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The association between patient-professional partnerships and self-management of chronic back pain: a mixed methods study

Running head: partnerships in care and self-management

Y. Fu, PhD*; G. Yu, PhD¶; E. McNichol, PhD*; K. Marczewski RGN‡; S.J. Closs, PhD*

* School of Healthcare, University of Leeds

¶ Epidemiology and Cancer Statistics Group, Department of Health Sciences, University of York

‡ SpineFit+, Leeds Community Healthcare NHS Trust

Corresponding author

Dr Yu Fu

School of Healthcare, University of Leeds

Leeds, UK

LS2 9JT

Email: y.fu@leeds.ac.uk, Tel: +44 (0) 113 3431244

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ABSTRACT

Background: Self-management is recommended for patients with chronic back pain. Health professionals' support for self-management can be more effective when working in partnership with patients. The aim of this study was to investigate the associations between patient-professional partnerships and the self-management of chronic back pain.

Methods: An explanatory sequential mixed methods study was undertaken. Adults with chronic back pain referred to pain management clinics participated at baseline and three-month follow-up. Their pain severity, partnerships with health professionals and self-management ability were measured. Hierarchical linear regression was undertaken to examine the strength of the associations between partnerships and self-management. A subsample was interviewed about experiences of the impact of patient-professional partnerships on their self-management ability, using a grounded theory approach.

Results: A total of 147 patients were recruited and 103 (70%) patients completed the follow-up. A strong association ($p<0.001$) was detected between patient-professional partnerships and all dimensions of self-management ability. This was validated by interviews with a subsample of 26 patients. Four themes emerged: connecting with health professionals, being supported through partnerships, feeling positive and making progress towards self-management, and acknowledging the impact but feeling no difference.

Conclusions: Developing a partnership in care may improve patients' ability to gain knowledge, manage side effects and symptoms and adhere to treatment. It helped strengthen health professionals' support and produce a sense of safety for patients. Guiding health professionals in building partnerships where expectations are acknowledged and tailored information and support are provided could be considered as part of the standard education and training.

SIGNIFICANCE

This study identified and validated strong associations between patient-professional partnerships and self-management. Support for self-management alone may not be sufficient, and building partnerships where patients and professionals work together towards agreed goals makes an essential contribution to helping increase patients' ability to self-manage chronic back pain.

INTRODUCTION

Chronic back pain is a major health problem and represents a significant burden on healthcare systems worldwide. In the UK, it has been estimated that the cost of back pain amounts to £1 billion per year (Phillips 2009), while in Germany chronic pain has been estimated to cost up to £13.44 billion annually (Bolten et al., 1998). Pain, reduced physical functioning and poor quality of life are the most common symptoms. However, effective treatment options are still lacking (Haldeman and Dagenais 2008; Hoy et al., 2012; The Pain Proposal Steering Committee 2010) and effect sizes are relatively low for most available treatments including physical, pharmacological and surgical interventions (Van Middelkoop et al., 2011). Further evidence suggests that patients who seek medical attention attributed to the frequency or intensity of chronic back pain do not show substantial improvement compared with those who do not (Balagué et al., 2012).

The development and implementation of health policies and guidelines on chronic back pain has highlighted the need for self-management and the provision of support for people to take care of their own health at all steps of the treatment pathway (Department of Health 2006a; b; NICE 2016). A number of self-management programmes for chronic pain have been developed aiming to improve patients' health outcomes and quality of life (Barlow et al., 2000; Lorig et al., 1998; van Hooff et al., 2010). However, evidence indicates that the management of chronic back pain requires improvement and consistent patient involvement still remains a challenge (De Silva 2011; Oliveira et al., 2012; Rogers et al., 2008; Slade et al., 2009).

Patients' ability to self-manage chronic pain can be affected by many factors, including demographic factors such as age and gender, and clinical factors such as pain severity and pain history (Ersek et al., 2004; Nicholas et al., 2012). Support from health professionals with relevant knowledge and skills is highlighted as an important source for the development of patients' self-management ability (Bodenheimer et al., 2002). Research suggests that patients prefer a partnership with health professionals that includes empathy, listening, respect and recognition and acknowledgement of their own expertise and understanding. Their active input and engagement with pain management is believed to be a key factor to favourable outcomes and best management options (Slade et al., 2009). However, there are various obstacles to self-management that are closely related to a poor consensus and engagement between health professionals and patients (Gordon et al., 2016). One fundamental obstacle is the existence of divergent viewpoints on the nature and meaning of effective self-management (Stenner et al., 2015). Patients find it challenging to practise self-management strategies that require commitment alongside managing other comorbidities and daily living (Currie et al., 2015). Supporting patients in building partnerships with health professionals where information provided is tailored to their diverse needs and perspectives, is a key component of fostering active self-management (Lawn et al., 2014; Lorig and Holman 2003). Working together with patients and being able to communicate and negotiate in different ways helps to enhance trust and mutual commitment (Bodenheimer et al., 2002; Cooper et al., 2008; Coulter and Collins 2011; Crawford et al., 2012; Fu et al., 2015; Street et al., 2009; Suchman et al., 1998; Wagner et al., 2005). Despite its strategic importance in theory, there has been little research using mixed methods approaches into the meaning of patient-professional partnerships and how it may influence self-management for patients with chronic back pain. This study systematically explored the associations between patient-professional partnerships and self-management of chronic back pain. Two specific issues were addressed:

1) To investigate whether a good patient-professional partnership is associated with an improved ability to self-manage chronic back pain; if so, to examine further the strength of the associations.

2) To validate the associations and explain how patient-professional partnerships may influence their self-management ability by exploring patients' experiences.

