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Pain Self-Management: Easier said than done? Factors associated with early dropout from pain self-management in a rural primary care population.

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Abstract

Objective: To explore whether psychosocial or demographic factors are associated with early dropout from pain self-management in a rural, low socioeconomic status population.

Design: Secondary analysis of retrospective data.

Setting: Multidisciplinary pain clinic located in an outer regional area of Australia.

Subjects: 186 people attending a public community health centre with chronic non-cancer pain: mean age 54.9 years; 58.1% women; 81.7% in receipt of government benefit as their primary source of income.

Methods: Bivariate analysis and logistic regression, with early dropout as the dependent variable and a range of demographic and psychological independent variables.

Results: Following bivariate analysis, early dropout was significantly associated ($p < 0.05$) with male gender, younger age, history of substance use, being a past victim of assault/abuse, receiving unemployment or disability benefit, having literacy difficulties, higher pain catastrophising score, higher daily opioid dose, and not holding a biopsychosocial belief about the cause of pain. Logistic regression analysis resulted in three significant predictors of dropout: substance use history ($p = 0.002$); past victim of assault or

abuse ($p=0.029$); high pain catastrophising score ($p=0.048$), and one of engagement: holding a biopsychosocial belief about pain cause ($p=0.005$).

Conclusions: In a rural, low socioeconomic status population, addressing social stressors related to lifetime adversity may be important in order to increase engagement in pain self-management. Lack of attention to these factors may increase health inequity amongst those most disabled by chronic pain. Further research into dropout and engagement, especially amongst disadvantaged populations, is recommended.

Key Words: Self-management; Chronic Pain; Primary Care; Social Determinants

Introduction

Chronic pain (CP) affects 20-25% of Australian adults, with similar numbers worldwide (1-3). It is associated with physical and mental health comorbidities (4), increased mortality (5) and substantial social and economic costs (6). There are major disparities in CP in relation to the social determinants of health, with women, the less educated, and the poor all experiencing more frequent, severe and disabling pain (1, 3, 5).

For 80-85% of Australians living with CP, the primary management strategy is analgesic medication (2, 7), despite growing evidence of poor efficacy and iatrogenesis (2, 8-11). Pain self-management (PSM), which aims to increase control over the pain experience (using strategies such as cognitive-behavioural therapy, graded exercise, and pain education), has long been recognised as an effective treatment (12-14). Systematic reviews (15, 16) have recommended that further research into PSM efficacy is not needed, but that attention should be directed toward subgroups that may benefit from PSM. Pain patients are not homogenous (17) and modest outcomes from PSM programmes conceal wide variations in benefit, with some people doing much better than others. Most PSM research has focussed on either intensive, full-time treatment programmes (often for compensable patients, and excluding those with low literacy or low motivation), or low-intensity programmes for treatment-seeking, well-educated, often privately insured people (15, 18-22). These studies describe a population different from those seen in chronic pain prevalence studies. The POINT study (8, 9), a recent cohort study of Australian primary care patients on long-term opioid therapy, observed that this population is characterised by low levels of education,

low income and complex psychosocial issues. This has been observed in other studies also (1, 5); however, it appears that many of these patients are either not being offered (23, 24) or not engaging with PSM. If those who are not accessing PSM are already disadvantaged, this may be increasing health inequity.

Currently in Australia, the focus is on addressing barriers to PSM such as cost, location, and available expertise (2, 7, 25). While this is vital, other factors may lead to dropout or disengagement from PSM, and this is the focus of the current study. Research on dropout is sparse, with few studies focussing on either people with CP or standard PSM interventions (26, 27). The only study found in the literature that recorded PSM dropout in detail reported that a low level of education, low literacy, and catastrophising predicted initial poor attendance at a low-intensity PSM programme designed for a low socioeconomic status (SES) rural U.S. population, and that higher income predicted treatment completion (28). This suggests that social determinants of health (29, 30) as well as psychological factors, may influence engagement. Psychological techniques such as motivational interviewing (14) are known to increase engagement with PSM (12, 31), but if social factors are also important, different interventions may be needed.

The aim of this study was to examine factors associated with early dropout (post assessment) from PSM in an Australian low-SES rural population. The hypothesis was that both psychological and social factors would contribute and that in particular, factors associated with the social determinants of health may be important.

