

Psychologically Informed Physiotherapy for Chronic Pain: patient experiences of treatment and therapeutic process

Abstract

Objectives Psychologically Informed Physiotherapy is used widely with patients with chronic pain. The study aimed to investigate patients' beliefs about and experiences of this type of treatment alongside helpful and unhelpful experiences.

Design A qualitative study using Interpretative Phenomenological Analysis of semi-structured interviews.

Participants Participants (n=8) were recruited within a national specialist pain centre following a residential pain management programme including 2.25 hours daily physiotherapy. Participants were eligible for inclusion if they had achieved clinically reliable improvements in physical functioning during treatment. Interviews were conducted 3 months post treatment.

Results Participants contrasted differing experiences of physiotherapy interventions, alongside differences within the therapeutic relationship, valuing a more individualised approach. The themes of 'working with the whole of me', 'more than just a professional', 'working through challenges in the therapeutic relationship' and 'awareness' emerged as central to behavioural change, alongside promoting perceptions of improved capability and physical capacity.

Conclusion Psychologically Informed Physiotherapy is an effective treatment for some patients with chronic pain. Participants experienced this approach as uniquely different from non PIP approaches through its focus on working with the patient's whole experience. Therapeutic alliance and management of relationship ruptures may have more importance than previously appreciated in physiotherapy.

Keywords: chronic pain, physiotherapy, cognitive behavioural therapy, qualitative

25 Introduction

26 Chronic pain is disabling and hard to treat medically and surgically; thus, pain management
27 treatments have increasingly emphasised self-management of the condition, using physical and
28 psychological techniques[1]. Self-management approaches view disability and suffering as resulting
29 from multiple factors beyond pain itself, including avoidant movement patterns, cognitions and
30 coping styles [2].

31 There is increasing evidence that patients can benefit from physiotherapist-led cognitive behavioural
32 self-management approaches for chronic pain [3]. For example, StarT Back is a stratified care model
33 for patients with low back pain (LBP) targeting patients with high risk of chronicity [4]. The StarT
34 Back model incorporates psychological concepts in both screening and treatment, and is now
35 integrated into UK national pathways and guidance for LBP Undergraduate Physiotherapy courses
36 also increasingly emphasise 'biopsychosocial' approaches to treatment. Thus, psychologically
37 informed physiotherapy practice (PIP) is becoming prevalent across care settings.

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39 The majority of outcome data suggest that Cognitive Behavioural Therapy (CBT) based treatments
40 for chronic pain yield superior outcomes compared with 'treatment as usual' and waiting list
41 controls. However, effect sizes are small and reduced at follow-up [5]. Thus, whilst CBT approaches
42 are useful, they need to be developed to have more impact. As such, here we will use the broader
43 term Psychologically Informed Physiotherapy (PIP) to describe all treatments where physiotherapy is
44 delivered with a psychological framework. PIP treatments aim to use psychological techniques to
45 increase the impact of physiotherapy and to entrench the patient's long-term maintenance of
46 exercise recommendations, for example by targeting low motivation or negative thinking patterns.
47 Both CBT and other psychological models may be used in the service of these goals.

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49 In order to develop a treatment, it is essential to understand how and why it works. Change process
50 research has been common in the psychotherapy literature for the past 20 years [6]. In the chronic
51 pain literature, changes in variables such as pain catastrophizing and acceptance have been
52 identified as active influences on treatment outcome [7–9]. However, there is little consensus on
53 which treatment processes are most important and the variables under inspection have generally
54 been selected based on psychological theory, as opposed to arising from patient, or physiotherapy,
55 accounts.

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57 Where important therapeutic processes are understood, they can be targeted specifically, to
58 improve clinical outcomes and to supporting efficient dissemination of effective practice.
59 Physiotherapists do not always feel adequately trained to implement psychologically informed
60 treatment despite recognising its value [10], and therapist ‘drift’ into ineffective clinical approaches
61 is common across professions [11]. Both of these factors indicate that more in-depth training is
62 required. Identification of important treatment processes should support clinicians to target
63 consistent, evidence-based variables.