METHODS

A mixed methods approach was undertaken to capture both the extent and the nature of the patient's perspective and understanding of the influence of patient-professional partnerships on patients' self-management. The advantages of using a mixed methods approach in health research have been highlighted in many studies (Bowling 2014; O'Cathain et al., 2007). This methodology ensures its ability to address different research perspectives in a logical sequence within a single study, providing broader evidence than either quantitative or qualitative approaches alone (Bryman 2006; Creswell and Plano Clark 2011). An explanatory sequential design comprising a quantitative phase and a complementary qualitative phase was undertaken. Within this design, the quantitative phase has the priority to address the research question, and the subsequent qualitative phase was implemented to focus on explaining the quantitative results. This approach is particularly useful when a study aims to explain the mechanism or reasons behind statistical results (Creswell 2014).

Ethics

Ethics approval was granted by the National Research Ethics Service Committee (13/YH/0413). All of the data were collected with the informed consent of participants provided prior to the study.

Study setting

This study was designed to take place during routine clinic appointments and not as a stand-alone research study. It was carried out in three National Health Service (NHS) pain management clinics in northern England in the UK. Each provided support and advice by a multidisciplinary team of health professionals (physiotherapists, specialised nurses and health care trainers) to help the patients self-manage chronic back pain. Their partnerships with patients were generally developed by providing individualised care and working together with the patient. Patients were involved with health professionals in setting goals and developing individualised management plans. Through this, health professionals undertook patients' health needs assessment, collaborated with patients to identify specific problems that they desired to be addressed within a certain period of time. They also offered written materials and tailored exercise. The patients practised self-management skills and provided feedback on their progress to health professionals during their individual consultations. The face-to-face consultations lasted up to 60 minutes and allowed patients flexible appointment options to bring along their family members. The clinic did not provide any medical interventional treatment such as injection therapy.

In order to observe the development of their partnerships with health professionals and self-management, eligible patients for this study had to be newly referred patients (aged 18 and above with sufficient ability to read and understand English) who also had opted in to the clinic after the initial assessment. They were approached and recruited straight after the completion of their initial assessment where they started to get familiar with the health professionals and receive self-management support (baseline). Once patients had signed the consent forms, self-report questionnaires were provided to be completed without assistance in a room in the clinic. The development of their partnerships with health professionals and self-management ability were reassessed at three months (follow-up).

Quantitative phase

Study subjects

A prospective cohort study of adult patients experiencing chronic back pain was undertaken over a period of three months in three community-based pain management services. A consecutive sampling strategy was applied to recruit patients in this study. Patients with malignant pain or requiring acute medical treatment were excluded.

Data collection

Patients' general health-related demographic (i.e. age, gender, ethnicity, and educational level) (Chandola 2000; Rose and Pevalin 2000) and clinical characteristics (duration of pain and pain sites) (Breivik et al., 2006; LeFort et al., 1998) were retrieved from their electronic clinical records. All questionnaires were administered solely for the purposes of this study by the same people, to collect patients' responses at baseline and three-month follow-up, helping to minimise the treat to the internal validity of this study.

The Brief Pain Inventory (BPI) was completed by patients to estimate the severity or magnitude of pain. The BPI has been frequently used in psychometric evaluations and clinical applications with a wide range of conditions (Cleeland 2014; Mathias et al., 2011). Patients were asked to rate their pain severity ("worst", "least", "average", and "now") with a numerical response scale ranging from 0 (no pain) to 10 (the worst pain) (Cleeland and Ryan 1994). A mean severity score of a composite of the four items was used to represent pain severity (Cleeland 2009).

Patient-professional partnership was measured using the partnership subscale of the Patient Partnership in Care (PPiC) questionnaire, which was designed specifically to measure the core elements of health professionals to work in partnership with patients with long term conditions to support self-management (Powell et al., 2009). It is a valid and reliable questionnaire that has also been used in the NHS Adult Cancer Survivorship Programme (Davies and Batehup 2010). It specifically asks patients to rate health professionals' ability to understand their needs and concerns, provide tailored information, listen to them and understand their personal situation, offer support for managing the condition and follow up on their health care, and to rate their overall perceived partnership with health professionals. The partnership subscale has 11 items with a five point Likert response (0 indicating poor, 5 indicating excellent) giving a maximum score of 55. A higher score suggests a better partnership. This subscale showed good internal consistency (Cronbach's alpha=0.977) in a study with respect to four long-term conditions (chronic obstructive pulmonary disease, musculoskeletal pain, depression and diabetes) (Powell et al., 2009).

Patients' abilities to self-manage chronic pain were measured using a 12-item version of the Partners in Health (PIH) scale, which has been demonstrated to have internal consistency and construct validity for assessing self-management in a range of chronic conditions (Battersby et al., 2003). Patients rate each item on a nine-point (0–8) Likert scale, with 0 being the worst and 8 being the best response. The PIH is a self-reported tool for patients to assess their self-management in four domains (knowledge, side effects, symptoms, and treatment adherence) following the general principles of self-management developed by Battersby et al. (Battersby et al., 2007; Battersby et al., 2003; Human and Malcolm 2005). The score for each domain comprised the sum of the relevant subscale scores, and a general index was computed by summing the score of the four domains. Scores on all domains and the general index were linearly transformed into a 0-100 scale on the assumption that each question carries equal weight. A higher score represents a better ability to self-manage. The PIH scale has been shown to have high internal consistency (Cronbach's alpha=0.82) (Petkov et al., 2010).

Data analysis

Three-level linear regression analyses were used to explore the associations between perceived ability to self-manage and patient-professional partnerships by taking into account the hierarchically-structured data. Hierarchical linear modelling allows the simultaneous investigation of the effect of group-level and individual-level variables on individual-level outcomes (Diez-Roux 2000; Gelman 2012). Patient-professional partnerships and ability to self-manage measured at baseline and follow-up were used as lowest level variables (level 1). Patient-related demographic and clinic characteristics at baseline were used as patient-level covariates (level 2), which were nested in each pain management clinic (level 3). Variations from each level were controlled by introducing a random intercept at each level (Diez-Roux 2000; Gelman 2012). Stata 14 was used for running the regression (StataCorp 2013).