2. Method.

2.1 Setting and Participants

2.1.1 Setting

The study was a secondary analysis of retrospective data gathered by clinical and administrative staff between January 2016-June 2017 from a multidisciplinary pain service located in Mildura, north-west Victoria, an outer regional area of Australia (32) covering 22,000 km² with a population of approximately 60,000. The area experiences relative social deprivation, with lower income levels, lower school completion, fewer skilled workers and higher unemployment rates than either the state capital, Melbourne (population 4.8 million) or regional Victoria generally (33). The area also has one of the highest opioid prescribing rates in Australia (25).

2.1.2 Participants

The multidisciplinary pain service involved in this study was located in a large public community health centre. To be eligible for the pain service, clients were required to be over 18 years; referred by their GP; suffering from chronic (greater than 3 months) non-cancer pain and potentially interested in a multidisciplinary PSM approach. Compensable clients were ineligible for the service because the community health centre was not registered as an insurance treatment provider.

Following referral, clients (who underwent telephone triage to confirm eligibility) were invited to attend a 90-minute introduction session designed to address expectations and clarify treatment philosophy prior to engagement with the service. The session provided pain neurophysiology education (34); introduced the biopsychosocial model of pain (which describes pain experience as the result of a complex interaction between biological, psychological and social factors (35)), and concluded with a brief explanation of multidisciplinary assessment and treatment options (including the central role of the client in managing their pain). Those who remained interested in multidisciplinary assessment and management were asked to complete an initial assessment survey including demographic data and outcome measures, from which the study data was obtained. One-to-one support for those with literacy difficulties was provided. All those who completed the survey form and consented to use of their data were included in the study, with the exception of those deemed not suitable for PSM (patients who required alternative treatment, usually surgery: n=29). 40% (n=144) of those who were offered assessment did not complete a survey or attend any appointments and this is consistent with reports from other pain management services (36). Written consent was obtained from all participants and ethics approval for this stand-alone retrospective study was provided by the Flinders University Social and Behavioural Research Ethics Committee.

Data for the secondary analysis was collected directly from the initial survey, with additional detail obtained from the face-to-face assessment if required. Following initial data entry,

20% of random paper surveys were rechecked against the electronic data to confirm accurate information transfer.

2.1.3 Assessment and treatment process

Approximately 8 weeks following the survey return, multidisciplinary assessment was initiated (appointments could include the pain physician, nurse, physiotherapist, occupational therapist, psychologist or counsellor), followed by a case conference. The assessment process concluded with a feedback meeting with the client to outline likely pain contributors and proposed management strategies. Engagement was encouraged by tailoring treatment according to client preference as well as identified clinical need (37, 38). All staff had been trained in the Flinders Chronic Condition Management Program (39), a client-centred approach to care planning and coordination which incorporates motivational interviewing (12).

A wide range of treatment options was available without charge through the pain service, including: group treatment (mindfulness, tai chi, pain coping skills, aquatic therapy); individual consults with pain team members; interventional anaesthetic procedures; and referral to other services within the community health centre such as dietetics, drug and alcohol services, podiatry.

Engagement with the service (as described below) was based solely on a client's attendance at PSM sessions, which was limited to treatments requiring active and goal-directed client

involvement (40). This excluded passive interventions such as injection procedures and provision of aids/equipment.

2.2 Measures

2.2.1 Engagement

The primary dependent variable was early dropout (n=75), which comprised the following groups (see also Figure 1):

1. Survey only: Completed survey, no face-to-face assessments attended (n=7: 5 did not attend/unable to contact (DNA), 2 cancelled - no reason given).
2. Incomplete assessment: Attended one or more face-to-face appointments, but did not complete assessment process (n=8: 6 DNA, 1 refused PSM, 1 no reason provided).
3. Completed assessment including feedback meeting, but no treatment sessions (n=44: 16 refused PSM, 17 no reason given, 11 DNA).
4. Commenced treatment, attended fewer than 3 sessions n= 16: 3 no reason given, 8 due to comorbidity, 5 DNA).

‘Engagement’, by contrast, was defined as attendance at 3 or more PSM sessions. This number was determined to require some initial commitment and likely to provide a basic understanding of the principles of PSM. The study was focussed only on early dropout, not later dropout or post-programme adherence. This category also included 11 people who

attended less than 3 sessions, either because: all issues were addressed in that time (n=5), due to the client having established PSM skills already; or because they were referred to, and attended, PSM at another location (n=6).

