Predicting Persistent Orofacial Pain: The Role of Illness Perceptions, Anxiety, and Depression

C. Penlington, V. Araújo-Soares, and J. Durham

Appendix

Supplementary Methods

Recruitment took place over a period of 22 months and included prospective and retrospective recruitment from primary care (non-specialist treatment) and prospective recruitment within secondary care (specialist treatment). For retrospective recruitment specific diagnostic codes referring to persistent orofacial pain were identified and patient records in primary care electronically searched for a match to one or more of these codes during the preceding 12 months. Patients identified using this method were contacted in writing and invited to make contact with the research team if they were interested in participating in the study. Patients recruited prospectively were approached by a member of staff, given a short description of the study and asked if they were interested in participating. All patients who expressed an interest in participating were given a study pack including an information sheet, initial consent form and a self-report screening measure. They were then contacted by telephone by the research team who completed the screening measure over the telephone. Those screening positive and giving informed consent were enrolled into the study.

Once enrolled in the study following informed consent and a positive screening result structured interviews were then completed with a trained interviewer at baseline. Follow-up data was collected by post. Study questionnaires were mailed to participants at each study timepoint, and a period of 14 days allowed for their return. Patients with missing or incomplete data after this period were followed up by telephone to remind them to complete the questionnaires or clarify any missing or confusing data.

Repeated measures Friedman's two-way ANOVAs were performed on each of the 7 illness perceptions tested to monitor change over time.

Supplementary Results

A total of 387 individuals were referred for screening for eligibility for the study. Of these 12 were from retrospective recruitment (3%). The majority (72%) of those referred accepted the invitation to be screened with two individuals from retrospective recruitment declining to be screened. There was no significant difference in gender (X^2(1, n=386) =0.66; p=0.261), age (t (366)=1.24; p=0.215; 95%CI difference -1.52, 6.73years), recruitment (X^2(1, n=386)=0.66; p=0.261), between those declining and accepting the invitation to be screened. There were a significantly greater number of

declined invitations from those referred from primary care than those referred from secondary care (X^2(1, n=386)= 6.610; p=0.01). Figure 1 demonstrates recruitment and attrition at the key time points of this study.

Perceptions of consequences (Z=3.079, p<.01) and emotional representations Z=3.365, p<.01) scores changed over time, showing some improvement from baseline to 24 months (table S6). There was no significant change over time in perceptions of timeline, personal or treatment control, illness coherence or cyclical timeline.

When entered as single factors, Consequences and Emotional representations consistently predicted dGCPS grouping at every point in time (data not shown). Since Consequences beliefs were consistently related to outcome, these were further explored with Spearman correlations. Correlations at baseline were carried out between Consequences beliefs, characteristic pain index, PHQ4, age, classification of pain, index of deprivation, education and employment status. The same correlations were repeated at 12 and 24 months (using baseline measures of age, classification of pain, index of deprivation, education and employment status as data on these measures were only collected once). Results are shown in table S8 Significant correlations were reported between Consequences beliefs and younger age, PHQ4 score, classification of pain, and being neither employed nor retired. Index of deprivation and employment status were not correlated with Consequences beliefs.

The reported correlations of 'Consequences' beliefs with higher reported pain younger age, higher psychological distress, unemployment and reduced likelihood of a simple 'musculoskeletal' diagnosis of pain may be relevant in terms of understanding the impact that POFP has in different circumstances on many aspects of somebody's life.

Supplementary Table 1 (S1): Illness Perceptions Questionnaire-Psychometrically Shortened (IPQ-PS)

	Views about your pain	**Relevant Domain**
1	I don't understand my pain	Illness Coherence
2	My pain will last for a long time	Timeline
3	I get depressed when I think about my pain	Emotional Representations
4	My pain has major consequences on my life	Consequences
5	My treatment will be effective in curing my pain	Treatment Control
6	Having this pain makes me feel anxious	Emotional Representations
7	Nothing I do will affect my pain	Personal Control
8	My pain doesn't make any sense to me	Illness Coherence
9	The negative effects of my pain can be prevented by my treatment	Treatment Control
10	My pain is very unpredictable	Timeline Cyclical
11	My pain is a mystery to me	Illness Coherence
12	My pain is likely to be permanent rather than temporary	Timeline
13	My pain causes difficulties for those who are close to me	Consequences
14	I have the power to influence my pain	Personal Control
15	My symptoms come and go in cycles	Timeline Cyclical
16	My pain strongly affects the way others see me	Consequences
17	My treatment can control my pain	Treatment Control
18	I go through cycles in which my pain gets better and worse	Timeline Cyclical
19	When I think about my pain I get upset	Emotional Representation
20	I expect to have this pain for the rest of my life	Timeline
21	My actions will have no effect on the outcome of my pain	Personal Control

IPQ-PS scale which was used in the study to assess Illness Representations. Items are scored on a scale of 1 (strongly disagree) to 5 (strongly agree).

Supplementary Table 2 (S2): Missing data for each measure at baseline, 12 and 24 months.