Due to the difficulties in obtaining an accurate estimate of the intracluster correlation coefficient and the degree of heterogeneity of the group distributions between clinics, we did not take into account the potential influence of clustering of effects across clinics when calculating the sample size, assuming the strength of the reported associations remained the same across clinics. The standardised difference of 0.40 using the Partners in Health scale as the key outcome measure required a target sample size of at least 84 participants based on statistical power calculation at a power level of 0.95 and type 1 error rate of 0.05 (Cohen 1988).

Qualitative phase

Study subjects

Patients who completed quantitative data collection at both baseline and three-month follow-up were eligible to participate in this subsequent phase. Patients were purposively selected using a maximum variation strategy (Patton 1990) to ensure the inclusion of patients with increased, unchanged, and lowered self-management ability. The concept of data saturation guided sample size for this phase (Charmaz 2006).

Data collection

Semi-structured individual face-to-face interviews, using open-ended questions were undertaken. An interview topic guide was developed partly based on the questions listed on the PIH questionnaire, probing issues relating to partnerships in care, ability to self-manage (knowledge, side effects, symptom, and treatment adherence) and the associations between partnerships and self-management (whether there were any, what they were, and why). This guide ensured that topics were covered consistently while being sufficiently flexible that patients could raise topics of personal relevance. The study protocol and topic guide were taken to an Involvement Advisory Group of 8-9 patients and carers for review and feedback. A final version of the interview topic guide was then developed (Fig. 1). During each interview, topics were probed on the support received in pain management from their health professionals, the knowledge and pain management skills developed and ways that health professionals may have influenced their self-management for chronic back pain. All interviews were undertaken either in the clinic or patients' homes based on their preferences, and digitally recorded and transcribed verbatim for analyses (Halcomb and Davidson 2006).

Data analysis

Constant comparative analysis was used to analyse the qualitative data (Charmaz 2006). Each interview was transcribed verbatim and each transcript was reviewed against the audio recording for accuracy. These transcripts were coded in an iterative process, including initial line-by-line coding, focused coding and theoretical coding. The substantive codes and strong analytical directions were developed when comparing and synthesising the most frequent codes. Following this, the theoretical codes were generated which specified potential connections between categories and themes. This process continued until no new themes were generated. The whole coding structure was examined by co-authors independently to confirm that each category and theme added a distinctive contribution and the complex relationships between them were thoroughly explored. NVivo 10 software facilitated coding and analyses (QSR International 2012).

Quality assurance

Three primary strategies, including triangulation, providing a thick description and peer reviewing were used to ensure the accuracy of findings of this study. Triangulation was achieved by designing the qualitative phase according to associations detected in the quantitative modelling. By purposively selecting patients with a lowered self-management score at follow-up for interviews, evidence that may provide contradictory information was also sought to ensure that all possible dimensions were covered in the emerging theory. A detailed description of the research setting, sampling strategy, sample size, methods of data collection and analysis has been provided to ensure transparency. Peer reviewing was undertaken by two academics independently.

RESULTS

Quantitative phase

A total of 147 patients were recruited at baseline and 103 participants were followed up at the final measurement point three months later. Patients not completing this phase included those who did not attend for follow-up due to having experienced similar treatment experience without improvement (n=12) and those who were discharged (n=32) according to the clinics' attendance policy (that patients would be discharged if two consecutive appointments were missed without contact). There were no differences shown on their demographic and clinical characteristics or the outcome of interest at baseline between patients who participated in the follow-up and those who dropped out. Therefore complete-case analyses were undertaken on the assumption that drop-outs were likely to have been missing by chance and were therefore non-informative. Table 1 shows the demographic and clinical characteristics of the 103 patients used in the analyses as well as outcomes at baseline by three clinic services. There were no significant differences in means or proportions at baseline between clinic services at 1% level. The majority were females (67.0%), and the median age of the patients was 48 (range: 19-84) years. More than three quarters (81.6%) of patients were British, and similar percentage (82.6%) of patients had no qualification or below “A level” in terms of educational background. The mean pain severity score was 5.7 (maximum score 10) with 1.6 standard deviation (SD), and half of patients (49.5%) had suffered back pain for more than eight years.

Details of patients’ partnership and self-management ability at both baseline assessment and follow-up were also shown in Table 1 to present changes in these two outcomes that might be attributed to the treatment provided by the clinics. The mean value of the total score of patient’s partnerships with health professionals increased from 37.8 (SD: 8.6) at baseline to 45.1 (SD: 6.8) at follow-up. The mean values for four dimensions and the overall index of self-management ability also increased by at least 13.3% from baseline to follow-up (knowledge: 50.8 vs 73.8, side effects: 45.0 vs 63.4, symptoms: 73.2 vs 82.9, treatment adherence: 78.2 vs 89.6, and overall: 63.2 vs 77.6). Both improvements in partnership and self-management from baseline were significant at 1% level.

Associations between patient-professional partnerships and patients’ ability to self-manage their pain and the standardised coefficients for the fully adjusted models can be found in Table 2. The significant positive regression coefficient (0.82, 95% CI: 0.63 to 1.01, $p<0.001$) specified that patients who reported better patient-professional partnerships experienced, on average, greater overall self-management ability. Similarly, patient-professional partnerships were also identified to be positively associated with each dimension (i.e. knowledge, managing side effects, managing symptoms and adherence to treatment) of self-management ($p<0.001$). Meanwhile, pain severity was found to be negatively associated with the overall ability to self-manage (-1.52, 95% CI: -2.58 to -0.47, $p<0.001$) and increased difficulty with management of side effects (-4.71, 95% CI: -6.48 to -2.93, $p<0.001$). Increasing age was also found to be associated with rising knowledge on self-management (0.44, 95% CI: 0.16 to 0.72, $p<0.001$) and ability to manage side effects (0.34, 95% CI: 0.10 to 0.58, $p=0.01$). Patients with a higher educational background (‘A’ level and above) had a greater ability to manage side effects (15.84, 95% CI: 5.65 to 26.04, $p<0.001$), whereas gender, pain history, and number of pain sites showed no significant association.