2.2.2 Independent variables

Based on the relevant literature, the following independent variables obtained from the initial survey were selected for bivariate analysis (17, 41-46):

2.2.2.1 Demographic characteristics

Demographic variables included: gender, age, income and communication level. Age was measured both in years and in three age groups defined as: 'working age' (18-54 years), 'nearing retirement' (55-64 years) and 'retirement age' (over 65 years). Age was described in these categories to enable comparisons between this population and that of the POINT cohort (9). Categories of income status were: independent income (workers, self-funded retirees, insurance income); age pension (approx. A\$400/week); disability pension (approx. A\$400/week); and unemployment or single parent pension (combined due to low numbers on single parent pension – approx. A\$300/week). Despite similar incomes, age pension and disability pension were maintained as separate categories since those on the age pension are likely to have greater wealth (e.g. more likely to own property)(47). 'Communication issue' was categorised as: no difficulty (able to fill in survey independently); or difficulty (inability to complete survey independently) due either to a literacy or a language barrier.

2.2.2.2 Pain-related measures

Self-efficacy: Participants were asked to rate the level of confidence in their ability to undertake a range of daily activities despite pain. This was measured using the Pain Self-Efficacy Questionnaire (PSEQ) (48), a widely used, validated 10-item Likert scale scoring from 0-60. Higher scores indicate greater self-efficacy. Psychometric properties of the PSEQ are well-established with excellent internal consistency (Cronbachs $\alpha = 0.92$) and test-retest reliability ($r=0.73$) (48).

Catastrophising: This was measured using the Pain Catastrophising Scale (PCS) (49), a 13-item, 5-point Likert scale scored from 0 to 52. It is a widely used self-report scale used to record the frequency of certain thoughts and feelings when experiencing pain (49). Higher scores indicate increased catastrophic thinking. The PCS has demonstrated internal consistency (Cronbachs $\alpha = 0.87$) and high test-retest reliability ($r=0.78$) over a range of populations (49-51).

2.2.2.3 Beliefs about pain cause

The initial survey had an open-ended question: “Some people have a good idea of what is causing their pain problem, and others do not. What do you think is the matter with you?” and the answers were coded as follows:

- Don't know: either recorded 'don't know' on initial survey and/or stated do not know when asked directly about their understanding of factors contributing to pain.

- Biomedical: reported their understanding of pain based on only anatomical/physiological descriptors. Typical answers included 'bulging discs', 'osteoarthritis'.
- Multifactorial: may use biomedical descriptors but in addition refer to psychological, social and/or environmental factors to explain pain experience. People typically referred to stress, a 'hard life', mental health issues or a history of trauma/abuse.

2.2.2.4 Medication use

An opioid calculator (52) was used to convert reported opioid consumption (including codeine) into a morphine equivalent dose (mg). Regular (not prn) consumption only was recorded and self-report was confirmed by sighting relevant medications at the initial assessment.

2.2.2.5 Physical health

Number of comorbidities in addition to CP (up to four) were recorded, as well as presence or not of a current mental health diagnosis (the commonest comorbidity).

2.2.2.6 Significant social issues

Although not identified as a potential variable in the literature review, this was coded in the database as follows: no social issue reported; history of substance use disorder; victim of

past child physical/sexual abuse; victim of past assault/domestic violence. Information about past substance use was routinely recorded in the initial survey and clarified in the interview. Participants were invited to disclose an abuse or assault history in the initial interview.

All data was sourced from the completed initial assessment survey. Missing data and additional information about social issues were obtained the face-to-face assessment if needed.

2.3 Analysis

The data was analysed using IBM SPSS (Statistics Package for Social Sciences; Version 24). Descriptive statistics outlined the participants' demographic and pain-related characteristics including how the dropout and engaged groups differed. Bivariate analysis was undertaken to examine potential statistically significant relationships between engagement and the other identified independent variables, using Chi-Square for categorical variables; Mann-Whitney or Kruskal-Wallis for non-parametric scale variables; and t-testing for parametric scale variables. All independent variables which reached significance in the bivariate analyses were then entered simultaneously into a logistic regression model in order to identify statistically significant associations with the dependent variable, engaged/early dropout.

3. Results

3.1 Descriptive characteristics

The study consisted of 186 participants, including 111 'engaged' and 75 dropouts. Table 1 contains a summary of demographic and clinical characteristics. Table 1 shows that just over half the participants were female with a mean age of 55 (+/-13) years. The vast majority of participants were Australian-born and received a government benefit or pension as their primary source of income. Most (71%) reported CP for more than 5 years and almost all had at least one comorbidity (most commonly a mental health condition). Almost three-quarters were using some form of prescription opioid (including codeine) regularly.

