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1 Personalised care in patients with chronic pain 2 disorders: Educational implications from a 3 population-based study

4 5 **Abstract**

6
7 **Background:** Personalised care offers psychological benefits to patients with chronic pain
8 disorders. However, it is unclear which patient groups are prioritised, and which ones may
9 require additional educational support in dealing with the psychological impact of chronic
10 pain.

11 **Aim:** To assess the relationship between having a chronic pain disorder and the likelihood of
12 being offered a personalised care plan, and also identify underlying psychological
13 vulnerabilities.

14 **Method:** Bootstrapping was performed on data from 3717 respondents to the 2014 Health
15 Survey for England. Participants were predominantly female (55.4%) and had a chronic pain
16 disorder; (a) mental illness (anxiety, depression), (b) arthritis, rheumatism, fibrositis, (c) back
17 problems, slipped disc, neck, and (d) other unspecified rheumatic problems (bones, joints,
18 muscles).

19 **Results:** Personalised care plans were more likely to be offered to patients with mental health
20 disorders, and experiencing specific psychological issues around feelings of usefulness
21 (Effect = 0.026, 95% CI = 0.001 to 0.051), decisiveness (Effect = 0.030, 95% CI = 0.008 to
22 0.057), and optimism about the future (Effect = -0.028, 95% CI = -0.046 to -0.012). By

23 contrast, patients with arthritis, rheumatism, fibrositis, and other unspecified rheumatic
24 problems (bones, joints, muscles), were less likely to be offered personalised care.

25 **Conclusion:** Patients with a rheumatic condition, or other problems of bones, joints, and
26 muscles, might require additional educational support in dealing with the emotional and
27 psychological impact of living with a chronic pain disorder. This should include referral to
28 structured patient education programmes that help improve self-management skills for
29 chronic pain disorders.

30

31 **1. Background**

32 ***1.1 Chronic pain disorders***

33 Chronic pain is a multi-faceted, interdisciplinary condition, often co-morbid with other long
34 term illnesses (Dahan et al., 2014). It has been estimated that 20% of adults suffer from pain
35 globally and 10% of adults are diagnosed with chronic pain every year (Goldberg & McGee,
36 2011). Personalised care plans are typically offered to patients with long-term conditions
37 (Coulter et al., 2015; Coulter et al., 2013), including chronic pain disorders (Earle, 2006;
38 Hager & Brockopp, 2009; Jambunathan et al., 2016; Malanga & Paster, 2007; Matthie &
39 Jenerette, 2015; Parker et al., 2013; Von Korff et al., 2016).

40

41 ***1.2 Personalised care***

42 A personal care plan is a special record that specifies treatment goals, and action plans for
43 achieving them (Coulter et al., 2013). The plan is discussed and agreed by both patient and
44 clinician (Coulter et al., 2015). Care plans have been implicated in favourable outcomes
45 amongst patients suffering from chronic pain (Kerns et al., 2011), particularly the elderly
46 (Malanga & Paster, 2007). They are structured around a particular illness (Coulter et al.,

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2
3 47 2013; Malanga & Paster, 2007; Parker et al., 2013); thus, a patient suffering from a *physical*
4
5 48 condition is offered a care plan to deal with that specific condition.

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9 50 ***1.3 Psychological benefits***

11 51 Care plans may provide *psychological* benefits to patients, even if their underlying condition
12
13 52 is biomedical (Hird et al., 2015; Russell et al., 2008). For example, they ‘empower’ patients
14
15 53 by giving them more control over their care, and improving the patient-professional
16
17 54 partnership (Coulter et al., 2013). This is important given that chronic pain disorders are
18
19 55 linked to mental distress (Hirsch et al., 2016), including depression (Chirita et al., 2008;
20
21 56 Hirsch et al., 2016; Jack et al., 1987). Indeed, pain disorders and depression are comorbid
22
23 57 (Bair et al., 2003; Dahan et al., 2014). Conditions such as arthritis can generate pain-inducing
24
25 58 functional impairments (e.g., avoiding sports/exercise) (Hunter & Riordan, 2014). Personal
26
27 59 care plans embolden patients, by giving them more say over their treatment, and encouraging
28
29 60 better partnerships health professionals (Coulter et al., 2013; Fu et al., 2016). Thus, care plans
30
31 61 can be set up entirely (or in part) to enable a psychologically vulnerable patient more
32
33 62 effectively manage feelings of anxiety and depression associated with having a chronic pain
34
35 63 disorder (Kerns et al., 2011). However, due to resource constraints it may not be possible to
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37 64 offer a care plan to *every* patient with a chronic pain disorder, thereby necessitating additional
38
39 65 support partly in the form of patient education courses (Coulter et al., 2013).
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47 67 ***1.4 Educational challenges***