Qualitative phase

A subsample of 26 patients was recruited for qualitative interviews and the majority of them were female, British and had no qualification and below “A level” as their educational background. Their demographic (i.e. age, gender, ethnicity and educational level) and clinical (i.e. change of pain severity, pain history, numbers of pain sites and change of overall and each domain of self-management ability) characteristics are presented in Table 3. More than half of the patients (n=15) experienced reduction of their pain severity. To ensure the inclusion of patients with different levels of self-management ability, 17 patients with increased, seven with unchanged and two with lowered self-management ability were purposively selected to explore the variation of their experiences in the clinics. For patients with unchanged and lowered overall self-management ability, it was likely that their pain severity remained unchanged or increased at follow-up.

Each interview lasted between 25 and 90 minutes. A comparison of patients’ experiences was made during constant comparative analysis allowing for the emergence of unforeseen findings that may challenge the results of the quantitative phase. Four themes emerged, three of which helped validate the positive associations identified between patient-professional partnerships and self-management whereas one explained the contrasting cases with unchanged and lowered overall self-management ability at follow-up.

Connecting with health professionals

Patients were able to feel a connection with health professionals in the clinics, particularly with those who they visited the most. They felt being supported in pain management was achieved through working together with health professionals to: set up realistic goals, go through exercises together and be treated as a partner to address their common goals rather than a general patient who is being told to comply. A list of factors was also suggested by patients that have facilitated the development of their relationships with health professionals and further motivated them to continue their treatment in the pain clinics. These factors included that patients expected health professionals to hold desirable attitudes and characteristics, be able to communicate effectively, and understand their situation and health needs. Meanwhile, patients expressed their desire to receive continuous care with particular health professionals and be able to trust them. Beyond this, patients also identified factors that may impede or had impeded their relationships with health professionals. These included insufficient information given or lack of an individualised treatment, being treated differently from what patients expected, gaining no improvement or being offered insufficient time. Patients also highlighted that such a connection was necessary to make them feel they were being placed at the centre of their care, but it required mutual contributions of both parties to recognise and share the expertise and responsibility.

> *"It's more that sort of they're here to teach, I'm here to learn. It's a partnership rather than I say you do. It is a partnership. You've got to work together with them and I think that they make that very clear in a very nice way." [Patient 69, 49-year-old female, with a pain severity score of 7 vs 9 and a PIH score of 96.8 vs 98.9 (baseline vs follow-up)]*

Being supported through patient-professional partnerships

Pain management skills offered in the pain clinics were not completely new to patients, as became clear when they were asked to compare the skills learnt before and after attending the pain clinics. However, patients were more willing to practise these skills when health professionals supported the whole process by demonstrating these skills in person and tailoring the level to fit their personal situations. Health professionals also provided written materials for patients to take away and reviewed their progress against their goals. Patients highlighted that the support from health professionals and relationships built with health professionals consistently motivated them to practise self-management. Such support was further strengthened and individualised through the development of their relationships by understanding patients' needs and priorities. The support received was categorised into education, practical skills and psychological support.

In contrast with knowledge learnt from their general practitioners (GPs), patients were more satisfied with the specialised knowledge on pain provided by health professionals in the clinics. Most of them had a more systematic understanding of their condition and pain management, as they were able to relate this information and instructions to their life situation. Health professionals also provided them with the written resources that contained examples of others self-managing pain and a variety of pain management tools, including pacing, prioritising and planning daily life, relaxation and a CD to help them sleep. This provided the freedom to choose what was appropriate to their personal needs in the short, and medium to long term, instead of having to adhere to a fixed programme. Patients described that they felt safe and equipped to have a range of accessible materials to support pain management.

> *“That small amount of information, any kind of information, is better than nothing.” [Patient 56, 45-year-old female, with a pain severity score of 4 vs 6 and a PIH score of 79.1 vs 84.3 (baseline vs follow-up)]*

Patients commented positively on health professionals’ performance in demonstrating physical exercises and taking time to review how patients could practise them correctly. This provided opportunities for both patients and health professionals to check their goal setting and progress. Patients felt satisfied about being able to control the amount of exercise based on their health needs and level of pain.

> *“I can see it because she’s shown me things in my movement and everything that need correcting.” [Patient 40, 54-year-old female, with a pain severity score of 5 vs 2 and a PIH score of 54.1 vs 76.0 (baseline vs follow-up)]*

In addition, patients appreciated explanations given by health professionals that there may not be an immediate improvement with a short period of time (2-3 months) and they could even suffer more pain at the beginning of practising exercise. However, this pre-notification produced reassurance for patients and enhanced their trust in their health professionals. They felt safe to continue self-management that was supported by their trust and connections with health professionals.

Along with education and practical skills, health professionals paid particular attention to patients’ emotional distress that may be caused by their physical pain. Patients remarked that they were frequently consulted about their anxiety and depression and were provided with specific skills, for example meditation, for the management of emotional distress. Patients described that they were able to identify the impact of their long term condition on their emotions. With knowledge and skills learnt from health professionals, they could identify some positive changes in their mind and mood. In addition, being able to read about others’ experiences of managing pain, they felt more confident and safe to manage the challenges that they faced.

> *“They taught me how to breathe better to help you relax and stuff like that. So it’s helpful. And I do look at it every so often and think I’ll try that again” [Patient 112, 49-year-old female, with a pain severity score of 7 vs 8 and a PIH score of 62.5 vs 81.2 (baseline vs follow-up)]*

Feeling positive and making progress towards self-management

Being held accountable by health professionals for pain self-management and supported through their partnerships with health professionals, resulted in patients feeling that their perceptions of pain and symptom management had changed positively to some extent. They started to accept the nature of the long term condition and think positively about their pain management. Gaining specialised knowledge, being able to trust health professionals, and feeling safe and equipped with self-management skills, patients attempted to cope with both their negative psychological state and pain. This change in patients’ perceptions and behaviour also enabled them to reflect on their previous experiences of pain management and identify the areas where they could set new goals. Patients' willingness and interest in pain management were particularly stimulated by individualised programmes that were developed through working in partnerships. Building a patient-professional partnership was perceived as a great advantage in developing individualised programmes, in which health professionals gathered details about patients' conditions and challenges faced while in turn patients obtained knowledge and skills specifically helping to address their own difficulties.