3.2 Bivariate analysis: engagement vs. dropout

Engaged participants were significantly more likely to be female ($p=0.047$), older ($p=0.003$), and either receiving the age pension or an independent income ($p=0.011$). They also reported a significantly lower opioid dose ($p=0.021$), a lower pain catastrophising score ($p=0.000$), and were more likely to endorse a multifactorial view of pain cause ($p=0.000$). Dropouts were significantly more likely to have a communication difficulty ($p=0.009$) (although numbers were small) or a major social issue ($p=0.000$). There was no statistically significant difference ($p<0.05$) between the groups in terms of numbers of comorbidities, past surgery, years with pain, living status, self-efficacy score (which was low in both groups), mental health diagnosis, or whether they currently used opioid medication.

3.3 Logistic regression

Multivariate analysis was undertaken using complete data sets from 174 people, consisting of 103 engaged and 71 non-engaged. The main reason for missing data was incomplete PCS score. Non-dichotomous categorical variables were recoded using dummy variables. An initial logistic regression was undertaken using simultaneous entry of the following variables: gender, age in years, PCS score, communication difficulty, oral morphine dose, pain causal belief, reported social issue, and income status. Simultaneous rather than hierarchical entry was used since there was no evidence suggesting that any particular variable was of greater importance.

The logistic regression results are outlined in table 2. The statistically significant predictors of whether participants engaged or dropped out were: multifactorial (MF) belief about pain cause ($p=0.005$), history of assault/abuse ($p=0.029$), substance use history ($p=0.002$), and PCS score ($p=0.048$). No other variable remained significant at the one or two tailed level.

Odds ratios indicated that those with a MF belief were five times more likely to engage than people who dropped out, whereas those with a substance use history were twelve times less likely to engage, and those with an assault or abuse history were three times less likely to engage.

Goodness of model fit was confirmed by using the Hosmer and Lemeshow test ($p=0.962$). A ROC curve (see figure 2) assessing sensitivity and specificity of the model yielded an area

under the curve of 0.832 (95%CI=0.771-0.893), significantly greater ($p=0.000$) than the null hypothesis area of 0.5. This supports the predictive value of the model obtained by logistic regression.

Discussion

This study describes both a population (rural, low SES public patients) and a treatment challenge (early dropout) that is relatively unexplored in PSM research. The aim was to identify factors associated with early dropout from PSM, with the hypothesis that dropout may be related to social determinants of health, as well as to psychological factors such as catastrophising. Although the limited sample size and cross-sectional nature of this study restricts causal inference, the results do support the hypothesis that there are differences between those who engage and those who drop out in terms of social and psychological factors.

In this population, holding a multifactorial belief regarding the cause of pain was strongly associated with increased engagement. Although the question asked about pain cause was too general to make assumptions about a patient's overall belief orientation (that is, whether they had an overall biopsychosocial rather than a biomedical understanding of pain), their answers did indicate a belief that their pain cause was related to factors other than, or in addition to, definite pathology or injury. Several qualitative studies have reported that having a clear explanation of pain cause which includes both psychosocial and biomedical contributors is needed for patients to be willing to engage with PSM (38, 45, 46, 53-55). The current study provides quantitative support for these observations. Of note, the

question about belief was asked after all participants had been provided with a biopsychosocial explanation of their pain in the introductory session. Given that only 29% of people reported a multifactorial understanding of pain cause, this one-off education session appeared insufficient to change beliefs, as suggested by other studies (56). Research on belief formation about pain cause has noted that healthcare providers, especially general practitioners (GPs) are a trusted source for such information and are likely to strongly influence patient beliefs (57, 58). It may be that for people to move away from a purely biomedical understanding of pain cause, the concepts need to be introduced (by the GP or other health provider) and reinforced over time rather than via a single education session. Further research on the factors influencing the development of pain causal beliefs is needed, especially if (as suggested by this study) it is a key factor in improving engagement with PSM.

