Depressive symptoms in patients with chronic pain

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Views on the association between chronic pain conditions and depression have a long history in both the pain and psychiatric literature. These ideas have included pain being an antecedent to depression, depression being a consequence of chronic pain,[1] or a common comorbid complication.[2] It has also been argued that chronic pain, especially when it is deemed "non-specific", could itself be seen as a *forme fruste* of depression or masked depression.[3] Estimates of the proportion of patients with chronic pain and mental disorders vary from almost none (1.5%) to perhaps all (100%),[2] with most studies nominating figures in the mid-range. For example, one study reported that 59% of one sample of patients with chronic pain demonstrated current symptoms for at least one psychiatric diagnosis, mainly major depression, substance misuse and anxiety disorders.[4] In another study of patients with chronic pain, 30%–40% were reported to be depressed.[5]

In recent years, research in this field has attempted to examine the nature of depression in populations of patients with chronic pain. In part, this has been prompted by the clinical observation that there is often symptom overlap between clinical depression and the common features of chronic pain conditions.[6] Clinically, this is manifest by the limitations found when using somatic symptoms in self-report measures of depression in both populations with depression and those with chronic pain,[7] and has generated debate about the utility of categorical diagnostic criteria, as described in the *Diagnostic and statistical manual of mental disorders*, fourth edition (DSM-IV),[8] for understanding and treating depression in people with chronic pain.[9]

The importance of investigating the putative association between chronic pain and mental disorders is underscored by two principal findings. First, there is evidence that patients with chronic pain who have a comorbid mental disorder have a more impaired quality of life than those without this comorbidity.[2,10] Second, treatment outcomes can be compromised when both pain and a mental disorder are present, but only one of them is targeted for treatment. For example, higher levels of depression have been shown to be predictive of poorer treatment outcomes for patients with chronic pain,[11] as well as higher health care costs

ABSTRACT

Objective: To determine the nature of depressive symptoms in a sample of patients with chronic pain, and to examine the relationship between depressive symptoms and physical disability due to pain.

Design, participants and setting: Cross-sectional study of 812 patients with complete datasets from a total of 2419 patients with pain who were referred to the Pain Management Research Institute at Royal North Shore Hospital, Sydney, between January 2000 and December 2007.

Main outcome measures: Pain severity and distress, physical disability, depressive symptoms, pain self-efficacy, catastrophising, fear of movement/(re)injury, use of unhelpful self-management strategies, sense of control over life, and perceived support from significant others, assessed by the West Haven–Yale Multidimensional Pain Inventory, modified version of the Roland Morris Disability Questionnaire, the depression subscale of the Depression Anxiety Stress Scales, Pain Self-Efficacy Questionnaire, Pain-Related Self-Statements Scale, Tampa Scale of Kinesiophobia, and Pain Self-Management Checklist.

Results: After controlling for the effects of age, sex and duration of pain, depressive symptoms were most strongly correlated with a combination of catastrophising, sense of control over life, physical disability, pain self-efficacy beliefs, higher use of unhelpful self-management strategies and lower perceived social support. Depressive symptoms also correlated with physical disability, but to a lesser extent than other variables, including fear of re-injury, low self-efficacy for activity and pain severity. The depressive symptoms that were rated as most frequently experienced reflected sadness, lack of initiative and lack of ability to experience pleasure.

Conclusions: In patients with chronic pain, depressive symptoms are correlated more strongly with cognitive variables than pain severity and pain distress, while physical disability is correlated more strongly with cognitive, behavioural and pain variables than depressive symptoms. Furthermore, depressive symptoms are characterised predominantly by mood-related symptoms, which suggests differences in the experience of depression in patients with chronic pain compared with those presenting with mental disorders.

over time.[12] Equally, the presence of pain in people being treated for mood disturbance has predicted delayed responses to mood interventions.[13] Therefore, improving our understanding of how chronic pain and depression are linked, and treating both components offers the prospect of enhancing treatment effects beyond the benefits of treating either condition alone.[14]

In this study, we examined three main questions. In a sample of patients with chronic pain:

• What somatic (pain) and psychological variables correlate with depressive symptoms, measured by the depression subscale of the Depression Anxiety Stress Scales (DASS)?[15]

• After controlling for other variables known to affect physical disability, do depressive symptoms measured by the DASS depression subscale correlate with physical disability, as measured by the Roland Morris Disability Questionnaire (RMDQ)?[16]

• Which DASS depression subscale items are rated as most frequently experienced?