> *"I'm managing the pain better and also some of the exercises that they've given me she said do this, do that, and I find that when I'm sat, when I'm driving that I'm changing my position. I have learnt something from it, and I'm thinking, oh I could do this, do that, it does help." [Patient 143, 63-year-old female, with a pain severity score of 5 vs 1.75 and a PIH score of 80.2 vs 92.7 (baseline vs follow-up)]*

A number of positive signs were identified as a result of practising self-management. Feeling positive about their mind-set and being optimistic in pain management were considered as the key benefits. Experiencing less pain and having increased awareness of self-management techniques enabled patients to realise that it was possible to lead a normal life.

Acknowledging the impact but feeling no difference

In contrast to other themes, this theme emerged particularly in interviews with patients who experienced unchanged and lowered self-management ability at follow-up. Patients commented positively on the necessity to develop a partnership with health professionals who supported their pain management. They also acknowledged the potential positive influences on their ability to self-manage pain. However, a relatively short time interval between baseline and follow-up was identified as the main barrier to effective self-management. Patients remained optimistic and believed their ability to self-manage the pain would be increased with health professionals' continued support.

> *"Having a partnership is quite important to me because I feel if they don't understand what's wrong with me, like how I'm feeling, then they're not going to be able to help me." [Patient 117, 28 years old female, with a pain severity score of 7 vs 5.5 and a PIH score of 78.1 vs 65.6 (baseline vs follow-up)]*

Possible explanations for lowered self-management ability were further explored. Both patients (Patient 49 and 117) had had a number of years' experience in seeking solutions to manage their condition and had tried almost every available intervention before being referred to the pain clinic. It was therefore challenging for them to find any novel or alternative strategies provided by health professionals, leaving them in the situation where they made no difference or progress on pain management.

> *"No, I've not felt any (differences)… I've just felt it's helped me relax, my entire body, relaxed. But I don't think it does anything…I've not really felt anything different. And nobody else in the family have said they've noticed anything particularly, other than I've found that relaxation benefits me." [Patient 49, 49-year-old female, with a pain severity score of 4.3 vs 5.8 and a PIH score of 93.8 vs 78.1 (baseline vs follow-up)]*

DISCUSSION AND CONCLUSIONS

This study suggested that a good patient-professional partnership was associated with an improved ability to self-manage chronic back pain. Pain management support provided by health professionals could be strengthened and maximised by building and maintaining a partnership with patients, who then felt safe and motivated to practise self-management strategies. These findings were achieved by employing a mixed methods approach that provided a rigorous research design to investigate and validate the strength of the positive associations in a logical sequence. In this study, the point where mixing of the methods occurred and their logical sequence was established was determined by the significant associations detected in the initial quantitative analyses. This informed the set-up of the following qualitative phase to explore and validate those associations by studying patients' experiences. Triangulation of methods and data was achieved using two main strategies in this study. First, it was undertaken by comparing patients' interview transcript with their responses to the questionnaires. Second, the emergent codes, categories and themes were compared with the associations detected. This confirmed that there was a consistency between their responses to the questionnaires and interviews, and the results of this study were found to be reliable for building a coherent and systematic understanding of the influences of patient-professional partnerships on the self-management of chronic back pain.

The strong positive associations between patient-professional partnerships and patients' ability to self-manage were validated and explained by patients' experiences of being supported by health professionals through their partnerships. Health professionals' support on pain management also mirrored each domain of the PIH scale that was significantly associated with patients' partnerships with health professionals. Both general and specialised knowledge were delivered according to patients' health needs, which further informed health professionals' demonstration of practical skills and provision of psychological support to help patients manage symptoms and other negative impacts. By building a partnership with health professionals and feeling accountable for pain self-management, patients were able to experience a sense of safety and increase their adherence to treatment and pain management. Findings from this study echo recommendations for self-management support to be tailored to individual preferences and lifestyles (Taylor et al., 2014). Individualised care provided by health professionals with different backgrounds and expertise reflects the development of the integrated service model, which refers to the management of health services that ensure patients' health needs are met whenever and wherever required (WHO 2008). This model is particularly advocated by the Core Standards for Pain Management Services in the UK, which state that primary care, secondary care and local authorities must co-operate to deliver individualised care plans for people with chronic pain (The Faculty of Pain Medicine 2015).