48 68 In the UK structured patient education/self-management programmes are routinely provided
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50 69 to patients with long-term conditions, with courses for chronic pain occurring frequently
51
52 70 (Department of Health, 2016). These educational programmes play an important role in
53
54 71 enabling patients take more control of their health, and keeping them informed and involved
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3 72 in discussions about how to manage their condition (Coulter et al., 2013). Thus, patient
4
5 73 education programmes form an integral part of personalised care (Lau-Walker et al., 2016). It
6
7 74 has been acknowledged in the literature that some patients may require additional educational
8
9 75 support, to help them develop strategies for managing the emotional and psychological
10
11 76 challenges of living with a long-term condition (Coulter et al., 2013). Since not every patient
12
13 77 may be offered personalised care, due to resource constraints (Moffat & Mercer, 2015), it is
14
15 78 important to identify patient groups that are prioritised for personalised care, and those which
16
17 79 aren't. The latter group (i.e., patients less likely to be offered personalised care) may need
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19 80 additional educational support in dealing with emotional and psychological impact of living
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21 81 with a long-term condition. This could include referral to a structured education programme
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23 82 that improve self-management skills for chronic pain disorders (Coulter et al., 2013).
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84 *1.5 The present study*

85 To the best of our knowledge, no study has examined the relationship between having a
86 chronic pain disorder and likelihood of being offered personalised care, and also considered
87 the educational implications. An educational approach to this topic may yield useful insights
88 for structured patient education programmes targeting patients with chronic pain disorders
89 (Department of Health, 2016), specifically by identifying patient groups that may benefit
90 from additional educational support due to comparatively deficient access to personalised
91 care planning (relative to other patient groups). Chronic pain disorders can present
92 psychological challenges for patients (Chirita et al., 2008; Davis et al., 2014; Hirsch et al.,
93 2016; Kerns et al., 2011). Although personalised care planning is set up partly to address
94 these emotional issues (Coulter et al., 2015; Coulter et al., 2013), not every patient is offered
95 personalised care (Moffat & Mercer, 2015). Thus, this study aimed to (a) assess the
96 relationship between having a chronic pain disorder, and the likelihood of being offered a

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3 97 personalised care plan, and also identify underlying psychological vulnerabilities, and (b)
4
5 98 consider the implications for structured patient education programmes.
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7 99

100 **2. Methodology**

101 ***2.1. Design and procedures***

102 This study used data from the 2014 *Health Survey for England* (HSE) (Health Survey for
103 England, 2014). The HSE is conducted annually to assess various health-related parameters
104 amongst UK residents. The UK Data Service manages access to HSE data. Data on
105 personalised care planning, mental wellbeing, chronic illness (e.g., rheumatic disorders, back
106 pain), and subjective perception of pain, were particularly relevant to the present study.
107

108 ***2.2. Participants***

109 A total of 3717 adults were eligible to participate. Respondents were included if they were
110 aged 16 and over, and suffered from a long-term condition, including chronic pain disorders
111 such as arthritis/rheumatism/fibrositis, back problems/slipped disc/spinal problems, and
112 mental illness. The average age was 55.67 years (SD = 17.66). The sample were all UK
113 residents and predominantly female (55.4%), with an average age of 53.05 (SD = 22.08)
114 years.
115

116 ***2.3. Personalised care plan***

117 The main outcome variable was whether patients had discussed and agreed a personal care
118 plan with a health professional. The HSE survey specifically addressed personalised care in a
119 separate section, in which participants were asked whether they had discussed setting up a
120 care plan with their doctor/nurse (Health Survey for England, 2014). Responses options were;
121 'Yes' (1), 'Not sure' (0), 'No' (0). There was an additional statement specifically on whether