Lower PCS scores also significantly predicted engagement. Although catastrophising has not been previously examined in relation to engagement, it is well established as a significant contributor to chronic pain onset, severity and associated disability (59). High levels of pain catastrophising are predictive of poor treatment outcome (60, 61) and reducing catastrophic thoughts and feelings is an important treatment target for PSM programmes (61). It is therefore not surprising that it may also be important in engagement. The 'helplessness' subscale of the PCS, which includes self-statements such as 'There's nothing I can do to reduce the intensity of the pain' (49), may particularly reflect willingness to engage, and this could be explored in future research. If people believe that they are helpless in the face of their pain experience, it may be harder to engage with a PSM

approach. Of note, although older age was no longer associated with engagement following logistic regression, it did appear to mediate the relationship between catastrophising and engagement. For people over 65, PCS score was significantly lower ($p=0.000$) than in younger people (which has been previously reported (62), and was also no longer associated with likelihood of engagement. By contrast, holding a multifactorial understanding of pain cause remained significantly associated with increased engagement across all age groups.

The two factors from the logistic regression results that predicted early dropout were being a victim of abuse/assault or having a history of substance use disorder. Substance use disorder in CP has primarily been looked at in the light of risky opioid use. Most PSM studies explicitly exclude those with current substance use issues and rarely document substance use history, despite the POINT study reporting a 30% lifetime alcohol use disorder (9) in a large sample of prescription opioid users. Trauma and substance use history have not been examined in the context of PSM and only emerged in this study during the course of data analysis. However, of the 22 people with substance abuse history, 17 also reported either being a victim of assault or abuse, experiencing current homelessness, or having a diagnosed Post-Traumatic Stress Disorder. Therefore, in the context of encouraging engagement with PSM, it is important to view this population as one with significant lifetime adversity, not simply as people with substance use disorders. Of those without a reported substance use history, being a past victim of abuse or assault, including domestic violence, physical assault, or child physical/sexual abuse was also significantly correlated with non-engagement. In this study, both abuse and substance use history was less commonly reported than in chronic pain prevalence studies, but this may be because only

sexual/physical abuse was recorded (not emotional abuse or neglect) (9, 63). In addition, a history of abuse, trauma or adversity was not specifically searched for in the initial assessment, which is also likely to have promoted underreporting. Despite this, the presence of any of these factors (at least one of which was reported by 47% of early dropouts) was also significantly associated with having a lower income (receiving disability or unemployment benefit); a high PCS score; and reporting 'do not know' when asked about their pain causal belief. These findings support the argument that social and psychological factors may compound in socially disadvantaged populations, such that perceived loss of control through catastrophic thoughts and feelings (as reflected in the PCS score and pain causal beliefs) becomes amplified by the actual loss of external control associated with poverty or past trauma (28, 64). Simply addressing psychological factors (for example, through cognitive-behavioural therapy) is unlikely to be sufficient for this group, unless attention is also paid to increasing social support services.

Higher levels of general lifetime adversity have been observed repeatedly in studies of CP prevalence (63, 65). A history of trauma in particular has been associated with more frequent, severe and disabling pain as well as a higher risk of long-term opioid use and opioid dependence (8-10, 63, 65, 66). People with high levels of lifetime adversity represent a sizeable sub-group in CP. Our study suggests that they are also less likely to engage in PSM and that attention to tailored strategies may be needed if we are to avoid increasing inequity for this already disadvantaged population.

Limitations and recommendations

Since this is a descriptive exploratory study with a small sample size, its value lies primarily in the questions it raises rather than just the conclusions that can be drawn. Further research, including longitudinal or experimental designs with larger samples, are needed to establish causation. A range of variables which were found to be significant in the bivariate analysis but not in the logistic regression could be explored further in a much larger sample. In particular, age (67), gender (43), communication issues (68) and morphine dose (69) have been noted to influence PSM outcomes in other studies. Their potential role in engagement could be investigated. It is also recommended that future research should employ more than just the one standardised pain assessment survey we used to collect data, because we believe this restricted the detail obtainable in a number of areas. For example, it would have been useful to have a questionnaire to ask about more than one pain belief, or specific elements of the BPS model (such as the "Survey of Pain Attitudes" (SOPA) questionnaire)(70). Due to limited resources, the categorisation process for the causal belief question could not undergo independent verification, which was a further limitation. Nonetheless, the fact that a simply coded question on pain cause remained highly correlated with engagement suggests that it could be further explored as a potential measuring tool. Due to the retrospective nature of the study, many of the factors that emerged as significant predictors of engagement were enquired about informally or by yes/no response only; namely lifetime adversity, substance use history, and poor literacy. Use of validated assessment tools for all these areas would have provided more accurate data. There is obviously a limit to the number of assessment tools patients can be expected

to complete in the pain clinic setting, but this study suggests that these factors, which are not necessarily a key focus of pain clinic assessment, deserve attention.