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65 Some studies have investigated patients’ overall experience of self-management treatment.
66 However, in this study, we aimed more specifically to focus on those processes that are important
67 within PIP treatments. Currently, minimal data on this topic exist; indeed, there are cautionary data
68 indicating that both treatment adherence and perception of benefit can be poor in self-management
69 approaches for back pain [12]. We chose to explore this topic in participants with severe chronic
70 pain who (a) had received a high ‘dose’ of PIP delivered at a specialist service, and (b) shown
71 evidence of benefiting from this treatment. This allowed us to explore their experiences with
72 confidence in the adequacy and competence of their PIP treatment.

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73 **Method**

74 ***Participants***

75 Participants were eight individuals who had undergone routine, yet, intensive residential pain
76 rehabilitation treatment including a substantial component of PIP, within a national specialist
77 service. Only those participants demonstrating clinically reliable treatment gains were included
78 (definition below). There were no specific exclusion criteria, although routine clinical assessment
79 prior to treatment had already excluded individuals with inadequate treatment readiness or poor
80 spoken English language skills. This study received ethical approval from the relevant NHS research
81 ethics committee, and was also approved by the local hospital R&D committee.

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82 Eight people took part in the study, with a median age of XX years (range: 20-51 years) and chronic
83 pain duration of 40-316 months (median: 94 months). Six were female. All had severe non-malignant
84 chronic pain (median numeric rating scale score xxx/10 at the 3 month follow-up) necessitating
85 treatment in a national tertiary service. All had previously accessed secondary care pain clinic
86 treatment and outpatient physiotherapy. The mix of chronic, non-malignant pain diagnoses in the
87 group, included Failed Back Surgery and Fibromyalgia.

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89 ***Procedure***

90 Participants underwent a three or four week group residential pain rehabilitation programme
91 (previously described in Vowles and McCracken [13]; McCracken and Gutierrez-Martinez [14]),
92 including approximately two hours of daily physiotherapy input. The programme used Acceptance
93 and Commitment Therapy (ACT) as its consistent psychological model. ACT is a form of behaviour
94 therapy that emphasises developing the ability to accept unpleasant sensations and emotions, and
95 which focuses on the hazards of struggling to change events that are chronic and often

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96 uncontrollable (including chronic pain). It focuses on helping patients to live well in the face of
97 chronic difficulty, and, like CBT, has specific techniques for targeting problematic thinking patterns
98 (for further details see Hayes et al. [15]). This informed the physiotherapy intervention, delivered by
99 experienced, specialist clinicians. The physiotherapy intervention included teaching a range of
100 modifiable exercises targeting strength, flexibility and cardio-vascular fitness, attending a public
101 gym, and outdoor mobility practice. All physical exercises were taught within a context of deliberate
102 self-awareness, paying attention to the cognitive, emotional and motivational aspects of movement
103 and behaviour change.

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104 At the end of treatment, we reviewed potential participants' scores on a routinely applied clinical
105 measure of disability, the Sickness Impact Profile (SIP) [16]. Statistical criteria defined individual
106 potential participants as treatment 'responders', eligible for recruitment. We calculated the change
107 in disability (using the SIP Total score) necessary to constitute a clinically reliable improvement, using
108 the method described by Vowles and McCracken [13] and Jacobson *et al* [17], see Appendix 1. . This
109 method requires the use of test-retest coefficients for SIP [16], and also standard deviations from a
110 relevant population at pre- and post-treatment. We used the published test-retest reliability
111 coefficient for the SIP total score, and took standard deviations from an internal database of patients
112 undergoing the same treatment as our participants (N > 500).

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113 Potential participants were contacted first by telephone and then sent an information pack.
114 Participants were offered interview times when they were in the locality for their three month
115 follow-up due to the wide geographical spread of participants and a desire not to burden them with
116 unnecessary travel. Written, informed consent was gained from participants before interviewing
117 them at their three-month post-treatment follow up.