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2
3 122 a care plan had been agreed. Response options were; ‘Yes, have agreed a personal care plan
4
5 123 in the last 12 months’ (1), ‘Yes, agreed a personal care plan more than 12 months ago’ (1),
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7 124 ‘No, do not have a personal plan’ (0). Responses to the two questions were summed to
8
9 125 generate a personal care plan index, with scores ranging from 0 to 2. High scorers had
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11 126 discussed a personal care plan with a health professional, or gone further and agreed a plan.
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15 16 128 **2.4. Mental wellbeing**

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18 129 During the HSE the WEMWBS (*Warwick and Edinburgh Mental Well-being Scale*) was
19
20 130 administered by asking participants to self-complete a questionnaire (Bridges, 2015). The
21
22 131 WEMWBS is a self-administered instrument that assesses fourteen domains of mental
23
24 132 wellbeing (i.e., positive psychological states) (Tennant et al., 2007). Responses are indicated
25
26 133 on a 5-point likert-style scale, ranging from 'None of the time' (1), 'Rarely' (2), 'Some of the
27
28 134 time' (3), 'Often' (4), 'All of the time's (5). The scale had good internal consistency ($\alpha = 0.93$).
29
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31 135 It has been recommended that the when internal consistency of a scale is extremely high –
32
33 136 that is, the items are extremely homogenous ($\alpha > 0.90$) – the use of single item measures
34
35 137 should be considered (Diamantopoulos et al., 2012; Fuchs & Diamantopoulos, 2009). High
36
37 138 inter-item homogeneity denotes semantic redundancy, which can negatively affect content
38
39 139 validity (Diamantopoulos et al., 2012). We felt generating a single mental wellbeing score,
40
41 140 from multiple items, will not adequately represent the different and more subtle facets of
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43 141 positive psychological functioning. For example, research suggests one specific domain of
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45 142 mental wellbeing – *optimism* – plays a particularly important role in patient outcomes
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48 143 (Dubois et al., 2012). In order to adequately account for the (subtle) distinctions between
49
50 144 different domains, it was decided to treat the fourteen WEMWBS items as individual single-
51
52 145 item measures.
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5 148 **2.5. Chronic pain disorders**

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7 149 The identification of chronic pain disorders in the HSE was based primarily on self-reported
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9 150 diagnosis (Health Survey for England, 2014). Participants were asked if they had any
10
11 151 physical or mental health conditions or illnesses lasting or expected to last 12 months or
12
13 152 more?', responding 'Yes' (1), 'No' (0). For those who responded 'Yes' the researcher *asked*
14
15 153 '*What (else) is the matter with you?*', then recorded up to six conditions. Participants who
16
17 154 provided a vague answer were asked to provide more clarity. Finally, the researcher asked
18
19 155 '(Can I check) do you have any other physical or mental health conditions or illnesses lasting
20
21 156 or expected to last 12 months or more? Several groups of chronic pain disorders were
22
23 157 identified from the first (of up to six possible) illnesses recorded; (a) mental illness (anxiety,
24
25 158 depression), (b) arthritis, rheumatism, fibrositis, (c) back problems, slipped disc, neck, (d)
26
27 159 other unspecified rheumatic problems (bones, joints, muscles). To identify mental illness
28
29 160 participants were shown a list of 17 different mental health conditions (e.g., phobia, panic
30
31 161 attacks, depression, psychosis or schizophrenia, dementia) and asked which they had ever
32
33 162 been told by a doctor, psychiatrist, or other health professional, that they had any of the
34
35 163 conditions on the list (Bridges, 2015). Although mental illness is not a physical condition, it
36
37 164 is implicated in chronic pain (Bair et al., 2003; Dahan et al., 2014). Each illness was
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39 165 converted into a dummy variable; each respondent was categorised as a 'case' (1) or non-case
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41 166 (0).

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48 168 **2.6. Subjective pain**

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50 169 HSE incorporated the *EQ-5D-3L* questionnaire, which assesses health-related quality of life
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52 170 (Feng et al., 2015; Herdman et al., 2011). This 5-item instrument measures various aspects of
53
54 171 general health including mobility, self-care, usual activities, pain/discomfort, and

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3 172 anxiety/depression. This paper focuses specifically on the pain/discomfort subscale, which
4
5 173 offers respondents three options to choose from; 'I have no pain or discomfort', 'I have
6
7 174 moderate pain or discomfort', and 'I have extreme pain or discomfort'. Due to the inherent
8
9 175 subjectivity in how respondents may define 'moderate' or 'extreme' pain we decided to
10
11 176 collapse the three options into a simple dichotomous variable, for easier interpretation; 'No
12
13 177 pain or discomfort' (0), 'Pain or discomfort' (1).

