining pain neurophysiology to  
432   patients due to their own perceived level of knowledge, which they felt to be inadequate. This is  
433   interesting to note, as understanding of pain and education is often advocated regarding self-management

434 (Stewart *et al.*2014; Nicholas *et al.* 2013). There is a growing awareness of the emphasis required on pain  
435 management education in undergraduate education (Ryan *et al.* 2015). Thus, a focus on PNE at  
436 undergraduate level may help with respect to confidence in this area.

437

#### 438 ***Limitations***

439

440 The main study limitation of the study was the small sample size, which limits generalisability of the  
441 findings. The researcher who delivered the programme carried out the focus groups with participants,  
442 which may have influenced some responses generated. However, the focus groups generated points for  
443 development of the programme, thus were not all positive. JM ensured throughout the interviews to create  
444 a balanced discussion informed by the topic guide to not influence responses generated.

445

#### 446 **Conclusions**

447

448 The findings from this pain education programme implemented in clinical practice provides valuable  
449 insights for the future development of PNE programmes for physiotherapists. Participants considered the  
450 programme to be acceptable in clinical practice in terms of content and delivery and reported that the  
451 relevance to practice and length of time of delivery was appropriate. A strength of the programme was the  
452 applicability to real life practice, which was valued by physiotherapists. The findings of the PABS-PT  
453 outcome measure followed the trend of similar studies and is worthy of exploration in a future study. The  
454 HC-PAIRS outcome measure showed great variation in scores, which provided limited insight given the  
455 small sample. PNE linked to patient extracts has developed physiotherapists understanding of the  
456 multidimensional nature of pain, and influences they can address in the clinic. Thus, in this regard it is a  
457 potentially useful means to support physiotherapists to consider the integrated nature of pain in order to  
458 support management of pain in clinical practice. Further research is required in a larger study in order to  
459 make recommendations with respect to the effectiveness of this intervention in clinical practice.

460

#### 461 **Declaration of interest**

462

463 The authors report no conflict of interest.

464

465

466 **References**

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