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119 Data were collected through the use of semi-structured, hour long interviews (see Appendix 2),
120 conducted by a researcher who was not their treating physiotherapist. Interviewers received joint
121 teaching and supervision to ensure consistency. Participants were encouraged to talk broadly and in
122 depth about their experiences of the physiotherapy component of treatment. Questions focused on
123 their experience of the way in which the physiotherapists worked with them and the noteworthy
124 aspects of the treatment content and approach (positive and negative). Attention was focussed on
125 the experience of physiotherapy treatment, rather than broader issues of the treatment approach or
126 setting. Individual views were encouraged; any topics that emerged were probed for more detail and
127 verbatim transcripts were produced.

128

129 ***Data Analysis***

130 Interpretative Phenomenological Analysis (IPA) was used to analyse the transcripts. IPA is a
131 qualitative analytic method that probes participants' lived experiences and uses the interviewer's
132 interpretation of the patient's report. It is often used in healthcare research to explore patient
133 experiences using a double hermeneutic where by both the participant and the researcher attempt
134 to derive meanings from the areas under discussion. It has previously been used to investigate other
135 aspects of the chronic pain experience [18,19].

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137 Analysis followed the four stage process described by Smith et al [20]. Two researchers (XX and XX)
138 performed the analysis and a further researcher (XX) reviewed the emergent themes to ensure that
139 they were grounded in, and representative of, the interviews. Participants were allocated a
140 pseudonym to maintain confidentiality.

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Analysis of the data identified four themes, encompassing experiences across the sample, including: working with the whole of me, more than just a professional, working through challenges in the therapeutic relationship and awareness. Each theme is presented below, alongside accompanying quotations.

Working with the whole of me

Differences between PIP and previous physiotherapy interventions were described as striking for all participants. Discussion of previous treatments revealed participant experiences of hopelessness, and associated accounts of feeling unsupported, dismissed and handed on, as if there was nothing else that could be done. These repeated experiences of failure and dismissal appeared to give rise to a sense of frustration for participants, and for some, who experienced their therapist as frustrated by their efforts, this led to a perception that *they* were becoming a problem, or hindrance.

“(Sigh) So frustrating. So frustrating, because he was so keen to try and help me with the pain that I was in and because I was bending over to one side, he was really, really keen on trying to build up my muscles on one particular side, building my tummy muscles and things like that...he was frustrated, I was getting frustrated. And I was getting quite angry with myself because I thought, well, I can’t do these exercises.”

(Joanne)

Within these interactions, treatment was experienced as brief and prescriptive, with the focus becoming on the body as a set of problems to be addressed and monitored through set exercises, rather than working with the person.

166 *"...they weren't interested, they didn't really, they, it was almost like you've done, you've got*
167 *this injury, we've got this set of programmes, this set of exercises and that's what you're*
168 *gonna do."* (Tom)

169
170 As the differences between previous therapy and PIP were discussed, the experience of being
171 worked with as a 'whole person' emerged; this was contrasted with prior accounts of feeling like a
172 'body' to be treated with a prescriptive, impersonal approach.

173
174 With regard to PIP, participants described that therapists worked with their whole body, not just the
175 pain affected or 'problem' area. Here, exercise was experienced as an individualised, flexible
176 approach and contrasted with past regimented or generic approaches. For some, this included being
177 helped to adapt and individualise exercise to a level that they could manage.

178
179 *"...but I guess it's a very different kind of physiotherapy that you would do for...you know, cos*
180 *it's not a particular muscle group or particular area you're looking at, it's the...whole body."*

181 (Victoria)

182
183 As the 'whole of me' was further explored, the experience of having a therapist work with
184 experiences beyond the physical experience emerged. Specifically, participants highlighted the
185 importance of acknowledging and working with inner experiences within physical rehabilitation,
186 such as thoughts and feelings. This shared understanding of influences on exercise behaviours was
187 linked to a sense that treatment became more personalised and impactful.

188
189 *"They treated you like a human being, they didn't just go right, you're a number, one, ten*
190 *squats, ten this, ten that"*

(Emily)

...it was a bit kind of like, oh my God, they are asking me how I am and they are talking about feelings...This isn't quite right. But it was lovely, really refreshing to have that kind of. Because they are interested in your physical and mental wellbeing, it's the two things..."

(Joanne)

The process of working with the whole body appeared central in creating different therapeutic interactions within which experiences were acknowledged and validated. This created a safe and supportive therapeutic space, within which hope was fostered, possibilities emerged and physical experimentation could begin.