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17 179 **3. Results**

18 180 ***3.1 Descriptive statistics***

19
20 181 Data is summarised in *Table 1*. Percentages reported exclude missing data. Just over 10% of
21
22 182 respondents suffered from a mental illness (anxiety/depression). A similar percentage had
23
24 183 arthritis, rheumatism or fibrositis, while just under 6% suffered from back, slipped disc, spine
25
26 184 or neck problems. Slightly over 8% reported 'other' rheumatic problems (bones, joints,
27
28 185 muscles). More than 50% experienced 'moderate' or 'extreme' pain or discomfort. Average
29
30 186 mental wellbeing was comparable to (albeit slightly lower than) population norms reported
31
32 187 elsewhere (Tennant et al., 2007). About 50% of participants had discussed a personal care
33
34 188 plan with a health professional, while only about one in ten had actually agreed a care plan.
35
36 189 The average personal care plan index score was less than one, confirming a general paucity of
37
38 190 care plans.

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45
46 192 Figure 1 Mediating effect of feeling optimistic about the future on the association between
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48 193 mental illness and setting up a PCP (^a $p \leq 0.05$, ^b $p \leq 0.01$, ^c $p \leq 0.001$).

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5 198 Figure 2 Mediating effect of ability to make up one's mind about things on the association

6
7 199 between mental illness and setting up a PCP (^a $p \leq 0.05$, ^b $p \leq 0.01$, ^c $p \leq 0.001$)

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12 13 202 **3.2 Bootstrapping**

14
15 203 We used an SPSS bootstrapping dialogue (Hayes, 2009, 2013) to assess the association

16
17 204 between illness status and mental wellbeing (*path a*), the relationships mental wellbeing and

18
19 205 personalised care (*path b*), the direct association between illness and personalised care (*path*

20
21 206 *c*), and the indirect effect of illness status on personalised care, mediated by domains of

22
23 207 mental wellbeing (*path a*b*). Age, gender, and subjective pain/discomfort were treated as

24
25 208 *covariates*. Due to software constraints limiting the total number of mediator variables per

26
27 209 model to ten (Hayes, 2013), the analysis was performed twice, initially using the first ten

28
29 210 domains of mental wellbeing, and then repeated using the last four domains. Statistical

30
31 211 significance was based on confidence intervals and the (conservative) Sobel normal theory

32
33 212 test (Mackinnon et al., 1995). Initial bootstrapping revealed *both* direct and indirect

34
35 213 associations. The results are summarised in *Table 2*.

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37 214

38 39 215 **3.3 Mental illness/anxiety/depression**

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41 216 Patients with mental illness (based on self-reported diagnosis, whereby a doctor, psychiatrist,

42
43 217 or other health professional had told participants, that they had a mental illness – see Section

44
45 218 2.5) were more likely to have a care plan. This association was mediated by several domains

46
47 219 of mental wellbeing – ‘optimism about the future’, ‘feeling useful’, and ‘being able to make

48
49 220 up ones’ mind. These mediator effects respectively accounted for 18.4%, 17.1% and 20.7%

50
51 221 of the total association between X (mental illness) and Y (personal care plan scores). The data

52
53 222

222 suggests respondents with a personal care plan were more likely to have poor mental health
223 (e.g., depression), but also tended to feel less useful, less able to make up their minds (*Figure*
224 2), and/or felt more optimistic about the future (*Figure 1*). The total effect models were
225 significant, accounting for up to 1% of the variance in personal care plan score.

226

227 ***3.4 Arthritis/rheumatism/fibrositis***

228 Patients who had a rheumatic condition, based on self-reported diagnosis (see Section 2.5),
229 were less likely to have a care plan. Mental wellbeing failed to mediate this relationship.
230 Total effect models were significant, explaining up to 1.3% of the variance in care plan
231 scores.

232

233 ***3.5 Back problems/slipped disc/spine/neck***

234 There was no direct association between self-reported diagnosis of back problems/slipped
235 disc/spine/neck problems (see Section 2.5) and having a care plan, and no mediating effects
236 for mental wellbeing. Total effect models were not significant.