Measure	**Data collection timepoint**		
	Baseline (n=198)	**12 months (n=155)**	**24 months (n=129)**
GCPS* (%)	3 (1.49%)	3 (1.91%)	0 (0%)
PHQ4 (%)**	11 (5.47%)	7 (4.46%)	13 (9.42%)
IPQ-PS (%)**	6 (2.99%)	8 (5.10%)	9 (6.52%)

Table shows number of participants in study with missing data for each measure at each time of data collection. *GCPS data was also collected at 6 months (n=172, 1 missing (0.6%)) and 18 months (n=136, 2 missing (1.4%)). **PHQ4 and IPQ-PS data was collected at baseline, 12 and 24 months only.

Supplementary Table 3 (S3): Correlations at Baseline between all measures.

Table shows Spearman correlations at baseline between Overall dichotomised Graded Chronic Pain Scale over time outcome category (dGCPS) and Illness perceptions subscales and PHQ subscales at baseline. PHQ-4 includes items from PHQ-2 (these scales were never included together in the same equation).

Time	1	2	3	4	5	6	7	8	9	10
Graded Chronic Pain Scale category (1)		0.209**	0.333**	-0.012	-0.123	-0.015	-0.032	0.181*	0.309**	0.235**
timeline (2)			0.457**	-0.206**	-0.327**	-0.097	-0.059	0.455	0.296**	0.272**
consequences (3)				-0.165*	-0.163*	-0.204**	0.055	0.692**	0.431**	0.430**
personal control (4)					0.3417**	0.404**	0.001	-0.342**	-0.223**	-0.160*
illness coherence (5)						0.140	0.160*	-0.159*	-0.071	-0.044
treatment control (6)							-0.48	-0.47	-0.198**	-0.168*
cyclical timeline (7)								0.007	-0.027	0.085
emotional representations (8)									0.518**	0.518**
PHQ-2 (9)										0.883**
PHQ-4 (10)										
p		0.004	0.000	0.872	0.835	0.090	0.664	0.012	0.000	0.000

Significance: * indicates p<.05, **p<.01. Bottom row shows p values at baseline of correlations of each measure with the dGCPS dichotomised outcome measure.

Supplementary Table 4 (S4): Correlations at 12 months between all measures.

Table shows Spearman correlations at 12 months between Overall dichotomised Graded Chronic Pain Scale over time outcome category (dGCPS) and Illness perceptions subscales and PHQ subscales at baseline. PHQ-4 includes items from PHQ-2 (these scales were never included together in the same equation).

Time	1	2	3	4	5	6	7	8	9	10
Graded Chronic Pain Scale category (1)		0.236**	0.479**	0.0725	-0.139	-0.074	-0.002	0.383**	0.357**	0.305**
timeline (2)			0.385**	-0.232**	-0.145	-0.383**-	-0.064	0.429**	0.425**	0.442**
consequences (3)				-0.102	-0.401**	-0.142	0.053	0.719**	0.466**	0.398**
personal control (4)					0.376**	0.427**	0.029	-0.203*	-0.100	-0.009
illness coherence (5)						0.200*	0.130	-0.465**	-0.224**	-0.134
treatment control (6)							0.130	-0.143	-0.227**	-0.168*
cyclical timeline (7)								0.007	-0.001	-0.046
emotional representations (8)									0.522**	0.501**
PHQ-2 (9)										0.882**
PHQ-4 (10)										
p		0.004	0.000	0.378	0.368	0.091	0.981	0.000	0.000	0.000

Significance: * indicates p<.05, **p<.01. Bottom row shows p values at baseline of correlations of each measure with the dGCPS dichotomised outcome measure.

Supplementary Table 5 (S5): Correlations at Baseline between all measures.

Table shows Spearman correlations at 24 months between Overall dichotomised Graded Chronic Pain Scale over time outcome category (dGCPS) and Illness perceptions subscales and PHQ subscales at baseline. PHQ-4 includes items from PHQ-2 (these scales were never included together in the same equation).

Time	1	2	3	4	5	6	7	8	9	10
Graded Chronic Pain Scale category (1)		0.342**	0.512**	-0.134	-0.152	-0.106	-0.062	0.477**	0.463**	0.444**
timeline (2)			0.380**	-0.283**	-0.134	-0.336**	-0.010	0.324**	0.381**	0.368**
consequences (3)				-0.291**	-0.392**	-0.119	0.099	0.722**	0.451**	0.411**
personal control (4)					0.433**	0.338**	0.005	-0.350**	-0.164	-0.133
illness coherence (5)						0.201*	0.053	-0.333**	-0.107	-0.113
treatment control (6)							-0.073	-0.110	-0.184*	-0.195*
cyclical timeline (7)								0.007	-0.027	0.053
emotional representations (8)									0.506**	0.482**
PHQ-2 (9)										0.936**
PHQ-4 (10)										
p		0.000	0.000	0.149	0.104	0.258	0.507	0.000	0.000	0.000

Significance: * indicates p<.05, **p<.01. Bottom row shows p values at baseline of correlations of each measure with the dGCPS dichotomised outcome measure.

Supplementary Table 6 (S6): Changes over time in illness perceptions and characteristic pain index measured by Wilcoxon signed-rank test.