Conclusion

Free timely access to PSM is important, however dropout from PSM is common and is associated with social and psychological factors. Those with the most disabling and distressing pain may be those least likely to access best-practice treatment. Complex social factors may limit the effectiveness of an individually-focussed approach such as PSM, resulting in increased health inequity. Beliefs regarding the cause of pain appear important for engagement; and this study reiterates the importance of primary care providers (especially GPs) to provide simple, non-catastrophic patient messages (57, 71), even if they cannot provide PSM. Further research into engagement and dropout is recommended, especially to explore the above variables in more detail and to investigate alternative approaches to manage those with greater lifetime adversity. Studies that explore how social support services can be integrated with self-management approaches are needed for both CP and chronic disease management as a whole.

Conflict of interest statement

The authors have no conflict of interest to declare.

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Table Legends**Table 1**

Descriptive characteristics and Bivariate analysis (n=186 unless otherwise noted)

a= Pearson Chi-Square test

b= t-test for independent means

c= Mann-Whitney test for non-parametric data

*= significant result $p < 0.05$

OR=odds ratio

M= mean

SD= standard deviation

CI= confidence interval

Table 2

Logistic regression

SE = standard error

CI= confidence interval

*= significant at 2-tailed level ($p=0.05$)

Table 1 Descriptive characteristics and Bivariate analysis (n=186 unless otherwise noted)

	All participants	Engaged n=111	Drop-out n=75	Bivariate analysis
Sex: Female	108 (58.1%)	71 (64.0%)	37 (49.3%)	OR= 1.83 P=0.047 ^{a*}
Age last birthday	M=54.9 SD=13.3	M=57.3 SD=13.7	M=51.4 SD=12.0	P=0.003 ^{b*} 95%CI = 2.00-9.69
Age in 3 groups 18-54 yr (working age)	91 (48.9%)	45 (40.5%)	46 (61.3%)	OR = 3.38 (above/below 65) P=0.004 ^{a*}
55-64 yr (near retired)	51 (27.4%)	31 (27.9%)	20 (26.7%)	
65+ yr (retired)	44 (23.7%)	35 (31.5%)	9 (12.0%)	
Activity status: Independent income	34 (18.3%)	23 (20.7%)	11 (14.7%)	P=0.011 ^{a*}
Disability Pension	65 (34.8%)	31 (27.9%)	34 (45.3%)	
Unemployed/sole parent benefit	46 (24.7%)	25 (22.5%)	21 (28.0%)	
Old age pension	41 (22%)	32 (28.8%)	9 (12.0%)	
Living status: n=179 Alone	57 (32%)	30 (27.3%)	27 (39.7%)	P=0.106 ^a
Other adults, no children	80 (44.9%)	56 (50.9%)	24 (35.3%)	
With children	41 (23%)	24 (21.8%)	17 (25.0%)	
Born in Australia?	163 (87.6%)	99 (89.2%)	68 (90.7%)	P=0.744 ^a
Communication issue: Poor literacy	16 (8.6%)	5 (4.5%)	11 (14.7%)	OR=3.50 (yes/no) P=0.009 ^{a*}
Non-English speaker	8 (4.3%)	3 (2.7%)	5 (6.7%)	
Years with pain: 2-5 years	33 (17.7%)	22 (19.8%)	11 (14.7%)	P=0.462 ^a
Over 5 years	132 (71.0%)	75 (67.6%)	57 (76.0%)	
Social issue: None reported	136 (73.1%)	96 (86.5%)	40 (53.3%)	OR=5.60 (yes/no social issue) P=0.000 ^{a*}
Substance use history	22 (11.8%)	2 (1.8%)	20 (26.7%)	
Child abuse history	17 (9.1%)	8 (7.2%)	9 (12.0%)	
History of assault	11 (5.9%)	5 (4.5%)	6 (8.0%)	
Comorbidities: One or two	103 (55.7%)	57 (51.8%)	46 (61.3%)	P=0.677 ^a
Three or more	69 (37.3%)	45 (40.9%)	24 (32.0%)	
Current mental health diagnosis n=185	110 (59.5%)	60 (54.5%)	50 (66.7%)	P=0.099 ^a
Past surgery for pain	55 (29.6%)	35 (31.5%)	20 (26.7%)	P=0.476 ^a
Oral morphine equivalent (mg)	M=54.7 SD=75.3 Median=30.0	M=47.9 SD=75.2 Median=20.0	M=64.7 SD=74.8 Median=40.0	P=0.021 ^{c*}
Using opioid now?	136 (73.1%)	76 (68.5%)	60 (80%)	P=0.082 ^a
PCS score n=174	Median=27.5	Median=23.0	Median=36	P=0.000 ^{a*}
PSEQ score n=176	Median=20	Median=21	Median=19	P=0.256 ^c
Cause of pain n= 184				OR = 7.09 (BPS vs. others) P=0.000 ^{a*}
Don't know	71 (38.6%)	29 (26.6%)	42 (56.0%)	
Biomedical concept (BM)	60 (32.6%)	34 (31.2%)	26 (34.7%)	
Multifactorial I concept (MF)	53 (28.8%)	46 (42.2%)	7 (9.3%)	