237

238 ***3.6 Other problems of bones/joints/muscles***

239 Care plans were less likely to be offered to patients with self-reported diagnosis of other
240 bone/joint/muscle problems (see Section 2.5). There were no significant mediator effects for
241 mental wellbeing. The total effect models were significant, accounting for about 1% of the
242 variance in personal care plan scores.

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Table 1 Descriptive statistics

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249

250 Table 2 Mediating effects of positive psychological states on relations between chronic pain
251 disorders and PCP status

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254 4. Discussion

255 4.1 Educational implications for mental health patients

256 The higher propensity for mental health patients to receive personalised care is important
257 given the added psychological challenges of living with a chronic condition (Bair et al., 2003;
258 Chirita et al., 2008; Hirsch et al., 2016). It appears the extent to which patients felt
259 ‘optimistic’, ‘useful’ and ‘decisive’, were key issues in their care. Presumably, patients may
260 express or project these sentiments during doctor-patient consultations, creating a mental
261 health narrative that feeds into care plan decision making. This is plausible given that
262 personalised care is meant to help address a patients psychological needs (Coulter et al.,
263 2013). One qualitative study found that a majority of patients interviewed expressed a degree
264 of psychological vulnerability in their relationship with their doctor (Frederiksen et al., 2010).
265 Expressing or projecting psychological insecurity seemed to underscore a need for
266 attachment, whereby vulnerable patients sort more regular contact with their doctor.

267 From the perspective of structured patient education programmes (Department of
268 Health, 2016), these findings highlight the need for educators to target *specific* psychological
269 vulnerabilities (i.e., feelings of usefulness, decisiveness, and lack of optimism) when teaching
270 mental health patients the skills and strategies needed to deal with the emotional challenges
271 of chronic psychopathology. From a doctors perspective, obvious mental fragility in a patient

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2
3 272 underscores the importance of personalised care (Frederiksen et al., 2010), and perhaps may
4
5 273 even justify additional support by referral to structured education courses (Coulter et al.,
6
7 274 2013). Such a referral may be particularly helpful if education programmes specifically target
8
9 275 some of the psychological vulnerabilities identified here (e.g., referring mental health patients
10
11 276 to educational courses that assume an ‘active’ role for patients, making them feel ‘useful’).

12
13 277 Health educators should carefully explore the clinical significance of psychological
14
15 278 themes like ‘feeling useful’, and ‘being able to make up one’s mind’ with patients, and
16
17 279 provide appropriate support and skill development where necessary. For example, the latter
18
19 280 theme may underscore patients uncertainty regarding decision making about their care,
20
21 281 and highlight a necessity for decision making skills to be addressed in education courses for
22
23 282 mental health patients (Coulter et al., 2013). Feeling ‘useful’ may partly reflect patients' need
24
25 283 to play a more active role in their care, thus highlighting the importance of educating patients
26
27 284 on how to be more involved in care planning (Coulter et al., 2013). ‘Optimism’ may partly
28
29 285 underscore patients’ uncertainty about the long-term management of their condition (Haddad,
30
31 286 2010), suggesting patient education programmes should, where appropriate, emphasise an
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33 287 optimistic outlook for patients struggling with mental health problems.
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289 ***4.2 Educational implications for patients with arthritis, rheumatism, fibrositis, or*** 290 ***unspecified rheumatic problems (bones, joints, muscles)***

291 The fact that patients with arthritis, rheumatism, fibrositis, or undetermined rheumatic
292 conditions, were less likely to be offered personalised care is curious since chronic pain and
293 mental distress are comorbid (Bair et al., 2003). Rheumatic problems can present significant
294 mental challenges (Kidd et al., 2007; Kreis et al., 2015). For example, analysis of the
295 experiences of amputees has identified up to six psychological issues that highlight the
296 importance of mental wellbeing in people with bone-related problems (Desmond &

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3 297 MacLachlan, 2002). Thus, unsurprisingly treatments for patients with chronic pain disorders
4
5 298 place considerable emphasis on improving behavioural, cognitive, and emotional functioning
6
7 299 (Kerns et al., 2011).

8
9 300 It is possible patients suffering from arthritis, bone, joint, or muscle problems, or
10
11 301 other rheumatic conditions, don't volunteer much information about their mental wellbeing
12
13 302 during doctor-patient consultations, perhaps due to the stigma associated with mental illness
14
15 303 (Mercer et al., 2012). If so, this highlights a need for additional support and guidance through
16
17 304 structured education programmes, to help patients develop specific strategies for managing
18
19 305 psychological distress due to chronic pain (Coulter et al., 2013). The role of educational
20
21 306 courses in this context may be especially crucial given that many doctors may simply lack the
22
23 307 time to consider a patients mental wellbeing during routine consultations (Moffat & Mercer,
24
25 308 2015).