Illness perception	Difference (Z)	Baseline mean (SD)	24month mean (SD)
Timeline	0.988	3.8 (±0.9)	3.7 (±1)
Consequences	3.079**	3.0 (±1.1)	2.8 (±1.2)
Personal Control	-1.530	3.1 (±0.8)	3.2 (±0.9)
Treatment Control	0.237	3.1 (±0.9)	3.0 (±1.0)
Illness Coherence	-2.043	3.3 (±1.2)	3.5 (±1.2)
Cyclical Timeline	0.238	3.5 (±1.0)	3.6 (±0.9)
Emotional Representations	3.365**	3.3 (±1.1)	3.1 (±0.9)
Characteristic pain intensity	6.745**	55.3 (±22.0)	40.7 (±25.0)

** p<.01

Supplementary Table 7 (S7): Differences in illness perceptions by outcome category across time.

	Baseline				
Illness perceptions construct mean score (SD):	**Low GCPS (n=121)**	**High GCPS (n=77)**	**Total (n=198)**	**Difference (z)**	**p**
Timeline	3.7(±0.8)	3.9(±1)	3.8(±0.9)	-1.778	0.075
Consequences	2.6(±1)	3.6(±1)	3(±1.1)	-6.469	0.000**
Personal Control	3(±0.9)	3.1(±0.8)	3.1(±0.8)	-0.879	0.379
Treatment control	3.3(±0.9)	2.9(±0.8)	3.1(±0.9)	1.404	0.160
Illness coherence	3.3(±1.2)	3.1(±1.2)	3.3(±1.2)	0.624	0.533
Timeline cyclical	3.5(±1)	3.6(±1)	3.5(±1)	-0.542	0.588
Emotional representations	3(±1.2)	3.8(±0.8)	3.3(±1.1)	-4.300	0.000**
	12 months				
	Low GCPS (n=113)	**High GCPS (n=43)**	**Total (n=156)**	**Difference (z)**	**p**
Timeline	3.6(±0.9)	4.2(±0.7)	3.8(±0.9)	-3.772	0.000**
Consequences	2.5(±1)	4(±0.9)	3(±1.2)	-6.815	0.000**
Personal Control	3.2(±0.8)	3(±0.8)	3.2(±0.8)	1.541	0.123
Treatment control	3.1(±0.8)	2.6(±0.7)	3(±0.8)	2.823	0.005**
Illness coherence	3.6(±1.1)	2.9(±1.2)	3.4(±1.2)	3.608	0.000**
Timeline cyclical	3.5(±0.9)	3.5(±0.9)	3.5(±0.9)	0.049	0.961
Emotional representations	3(±1)	4(±0.9)	3.3(±1.1)	-5.437	0.000**
	24 months				
	Low GCPS (n=96)	**High GCPS (n=35)**	**Total (n=131)**	**Difference (z)**	**p**
Timeline	3.4(±1)	4.3(±0.7)	3.7(±1)	-4.699	0.000**
Consequences	2.3(±0.9)	3.8(±0.9)	2.8(±1.2)	-6.398	0.000**
Personal Control	3.3(±0.9)	2.9(±0.8)	3.2(±0.9)	2.582	0.010**
Treatment control	3.1(±1)	2.9(±1)	3(±1)	1.576	0.115
Illness coherence	3.6(±1.1)	3.1(±1.2)	3.5(±1.2)	3.608	0.000**
Timeline cyclical	3.6(±0.9)	3.4(±0.8)	3.6(±0.9)	1.352	0.176
Emotional representations	2.7(±1)	3.8(±0.9)	3.1(±1.1)	-5.018	0.000**

Table shows means (standard deviations) of Illness Perception scales at baseline, 12 months and 24 months by dichotomised Graded Chronic Pain Scale (dGCPS) (Dworkin et al. 2002) indicating high or low disability at each point in time and significance of differences between high and low disability groups. Wilcoxon signed-rank tests were used to test for difference between low and high GCPS outcome status for each variable and at each point in time at **p<.01.

Supplementary Table 8 (S8): Spearman correlations between Consequences, characteristic pain intensity, PHQ4 and demographic factors

	Baseline	12 months	24 months
Age	-0.182*	-0.241**	-0.309**
Characteristic pain intensity	0.331**	0.436**	0.541**
PHQ4	0.394**	0.405**	0.387**
Male	0.062	0.021	0.015
Musculoskeletal diagnosis	-0.261**	-0.285**	-0.344**
Neuropathic diagnosis	0.216**	0.159	0.218**
Combined diagnosis	0.069	0.177*	0.177
Employed	-0.024	0.028	0.120
Retired	-0.137	-0.101	-0.185
Not employed or retired	0.198*	0.095	0.086

Table shows Spearman correlations between Consequences scores, characteristic pain intensity and PHQ4 scores reported at each time of data collection. Demographic factors were measured only at baseline so correlations including these factors used the baseline measures. No significant correlations were reported between Consequences and Deprivation Index or level of education (data not shown).

Significant correlations are indicated by *($p<.05$) and ** ($p<.01$).