"They weren't just, move your arm, move your leg. You know? They were trying to get into your head, trying to reason with your mad mind. That tells you these things that you can't do. That anything is possible in some form." (Duncan)

(Duncan)

"...this was all options, and at the same time if like you struggled with something, there was help for you to like, combat that, like...how can you do it." (Amanda)

(Amanda)

This supported environment also appeared to encourage experimentation with functioning in the “real world” outside of the treatment room with patients taking on challenges.

"And I thought, if I don't do this, I've got to do it here because I won't do it at home. Because I haven't got the support network behind me. Things like that" (Joanne)

(Joanne)

▲ This experimentation brought ongoing physical progression and an increase in activity, despite the tasks remaining challenging.

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218 More than just a professional

219 Alongside the experience of PIP therapy in addressing the whole person, a related theme emerged
220 reflecting the experience of the PIP clinicians as fellow human beings, alongside their professional
221 role.

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223 Here, the physiotherapists are experienced as a non-expert and fallible, with participants describing
224 how they experienced their therapists as willing to be vulnerable; this was welcomed and contrasted
225 with previous experiences of therapists as somehow different, remote and impersonal.

226

227 *"...they were down to earth and it was relaxed...and they made it light hearted."*

228 *(Anne)*

229

230 *"Just to have a lovely banter with the patient and be interested in them and not their*
231 *ailment, their particular problem. You know? I think that is so important."* *(Joanne)*

232

233 *"It was like someone had your back almost...as well as...you know...having them to guide*
234 *you, they were also, you know, there, for you"* *(Amanda)*

235

236 Through this more open, human interaction the distance or "them and us" divide that can be
237 present within medical interactions was described as lessened.

238

239 *"...you would have ten minutes of them saying have you done, Have you done this? On the*
240 *computer screen, another piece of paper. See you in two weeks... no have you tried this?...But*
241 *there wasn't really (pause)...I don't know. A nurturing side..."* *(Duncan)*

242

243 Participants gave an account of a therapeutic context in which they felt cared for, which appeared to
244 give rise to feelings of safety and support. For some, experiencing the physiotherapist as human
245 appeared to generate a shared responsibility for treatment. Progress was influenced by both the
246 support of the physiotherapist and the participant's ability to influence their own outcome.

247

248 *They are human (laughs). They are just people that want to help you. And I think that if you*
249 *are willing to help as well, if you are willing to help yourself, that is half the battle.*

250 *(Joanne)*

251

252 *"But they were people people...They weren't "I'm a physio, I need to see how you move, I've*
253 *got all this education...this is how it all works." "* *(Anne)*

254

255 Participants described the value of seeing a professional who also presented themselves as
256 vulnerable and fallible, in contrast to the physiotherapist adopting a purely 'knowledgeable expert'
257 role. This seemed to create a 'lighter' clinical atmosphere where experimentation and 'imperfect'
258 efforts at exercise were acceptable.

259

260 *"Because you think, well if she can laugh at herself, then we are alright to laugh as ourselves*
261 *too...Because with physios, you think they are perfect at exercise and to do this. This and*
262 *this..."* *(Joanne)*

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264 Overall creating a caring and safe environment through human interaction appeared to stimulate
265 patients to both experiment, and be less restricted by real or imagined judgements from others.

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268 Awareness

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269 Alongside accounts of more open, human to human interactions, participants described becoming
270 more aware of the influence of internal experiences (body sensations, thoughts and emotions) on
271 their responses, both within exercise sessions and wider daily activities.

272

273 *...I actually realised that a lot of the limitations I've put on myself, a lot of limitations I felt*
274 *were limitations I'd put on myself...* (Tom)

275

276 This awareness in turn, was described as facilitating further experimentation with regards to
277 patterns of movement and choices about the amount of an activity to undertake.