Individuals with severe pain in this study showed significantly poor self-management ability. This has also been reflected in the profiles of patients selected for the interviews. Patients with unchanged or lowered self-management ability were likely to experience unchanged or increased severity of pain, whereas patients with increased self-management ability were likely to report less pain. Such findings are consistent with previous studies investigating the effects of chronic pain on patients' self-management (Kerns and Rosenberg 2000; Krein et al., 2005). Possible reasons explored in this study included that those patients often suffered multiple conditions and some of which were triggered by their severe pain. They therefore reported more difficulties in their daily life and desired a more holistic approach to pain management. However, it was noted that two interviewees with lowered self-management experienced contrasting pain severity change (Patient 49 and 117). This may be explained by the effect of the knowledge gained and their ability to manage symptoms, that is, increased level of knowledge and ability to management pain and other related symptoms may contribute to the reduction of pain severity. It is also worth noting that although three interviewees who (Patients 20, 63 and 137) showed increased self-management ability, their pain severity scores were not necessarily reduced. This may be attributed to their age (being 55 years and older), long history of pain (at least eight years) and multiple pain sites (at least three sites). These findings have been supported by existing literature on ageing and pain. The occurrence and prevalence of back pain and other musculoskeletal conditions increases markedly with age (Woolf and Pfleger 2003). Meanwhile, older adults are likely to suffer multiple health conditions such as obesity where pain is often identified as a symptom (Patel et al., 2013). Given that pain is a subjective experience, duration and frequency of pain have been suggested as important temporal aspects of pain to measure that allow an accurate assessment of how the pain affects an individual's daily functioning (Farrar et al., 1998; Jensen and Karoly 2001). History of pain can also be referred to as an important factor when recommending self-management strategies that may work effectively at different stage of pain. For example, knowledge of the cause of pain and available therapies may be emphasised to patients when they initially feel pain, whereas behavioural change and other lifestyle interventions may need to be adapted for those with an established condition. Multisite pain is also found to be associated with mental disorders and lower physical performance in older adults (Denkinger et al., 2014; Gureje et al., 2008), therefore it could be a simple measure in the management of complex pain. These findings highlight the importance of considering potential competing demands in practice, for example, self-management may be beneficial when being integrated with other interventions helping to minimise the effects of pain. In addition to assessing patients' pain severity on a standard scale, treating patients as equal partners and developing a partnership enable health professionals to gain a greater understanding of both their pain and health needs, which may facilitate the design an individualised self-management programme.

Patients described their patient-professional partnerships as a co-production model (Gilardi et al., 2016) that requires individual contributions from both patients and health professionals to achieve desired health outcomes. A number of identified facilitators and barriers to a good partnership should also be recognised by health professionals in practice, as they may have an impact on patients' receipt of health professionals' support and the effectiveness of treatment and care. The findings of this study also underlines the concept of supported self-management for patients with long term conditions, which requires responsibilities and input from health professionals who provide education and guidance and also from patients who develop the skills to manage their condition (Panagioti et al., 2014; Taylor et al., 2014). Currently, 'self-management' and 'self-care' are the terms interchangeably used by the Department of Health (DH) (Department of Health 2006b; 2009) and other leading health organisations such as the National Institutes of Health (NIH) in the US (Control and Prevention 2011; DeFriese and Ory 1998), the King's Fund and the Health Foundation in the UK (Naylor et al., 2015). However, it is worth noting that they may be interpreted differently. Compared with self-management, self-care is a more encompassing concept that refers to individual responsibilities for healthy lifestyle behaviours required for human development and functioning (Richard and Shea 2011). Self-management can be conceptualised as a subset of self-care that has a particular focus on managing symptoms, treatments, lifestyle changes, and psychosocial, cultural, and spiritual consequences of chronic diseases, with support and efforts from health professionals in conjunction with family and community (Wilkinson and Whitehead 2009). This is consistent with the findings of this study that self-management of chronic back pain is strengthened by health professionals' support through their partnerships.

Study limitations

There were potential weaknesses in this study. First, the relatively short duration of follow-up (3 months) may over- or underestimate some outcomes of interest. Future studies with long-term follow-up would greatly enhance the value of this study by investigating the long-term impact of ongoing patient-professional partnerships on patients' self-management. Second, there is a possibility of bias associated with the self-reported measures used. Given the fact that pain is a subjective feeling, it would be useful to collect other objective information such as medicine use and the views of health professionals in future studies. With a 30% dropout rate, it was unknown whether follow-up data would have strengthened or weakened the associations if they had been followed up. However no differences were found between baseline participants and non-participants in demographic characteristics, pain history, sites and severity. This suggested that missing data were likely to have been missing by chance. Because the majority of the patients' ability to self-manage increased after three months, only two patients with lowered ability could be included in the interview phase. Hence patients with indifferent experiences or perceptions may be under-reported and future studies would be useful to set up with the aim of exploring the experiences of those with unchanged or lowered self-management ability after attending pain management clinics. These limitations identified in this study were overcome to some extent through the use of the mixed methods study design, in which the findings of the patients' interviews showed congruence with their responses to the questionnaires and also provided further information helping to explain and validate the associations detected in the quantitative phase.

Conclusion and implications

This mixed methods study suggested that self-management advice and support provided by health professionals, based on a good patient-professional partnership, increased patients' ability to self-manage. The findings confirmed the theory proposed by Bodenheimer et al., (2002) that good patient-professional partnerships improve self-management for patients with chronic conditions. The mechanisms for this improvement were also comprehensively validated through exploring patients' perceptions and experiences, which suggested that self-management is supported and strengthened through the development of a patient-professional partnership.

Patients commented that it was necessary to develop a partnership with their health professionals, not just in the pain clinic, but also elsewhere. More research may be needed to compare any differences that might arise depending on who the partnership is developed with (e.g. physiotherapists or health care trainers) and determine the relevance and applicability of the results of this study to other patients with long term conditions as well as to other health care settings. It would also be beneficial to understand views from health professionals on the associations between patient-professional partnerships and self-management of chronic back pain. With self-management becoming increasingly common in pain clinics, further research using randomised controlled trials is needed to assess the effectiveness of pain management clinics in primary care settings. The individualised care and support provided by health professionals in this study also reflected existing health policies nationally and internationally, which highlight the importance of involving patients with long term conditions in management and decision-making for their own care and treatment (Department of Health 2013). This study has provided empirical evidence to support the Expert Patient's Programme that aims to develop self-management initiatives for patients with long term conditions through a good patient-professional partnership (Department of Health 2001). In practice, more training may be needed for GPs to access structured and specialised knowledge in pain management. Guiding health professionals in building partnerships where expectations are acknowledged and tailored information, skills and support are provided, could be considered as part of the standards of education and training.

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AUTHOR CONTRIBUTIONS

All authors have read the article, discussed the results and commented on the manuscript. All authors have met the criteria for authorship and approved the final.

Y. Fu: study design, ethics application, patients' recruitment, data collection and analysis, drafting the manuscript.

G. Yu: data analysis and interpretation, supervision of data analysis, revising the manuscript.

E. McNichol: supervision of study design, ethics application, patients' recruitment, and data collection, revising the manuscript.