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30 310 ***4.3 Educational implications for doctor-patient consultations***

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32
33 311 Clinicians are responsible for ensuring patients with chronic pain disorders receive the
34
35 312 necessary education to enable them manage their condition (Coulter et al., 2013). This may
36
37 313 include making referrals to structured education courses (Department of Health, 2016).
38
39 314 Consequently, it is important for health professionals to monitor a patient's educational
40
41 315 needs, particularly in relation to managing psychological issues associated with their
42
43 316 condition (Frederiksen et al., 2010). This is particularly important for patients with mental
44
45 317 health problems, given their added psychological vulnerabilities.

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47
48 318 Health professionals who are unsure whether to offer a care plan to patients with
49
50 319 arthritis and other rheumatic problems should, where possible, recommend structured
51
52 320 education programmes, to assist patients self-manage their condition, and develop strategies
53
54 321 for dealing with associated emotional challenges (Coulter et al., 2013). It's also important that

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3 322 patients experiencing psychological problems associated with chronic pain emphasise this
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5 323 mental vulnerability during doctor-patient discussions and, where necessary, request
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7 324 additional educational support (Frederiksen et al., 2010). More research is needed to verify
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9 325 the present findings, and better understand why specific psychological themes (e.g.,
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11 326 decisiveness) were salient in care planning for mental health patients, but not those
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13 327 experiencing unspecified bone/joint/muscle problems and major rheumatic conditions such as
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15 328 arthritis.
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19 20 330 **4.4 Limitations**

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22 331 This study has several limitations. The observed indirect effects do not on their own provide
23
24 332 clear evidence that patients' mental wellbeing was consciously considered in the decision to
25
26 333 offer them a personal care plan. The data merely shows that psychological functioning
27
28 334 explained some of the *variance* in relations between illness and having a care plan. As
29
30 335 chronic pain disorders and mental health are comorbid (Bair et al., 2003), the latter may by
31
32 336 default be implicated in any associations between pain syndromes and care plans, whether or
33
34 337 not psychological functioning is specifically mentioned during doctor-patient decision
35
36 338 making to set up a plan. Use of single item measures is debatable (Diamantopoulos et al.,
37
38 339 2012). The analysis of single items in the present context has provided insights on how
39
40 340 specific aspects of positive psychological functioning affect the illness → care plan
41
42 341 association. The analysis of ten psychological mediators in one model, followed by analysis
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44 342 of the remaining four in a second model, may partly confound the results. Psychological
45
46 343 states significant in one model might not necessarily have been significant if tested within the
47
48 344 other model, given the different set of variables (i.e., other sources of shared variance).
49
50 345 Finally, the cross-sectional design precludes conclusive inferences about causality.
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4.5 Conclusions

349 This study suggests personalised care is more likely to be offered to mental health patients,
350 compared to patients with a rheumatic condition, or other problems of bones, joints, and
351 muscles. This perhaps highlights the need for additional educational support targeted at
352 patients in the latter groups, to equip them with practical skills necessary for managing the
353 psychological challenges associated with chronic pain (Coulter et al., 2013). This added
354 support can involve referrals to structured education programme for chronic pain, which are
355 amongst the most frequently occurring patient education courses in Britain (Department of
356 Health, 2016). These findings extend current understanding of care plans in caring for
357 patients living with chronic pain (Hager & Brockopp, 2009; Jambunathan et al., 2016;
358 Malanga & Paster, 2007; Parker et al., 2013; Von Korff et al., 2016). Even though chronic
359 pain disorders have psychological comorbidities (Bair et al., 2003), mental wellbeing wasn't
360 a significant factor in care planning, except for patients with mental illness. Given the
361 growing emphasis on personalised care (Coulter et al., 2013), this study highlights a potential
362 problem whereby certain patient groups with chronic pain disorders are less likely to
363 experience the psychological benefits of personalised care, and hence may require additional
364 educational support through structured education programmes.