Table 2: Logistic Regression

<u>Variable</u>	<u>SE</u>	<u>2-tailed Sig.</u>	<u>Odds ratio</u>	<u>95% CI Lower</u>	<u>95% CI Upper</u>
Age	0.023	0.254	0.97	0.93	1.02
Sex	0.399	0.781	0.90	0.41	1.96
Pain catastrophising score	0.016	0.048*	1.03	1.00	1.06
Communication difficulty	0.603	0.511	0.67	0.21	2.19
Oral morphine equivalent	0.003	0.576	1.00	0.99	1.01
Biomedical belief	0.449	0.913	0.95	0.40	2.30
Multifactorial belief	0.576	0.005*	5.01	1.62	15.51
Substance use history	0.827	0.002*	0.08	0.02	0.38
Assault or abuse history	0.558	0.029*	0.30	0.10	0.88
Independent income	0.632	0.763	0.83	0.24	2.85
Unemployed/sole parent pension	0.520	0.841	1.11	0.40	3.07
Age pension	0.694	0.859	1.13	0.29	4.41

Figure legends

Figure 1. Patient engagement flowchart

Figure 2: ROC curve demonstrating high sensitivity and specificity in the proposed model.

Area under the curve=0.832 (95%CI=0.771-0.893; p=0.000)

Figure 1.

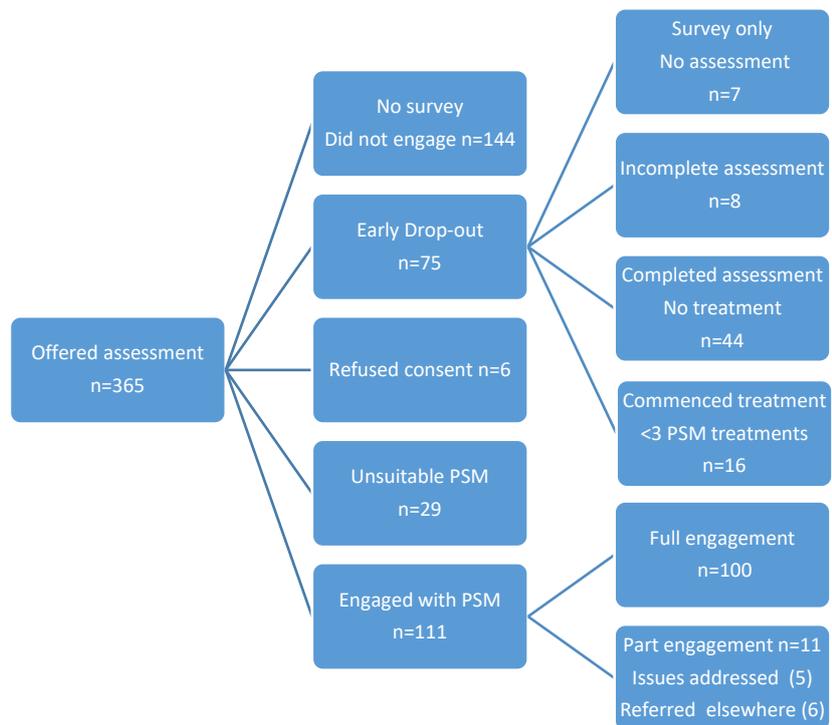


Figure 2