278

279 *"...and I've realised, you know, I don't need to do this, you know, I'm not doing it cos it hurts,*
280 *I'm doing this cos this is just kind of the default pattern."* (Victoria)

281

282 *"...it's a case of being self-aware and then knowing what to do with it"* (Victoria)

283

284 Awareness alone did not appear to be enough to engender change, however, awareness did allow
285 participants to understand their own difficulties both interpersonally and physically, supporting
286 behaviour change. Accounts of using awareness to make different types of choices, less bothered by
287 the thoughts that had once been painful and constraining, were common. In the following example
288 Duncan describes being less driven by thoughts about having to push himself.

289

290 *"...And I'd just keep going to start with (laughs). But then you just, in the end, say, it doesn't*
291 *matter. That's me for today."* (Duncan)

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293 However, the process of developing awareness was not without challenges and for some this elicited
294 distress associated with past life constraints.

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“...I guess sometimes it could be realising that actually you’ve missed out on so much...”

(Emily)

For some individuals awareness of the consequences of past choices and associated distress promoted change or stimulated further experimentation.

Working through challenges in the relationship

PIP was described as potentially challenging; however, participants also described the relationship between clinician and patient as a key factor in helping them to understand and overcome emotional and physical difficulty. . Ordinarily, the distress and difficulty associated with rehabilitation may have resulted in disengagement from the therapeutic process, yet acknowledging and exploring this experience whilst exercising allowed therapist and participant to approach them differently. This was related to other themes such as ‘working with the whole of me’ and ‘more than just a professional’. Participant experiences suggested that these elements combined to generate a space where distress, conflict and even hostility towards the therapist could be worked with in fostering behaviour change.

“And sit and chat to you about how you are feeling. Not only physically but mentally. Because doing exercise in front of a group of complete strangers, you feel a complete...I just felt like, I can’t do this. I’m going to look really stupid. Bits wobbling all over the place, I’ll get stuck or...”

(Joanne)

319 Even where a participant described wanting something different from treatment, the openness and
320 warmth of the therapeutic relationship appeared to transcend any conflict over approach, and
321 facilitated continued engagement with PIP, in the presence of scepticism or concern.

322

323 *“...I have to say looking back on the couple of times that I flared at [the physio], er, she*
324 *handled it with huge dignity and left me a dignified way out as well.”* (Tom)

325

326 Over and above the importance of the therapeutic relationship in working with scepticism or strong
327 emotional experiences elicited by exercise, three participants described experiencing strong feelings
328 towards their treating physiotherapists which were not always pleasant.

329

330 *“...I wanted to punch her between the eyes and run away, but I guess they kind of, everybody*
331 *on the team are like just stick with it and you do and then you realise why you stuck with*
332 *it...and then it starts making sense. It’s a bit of a relief as well I think.”* (Emily)

333

334 The “it” referred to in this extract is emotional distress, which is accompanied by urges to fight back
335 at the person perceived to be responsible for it. In continuing to work with both the emotion and
336 the response, the alliance is not only strengthened but continuing progress is made.

337

338 The therapeutic relationship allowed these challenges to be acknowledged, explored and held within
339 the alliance. This facilitated engagement in treatment, whilst also supporting participants to develop
340 alternative ways to approach emotional difficulty.

341

342

343 **Discussion**

344 In this study we investigated patients' experiences of helpful treatment processes in PIP. We used
345 reliable change calculation to select a group who had responded to treatment. This allowed us to
346 confidently explore the treatment method and processes without fearing that our results were
347 affected by under-powered or ineffective treatment. Four super-ordinate themes emerged which
348 will be considered in relation to the wider literature and implications for practice.

349

350 PIP was described as markedly different to past input from both outpatient services and pain
351 management services. Past interventions had included a self-management approach to exercise;
352 however, participants emphasised that they found PIP different in its focus on the whole of the body
353 and the attention to thoughts and emotions that functioned as barriers. This led to improved patient
354 awareness as discussed below, and a perception that treatment was individualised, thus promoting
355 engagement.

356

357 However, PIP was not experienced as easy and all participants referred to challenges within this
358 process. Making changes is difficult and exploration of associated distress appeared central in
359 promoting this. This may also reflect and prepare patients for parallel challenges in home
360 environment if change is to be sustained over the longer-term. Future research may clarify whether
361 these are common to all PIP approaches or specific to ACT and the intensity of the treatment context
362 in this study.