365

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Table I – *Descriptive statistics*

Variables	Mean/SD or N/%/Valid %
Sample size	3717
Age	53.1/22.08
Gender (Male/Female)	
Male	1656/44.6/44.6
Female	2061/55.4/55.4
Mental illness (anxiety/depression)	
Yes	382/10.3/10.3
No	3335/89.7/89.7
Arthritis, rheumatism, fibrositis	
Yes	399/10.7/10.7
No	3318/89.3/89.3
Back problems, slipped disc, spine, neck	
Yes	219/5.9/5.9
No	3498/94.1/94.1
Other (unspecified) rheumatic problems (bones, joints, muscles)	
Yes	306/8.2/8.2
No	3411/91.8/91.8
Mental Wellbeing (WEMBS)	
Overall score (sum of responses to all 14 items)	48.29/9.92
PCP conversation with a health professional	
Yes, agreed PCP < or > 12 months ago	464/12.5/13.8
No PCP agreed	2909/78.3/86.2
PCP agreed with health professional	
Yes	1760/47.4/51.8
No or not sure	1636/44.0/48.2
PCP index	
Overall score (conversed + agreed)	0.65/0.69

Figures show the mean (+ standard deviation) or count (+ percentage). PCP = Personal care plan (status). Valid percentages exclude missing data.

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Table II – *Mediating effects of positive psychological states on relations between chronic pain disorders and PCP status*

Chronic pain disorder (CPD)								
Regression pathways (bootstrapping)	Mental illness (anxiety, depression)		Arthritis, rheumatism, fibrositis		Back problems, slipped disc, spine, neck		Other rheumatic problems (bones/joints/muscles)	
	Effect	(CI)	Effect	(CI)	Effect	(CI)	Effect	(CI)
First mediation model (10 positive psychological states as mediators)								
<i>Total association between CPD & PCP</i>	0.15 ^a	(0.06, 0.24)	-0.17 ^a	(-0.26, -0.09)	-0.05	(-0.15, 0.05)	-0.14 ^a	(-0.23, -0.05)
<i>Direct association between CPD & PCP</i>	0.14 ^a	(0.05, 0.23)	-0.16 ^a	(-0.25, -0.08)	-0.04	(-0.14, 0.07)	-0.14 ^a	(-0.23, -0.05)
<i>Indirect association between CPD & PCP, mediated by;</i>								
Feeling optimistic about future	-0.03 ^{a, s}	(-0.05, -0.01)	-0.00	(-0.01, 0.01)	-0.00	(-0.01, 0.00)	0.01 ^y	(0.00, 0.02)
Feeling useful	0.03 ^{a, s}	(0.00, 0.05)	-0.00	(-0.01, 0.00)	-0.01	(-0.02, 0.00)	-0.01 ^a	(-0.02, -0.00)
Feeling relaxed	0.00	(-0.02, 0.03)	0.00	(-0.01, 0.01)	0.00	(-0.00, 0.00)	0.00	(-0.01, 0.00)
Feeling interested in other people	-0.02	(-0.04, 0.00)	0.00	(0.00, 0.01)	0.00	(0.00, 0.02)	0.00	(0.00, 0.01)
Had energy to spare	0.01	(-0.00, 0.02)	-0.00	(-0.01, 0.00)	-0.00	(-0.02, 0.00)	-0.00	(-0.01, 0.00)
Dealing with problems well	0.00	(-0.03, 0.04)	-0.00	(-0.01, 0.01)	-0.00	(-0.01, 0.00)	-0.00	(-0.01, 0.01)
Thinking clearly	0.02	(-0.01, 0.05)	-0.01	(-0.02, 0.00)	-0.00	(-0.02, 0.00)	-0.00	(-0.01, 0.00)
Feeling good about myself	-0.01	(-0.05, 0.03)	0.00	(-0.00, 0.01)	0.00	(-0.00, 0.01)	0.00	(-0.00, 0.01)
Feeling close to other people	-0.02	(-0.05, 0.01)	0.00	(-0.00, 0.01)	0.00	(-0.00, 0.01)	0.00	(-0.00, 0.01)
Feeling confident	0.03	(-0.02, 0.07)	-0.01	(-0.02, 0.00)	-0.00	(-0.01, 0.00)	-0.01	(-0.02, 0.00)
Second mediation model (5 additional positive psychological states as mediators)								
<i>Total association between CPD & PCP</i>	0.15 ^c	(0.06, 0.23)	-0.16 ^c	(-0.24, -0.08)	-0.05	(-0.15, 0.05)	-0.14 ^a	(-0.23, -0.05)
<i>Direct association between CPD & PCP</i>	0.14 ^b	(0.05, 0.23)	-0.15 ^c	(-0.23, -0.07)	-0.04	(-0.14, 0.06)	-0.13 ^a	(-0.22, -0.04)