K. Marczewski: supervision of study design, patients' recruitment and data collection, revising the manuscript.

S.J. Closs: supervision of study design, ethics application, patients' recruitment and data collection, revising the manuscript.

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LEGENDS FOR ILLUSTRATIONS AND TABLES

FIGURES

Fig. 1. Interview topic guide

TABLES

Table 1. Patients' demographic and clinical characteristics

Table 2. Results of multilevel random intercept linear regression for self-management ability

Table 3. Characteristics of interviewees (n=26)

TABLES

Table 1. Patients' demographic and clinical characteristics

	Overall		**Clinic A**		**Clinic B**		**Clinic C**		**p-value**
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	
Socio-demographic Characteristics									
Age (median, range)	48	19-84	46	25-84	48	20-82	48	19-71	0.772
Gender									0.548
Male	34	33.0	9	29.0	16	31.4	9	42.9	
Female	69	67.0	22	71.0	35	68.6	12	57.1	
Ethnicity									0.058
Non-British	19	18.4	10	32.3	6	11.8	3	14.3	
White British	84	81.6	21	67.7	45	88.2	18	85.7	
Educational Level									0.049
No qualifications	32	31.1	6	19.4	20	39.2	6	28.6	
Below A level	53	51.5	20	64.5	19	37.3	14	66.7	
A level and above	18	17.4	5	16.1	12	23.5	1	4.7	
Clinical Characteristics at Baseline									
Pain Severity (mean, SD)	5.7	1.6	5.6	1.4	5.7	1.7	5.9	1.6	0.815
BPI Pain Interference (mean, SD)	6.2	2.0	6.2	2.2	6.3	1.9	6.2	1.9	0.945
Pain History (years)									0.107
≤ 4	36	35.0	13	41.9	20	39.2	3	14.3	
5-7	16	15.5	2	6.5	10	19.6	4	19.0	
≥ 8	51	49.5	16	51.6	21	41.2	14	66.7	
Number of Pain Sites									0.803
1	20	19.4	5	16.1	11	21.6	4	19.0	
2	39	37.9	10	32.3	21	41.2	8	38.1	
≥ 3	44	42.7	16	51.6	19	37.2	9	42.9	
Outcome Measures at Baseline (mean, SD)									
Partnership	37.8	8.6	35.2	10.4	39.2	7.6	38.6	7.6	0.113
Ability of Self-management									
Knowledge	50.8	29.0	48.4	22.6	49.9	29.3	56.8	36.5	0.560
Side Effects	45.0	23.8	41.5	25.4	47.5	23.4	44.0	22.7	0.543
Symptoms	73.2	15.3	69.1	13.5	76.5	15.4	71.2	16.2	0.081

Treatment Adherence	78.2	18.8	75.2	19.1	80.6	19.5	76.5	16.6	0.407
Overall	63.2	14.1	59.8	12.1	65.5	14.8	62.9	14.7	0.205
Outcome Measures at Follow-up (mean, SD)									
Partnership	45.1	6.8	45.7	5.8	43.8	7.1	47.3	7.2	0.122
Ability of Self-management									
Knowledge	73.8	21.5	70.0	18.1	76.3	20.8	73.2	27.3	0.427
Side Effects	63.4	20.3	60.5	20.9	64.9	19.8	64.3	20.8	0.626
Symptoms	82.9	11.2	79.7	13.4	85.7	8.5	80.8	12.0	0.038
Treatment Adherence	89.6	13.8	87.3	13.5	92.5	12.2	85.7	16.7	0.088
Overall	77.6	11.1	74.5	12.3	80.1	9.3	76.2	12.5	0.073
Overall	103		31	30.1	51	49.5	21	20.4	

Table 2. Results of multilevel random intercept linear regression for self-management ability

Parameter	Knowledge			Side Effects			Symptoms			Adherence			Overall		
	Coef.	95% CI	p-value	Coef.	95% CI	p-value	Coef.	95% CI	p-value	Coef.	95% CI	p-value	Coef.	95% CI	p-value
Partnership	1.47	(1.10 to 1.84)	<0.001	0.70	(0.37 to 1.02)	<0.001	0.72	(0.54 to 0.90)	<0.001	0.62	(0.36 to 0.88)	<0.001	0.82	(0.63 to 1.01)	<0.001
Age	0.44	(0.16 to 0.72)	<0.001	0.34	(0.10 to 0.58)	0.01	0.18	(0.02 to 0.34)	0.03	-0.03	(-0.22 to 0.15)	0.73	0.23	(0.09 to 0.37)	<0.001
Gender															
Male	(reference group)														
Female	-2.78	(-10.84 to 5.28)	0.50	3.52	(-3.47 to 10.52)	0.32	1.54	(-3.08 to 6.16)	0.51	-0.03	(-5.49 to 5.42)	0.99	1.10	(-3.05 to 5.25)	0.60
Ethnicity															
Non-British	(reference group)														
White British	10.46	(0.87-20.05)	0.03	7.24	(-1.08-15.57)	0.09	3.35	(-2.23-8.93)	0.24	3.50	(-3.02-10.03)	0.29	5.37	(0.38-10.35)	0.03
Educational Level															
No qualifications	(reference group)														
Below A level	4.46	(-4.47 to 13.38)	0.33	7.03	(-0.71 to 14.78)	0.08	3.31	(-1.90 to 8.52)	0.21	-4.10	(-10.17 to 1.98)	0.19	3.36	(-1.29 to 8.01)	0.16
A level and above	2.52	(-9.22 to 14.27)	0.67	15.84	(5.65 to 26.04)	<0.001	3.26	(-3.49 to 10.01)	0.34	-9.96	(-17.91 to -2.01)	0.02	4.12	(-1.94 to 10.17)	0.18
Pain Severity	-1.32	(-3.35 to 0.71)	0.20	-4.71	(-6.48 to -2.93)	<0.001	-0.62	(-1.67 to 0.44)	0.25	0.78	(-0.63 to 2.18)	0.28	-1.52	(-2.58 to -0.47)	<0.001
Pain History (years)															
≤4	(reference group)														
5-7	-8.33	(-19.58 to 2.92)	0.15	-0.17	(-9.94 to 9.59)	0.97	1.53	(-4.96 to 8.01)	0.64	0.21	(-7.41 to 7.83)	0.96	-0.88	(-6.69 to 4.93)	0.77
≥8	2.33	(-5.90 to 10.57)	0.58	-1.46	(-8.61 to 5.68)	0.69	-2.29	(-7.07 to 2.48)	0.35	-0.67	(-6.27 to 4.93)	0.82	-1.00	(-5.28 to 3.27)	0.65
Number of Pain Sites															
1	(reference group)														
2	4.01	(-6.22 to 14.23)	0.44	-2.36	(-11.24 to 6.52)	0.60	-1.09	(-6.96 to 4.77)	0.72	6.57	(-0.34 to 13.49)	0.06	0.70	(-4.56 to 5.96)	0.79
≥3	12.88	(2.73 to 23.04)	0.01	-6.65	(-15.47 to 2.16)	0.14	1.14	(-4.69 to 6.97)	0.70	1.58	(-5.28 to 8.45)	0.65	1.24	(-3.98 to 6.46)	0.64