363

364 The physiotherapist's professional and personal bearing and the resulting nature of the therapeutic
365 relationship were cited as different to past physiotherapy interactions. PIP appeared to bring a less
366 expert, and more vulnerable, stance towards the patient, supporting patient perceptions that the

367 physiotherapist was personally interested in their wellbeing and progress. Although this genuine
368 care will not be specific to PIP, it is important to note that all participants had previously experienced
369 physiotherapy, yet described this clinical stance as novel and welcome.

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371 This interpersonal stance appeared to promote exploration of potential barriers to the therapeutic
372 relationship, and continued engagement in the presence of these. This in turn, appeared to
373 strengthen relationships, creating a different experience of relationships enduring difficulty.

374

375 The strength of this theme is noteworthy. The pain literature has previously assessed patient
376 variables such a catastrophizing and acceptance, however interpersonal relationships have received
377 little attention. Looking outside of the pain field this is not a new concept and the area of
378 'therapeutic alliance' and rupture has been thoroughly examined in the psychotherapy literature
379 [21]. Although an effective working relationship is a feature of every useful clinical encounter,
380 researchers in the psychotherapy literature have begun to specify the central features of a good
381 'alliance' These include therapist characteristics such as empathy, non-judgement and positive
382 regard, as well as processes such as collaborative goal setting. These seem to facilitate positive
383 outcomes [22–24]. In the pain literature this has also recently been examined in doctor-patient
384 relationships when discussing opiate treatment, where both the nature and history of the
385 relationship affected patients' satisfaction with the decisions their doctor made[25]. Collaborative
386 goal setting has long been understood in physiotherapy; however the many broader aspects of the
387 therapeutic alliance may be more important than previously appreciated.

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389 This group of participants identified a change in their approach following PIP treatment, emphasising
390 development of physical awareness, thoughts and emotions alongside how these influenced their
391 behaviour, contrasting this with past treatments. The role of attention in promoting behavioural
392 change is a central tenet in the mindfulness-based therapies, which have shown improvements in
393 behavioural and emotional wellbeing in a number of conditions including eating disorders [26],
394 chronic pain [27,28] and psychosis [29].

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396 Awareness alone did not appear to be enough; rather, the process of making choices in the presence
397 of awareness appeared to be central. Awareness was not necessarily comfortable; however it may
398 be the case that some choices would not emerge without awareness of barriers and behavioural
399 influences. In turn, experiencing new activities which had been previously avoided due to strong
400 internal experiences created a shift in the participant's view of themselves and what they could
401 achieve. The role of awareness in facilitating different choice making is important as making values
402 led choices has been identified as an important factor in sustained behaviour change [30].

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405 These findings are consistent with the ACT model which was at the heart of the PIP delivery.
406 However, participants did not give accounts that focused on psychological theory; rather, they
407 described lived experiences of making changes supported by a wider pain management programme,
408 including PIP. We might have predicted that participants would have discussed ACT-related
409 variables; however, other themes such as the therapeutic alliance dominated more strongly. These
410 aspects of care discussed have implications for both undergraduate and post-graduate training and
411 may suggest that a more behaviourally sensitive approach to communication, relationship building
412 and human centred care is indicated.

Methodological issues

The sample size in this study is adequate for qualitative research purposes, however, it cannot be assumed that the findings would generalise more broadly. The method of selecting treatment responders, whilst helpful in ensuring that an effective treatment had been performed, does not allow exploration of the experiences of non-responders, which may have yielded other views on the treatment process and is a topic for future research. Furthermore, as participants had not benefited from past treatment approaches, their experience may not generalise to a less impaired group.

Treatment was provided within a highly specialist tertiary care setting and it we cannot discount the possibility that the experience of individualised treatment and nature of the therapeutic relationship were due to the time-rich aspects of the treatment setting rather than PIP *per se*. Similarly, treating physiotherapists in this study had a comparatively high level of training and supervision for their clinical work. Whilst this is not replicated in most primary and secondary care settings there are aspects of relationship building which may be introduced to undergraduate and post-graduate training programmes.