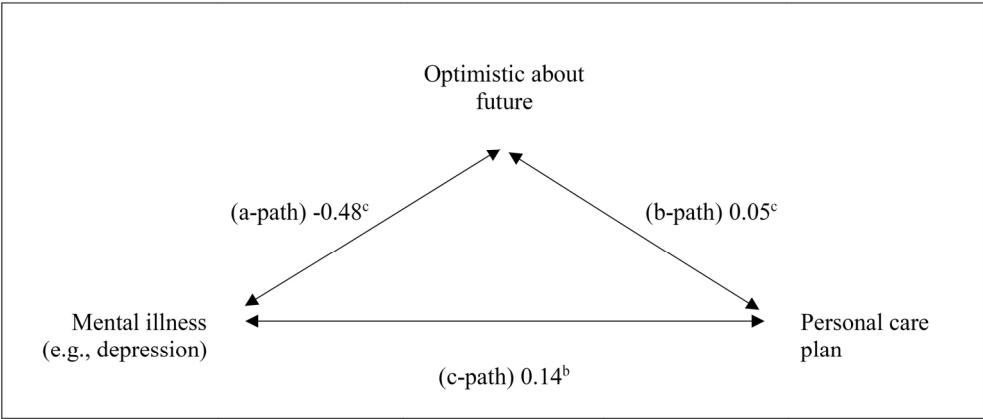
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<i>Indirect association between CPD & PCP, mediated by:</i>								
Able to make up my own mind	0.03 ^{a,s}	(0.01, 0.06)	-0.01	(-0.01, 0.00)	-0.01	(-0.02, 0.00)	-0.01 ^a	(-0.02, -0.00)
Feeling loved	-0.02	(-0.04, 0.00)	0.00	(-0.00, 0.01)	0.00	(-0.00, 0.01)	0.00	(-0.00, 0.01)
Interested in new things	-0.01	(-0.04, 0.01)	0.00	(-0.00, 0.01)	0.00	(-0.00, 0.01)	0.00	(-0.00, 0.01)
Feeling cheerful	0.01	(-0.02, 0.04)	-0.00	(-0.01, 0.00)	-0.00	(-0.01, 0.00)	-0.00	(-0.01, 0.00)

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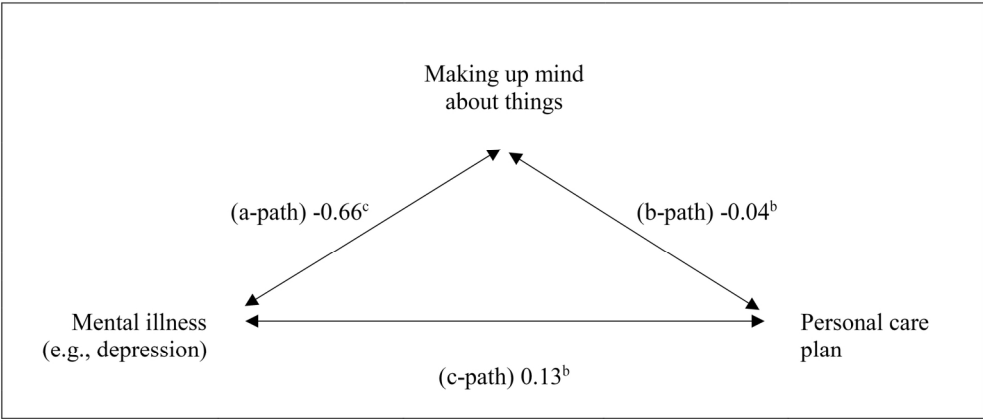
^a $p < 0.05$ or CI range excludes '0'. ^sSignificant based on the conservative ('normal theory') Sobel test. ^yMediator path 'a' (i.e., association between illness and optimism) was not significant, despite a marginally significant indirect effect of X on Y. PCP = Personal care plan (status); CPD = Chronic Pain Disorder. For simplicity the table does not include the effects of variable X (CPD) on variables M (psychological states), and effects of variables M on variable Y (PCP status).

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