(Coef: coefficient; CI: confidence interval)

Table 3 Characteristics of interviewees (n=26)

Patient No.	Age	Gender	Ethnicity	Educational Level	Change of Pain Severity	Pain History (years)	Numbers of Pain Sites	Change of Self-management Ability				
								Knowledge	Side Effects	Symptoms	Adherence	Overall
P5	52	Female	British	Below A level	Unchanged	1-4	≥3	Unchanged	Lowered	Unchanged	Unchanged	Unchanged
P20	58	Female	British	A level and above	Unchanged	≥8	≥3	Unchanged	Increased	Unchanged	Lowered	Increased
P33	29	Female	British	A level and above	Lowered	≥8	2	Increased	Unchanged	Unchanged	Unchanged	Unchanged
P40	54	Female	British	No qualification	Lowered	≥8	2	Increased	Increased	Increased	Lowered	Increased
P42	29	Female	British	A level and above	Lowered	≥8	1	Increased	Unchanged	Increased	Increased	Increased
P44	40	Male	British	Below A level	Lowered	≥8	2	Increased	Increased	Increased	Unchanged	Increased
P45	68	Female	British	No qualification	Lowered	1-4	2	Increased	Increased	Increased	Increased	Increased
P49	49	Female	British	Below A level	Increased	1-4	≥3	Lowered	Lowered	Lowered	Unchanged	Lowered
P53	43	Male	Non-British	Below A level	Lowered	1-4	1	Increased	Increased	Increased	Lowered	Increased
P54	59	Female	British	Below A level	Unchanged	1-4	≥3	Unchanged	Increased	Increased	Unchanged	Increased
P56	45	Female	British	Below A level	Increased	5-7	1	Increased	Unchanged	Unchanged	Unchanged	Unchanged
P63	55	Female	British	No qualification	Increased	≥8	≥3	Increased	Increased	Unchanged	Increased	Increased
P64	56	Female	Non-British	Below A level	Lowered	1-4	2	Increased	Increased	Unchanged	Increased	Increased
P67	57	Male	British	Below A level	Lowered	≥8	2	Increased	Increased	Unchanged	Lowered	Increased
P69	49	Female	British	A level and above	Increased	≥8	≥3	Unchanged	Unchanged	Unchanged	Unchanged	Unchanged
P72	44	Female	British	Below A level	Lowered	≥8	1	Increased	Increased	Lowered	Lowered	Unchanged
P78	48	Female	British	Below A level	Increased	1-4	≥3	Increased	Increased	Increased	Increased	Increased

P94	37	Female	Non-British	A level and above	Lowered	≥8	≥3	Increased	Increased	Increased	Unchanged	Increased
P95	44	Female	British	Below A level	Lowered	1-4	2	Increased	Increased	Increased	Increased	Increased
P107	35	Female	British	Below A level	Unchanged	≥8	2	Unchanged	Unchanged	Unchanged	Unchanged	Unchanged
P109	69	Male	British	No qualification	Lowered	1-4	2	Unchanged	Unchanged	Unchanged	Unchanged	Unchanged
P112	49	Female	British	Below A level	Increased	≥8	2	Increased	Increased	Increased	Unchanged	Increased
P117	28	Female	British	A level and above	Lowered	5-7	2	Increased	Lowered	Unchanged	Unchanged	Lowered
P137	60	Female	British	No qualification	Increased	≥8	≥3	Increased	Increased	Increased	Increased	Increased
P141	27	Male	British	Below A level	Lowered	≥8	≥3	Increased	Increased	Increased	Increased	Increased
P143	63	Female	British	A level and above	Lowered	≥8	2	Increased	Unchanged	Unchanged	Increased	Increased

Fig. 1. Interview topic guide

Interview Topic Guide

- Personal background and circumstances;
    - A picture of your chronic back pain and other related symptoms;
- How do you feel being supported by health professionals in the pain clinics;
    - Experiences of receiving support from health professionals;
    - Experiences of working in partnership with health professionals;
    - Views on factors that may influence your partnerships with health professionals;
- How having a partnership with health professionals may impact on your ability to self-manage your condition;
- How did you manage your back pain before and after attending pain clinics (knowledge, side effects, symptoms and treatment adherence); If there are any changes, could you explain why you have experienced these changes?
    - What do you think of health professional's role in your management of pain?
    - In what ways do you think health professionals may influence your knowledge, management of side effects, symptoms and treatment adherence?
- How do you notice when there is a difference on your self-management ability;
- Any other questions you have about this study.