Future research

Further study of the delivery and processes within PIP within primary and secondary care settings would enable an understanding of how treatment delivery can be optimised and modified to the treatment setting. If PIP emerges as a useful and generalizable treatment approach this would warrant study of the ability to effectively train physiotherapists.

436 **Conclusions**

437 Participants in this study described PIP as a different treatment approach to others encountered.
438 Changes in participant's psychological approach to exercise were clearly described including self-
439 awareness and a degree of candour with regards to influence of the therapeutic relationship upon
440 this process.

441

442 Looking more broadly at the literature surrounding therapeutic alliance, specifically in the
443 psychological therapies, may have considerable value. These findings have pointed to powerful
444 relationship variables that are consistent across therapeutic models and conditions. This may serve
445 to build on the already apparent shift in physiotherapy practice towards a biopsychosocial approach.

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450

451 *Ethical approval*

452 This research received ethical approval from the appropriate NHS Research Ethics Committee, and
453 from the hospital R&D committee

454

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457

458 *Conflicts of interest*

459 The authors declare that there are no conflicts of interest.

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Appendix 1 – Calculation of Reliable Change from Jacobson et al. 1999

The calculation of the standard error between two assessment points (S_{diff})

$$SEM_1 = SD_1 \sqrt{1 - r_{12}}$$

SEM_1 is the standard deviation at time 1 multiplied by the square root of one, minus the test-retest coefficient.

$$SEM_2 = SD_2 \sqrt{1 - r_{12}}$$

SEM_2 is calculated in the same way as SEM_1 , but uses SD at the post-treatment time point.

$$S_{\text{diff}} = \sqrt{SEM_1^2 + SEM_2^2}$$

S_{diff} is the square root of the sum of the squared SEMs

90% confidence interval = $S_{\text{diff}} \times 1$.

Appendix 2 - Interview schedule

- Can you tell me how you came to be on a residential pain management programme?
 - *Had you had past treatments?*
 - *Did you see a physiotherapist?*
 - *How did you feel about the prospect of working with physiotherapists as part of the programme?*
 - How did you experience of physiotherapy on programme compare with your previous experiences?
 - *Were there any similarities or differences?*
 - *Can you tell me more about these?*
 - *What were your experiences of these (similarities/differences) in treatment?*
 - *Did the physiotherapist place any emphasis on awareness of your body?*
 - *Did the physiotherapist explore how thoughts and emotions influenced how you moved?*
- If answers that yes physio placed emphasis on awareness:**
- Were you able to become aware of your body as you moved?
 - How did the physiotherapist help you to do this?
 - What was your opinion of working on this awareness?
 - Has you used this awareness since leaving programme?
 - Do you find it helpful?

588

589 **If answers that yes emphasis was places on thoughts and emotions:**

590 • Were you able to notice thoughts and emotions as you moved in physiotherapy sessions?

591 ○ How did the physiotherapist help you to do this?

592 ○ What was your opinion of noticing thoughts and emotions?

593 ○ Was you experience in physiotherapy sessions linked to times in your life that
594 thoughts and emotions influence what you do?

595

596 • How was your experience of life after treatment?

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597 ○ *How does life compare to before treatment?*

598 ▪ *What has changed or stayed the same?*

599 ▪ *What has led to these changes being made?*

600 ▪ *What experiences helped or hindered that change?*

601

602 • How you think or feel about yourself following treatment?

603 ○ *How does this compare to before treatment?*

604 ○ *What experiences led to these changes?*

605

606

607 • What has been your experience of maintaining physical changes at home following
608 programme?

609

610 **Maintained**

611 ○ *Did you have a plan to maintain the changes when you finished programme?*

612 ○ *Has anything helped you to maintain the changes?*

613

- *Family, friends, environment...*

614

615

Not Maintained

616

- *Did you have a plan to maintain the changes when you finished programme?*

617

- *Has anything helped you to maintain the changes?*

618

- *Family, friends, environment...*

619

620

621

622

- Would you like to see any changes to how physiotherapy sessions are delivered on

623

programme?

624

625

- Looking back at your experiences of physiotherapy before coming onto programme would

626

you like to see any changes to how this was delivered?

627

628

- What are your plans for exercise and physical activity into the future?

629