METHODS

Data were available from a total of 2419 patients with pain, who were referred to the Pain Management Research Institute at Royal North Shore Hospital, Sydney (a tertiary referral centre), for assessment and treatment between January 2000 and December 2007. Demographic data were collected, and all patients were asked to complete a set of self-report measures. Use of the de-identified dataset for this study was approved by the Human Research Ethics Committee of Royal North Shore Hospital.

Measures

We attempted to capture the following typical multidimensional features of chronic pain with the instruments described.

• **Pain severity:** the three-item pain intensity subscale of the West Haven–Yale Multidimensional Pain Inventory (MPI).[17] The MPI has been widely used in research and clinical practice, and has been shown to have good reliability and validity.[18] Scores range from zero to 6, with higher scores reflecting more severe pain over the past week.

• **Pain distress:** the distress caused by patients' pain over the past week was assessed on a zero to 10 numerical rating scale, with higher scores indicating greater pain distress.[19]

• **Physical disability:** the modified RMDQ.[16] The RMDQ has 24 items and covers a range of daily activities perceived by patients to be limited by their pain. The scores can range from zero (no disability) to 24 (severe disability). In this study we employed a modified version using all 24 items of the RMDQ that is appropriate for patients with all pain sites.[20]

• **Severity of depressive symptoms:** the depression subscale of the DASS.[15] The depression subscale does not include somatic items, and is therefore less likely to be artificially inflated in a chronic pain setting. Reliability and validity of the DASS have been well established.[7,15] Respondents report how frequently they have experienced each symptom in the past week on a scale ranging from zero ("not at all") to 3 ("most of the time"). Scores on the depression subscale range from zero to 42, with higher scores reflecting greater severity.

• **Pain self-efficacy:** the Pain Self-Efficacy Questionnaire (PSEQ).[21] The PSEQ measures the strength and generality of patients' beliefs about their ability to accomplish a range of activities despite their pain. High reliability and validity of the PSEQ have been reported.[21] Scores range from zero to 60, with higher scores indicating stronger self-efficacy beliefs.

• **Catastrophising:** the Pain-Related Self-Statements Scale (PRSS).[22] Scores range from zero to 5, with higher scores indicating more frequent catastrophising when experiencing pain. The PRSS has good psychometric properties.[22]

• **Fear of movement/(re)injury:** the Tampa Scale of Kinesiophobia (TSK).[23] The TSK is a measure of specific fear of movement, and has shown good validity and reliability.[24] Scores range from 17 to 68, with higher scores reflecting greater fear of movement, injury or re-injury.

• **Use of unhelpful self-management strategies:** assessed by the Pain Self-Management Checklist (PSMC).[25] This reflects the frequency of use of a number of self-management strategies generally thought to be unhelpful for chronic pain. Scores range from zero to 76, with higher scores reflecting more frequent use of unhelpful strategies.

• **Sense of control over life:** the life-control subscale of the MPI.[17] Scores range from zero to 6, with higher scores reflecting more control over life at present.

• **Perceived support from significant others:** the support subscale of the MPI.[17] Scores range from zero to 6, with higher scores reflecting greater support at present.

Statistical analysis

We performed forward-entry multiple regression analyses to investigate our first two key questions, namely, which variables correlate with depressive symptoms (as measured by the DASS depression subscale), and whether DASS depression scores correlate with physical disability (as measured by the RMDQ) after controlling for other variables known to affect physical disability.

In both sets of multiple regression analyses, age, sex, and pain duration (months) were entered first to control for their possible effects.

The range of variables entered into both sets of multiple regression analyses were subscales of the MPI (pain severity, life control, support), physical disability (measured by the RMDQ), depressive symptoms (measured by the DASS), pain self-efficacy (measured by the PSEQ), catastrophising (measured by the PRSS), fear of movement/(re)injury (measured by the TSK), pain distress in the past week, and use of unhelpful self-management strategies (measured by the PSMC).

The dataset was screened for normality, homoscedasticity, linearity and independence of the residuals, multicollinearity, and univariate and multivariate outliers. Twenty participants were excluded from the analysis because they were univariate or multivariate outliers — nine in relation to correlates of physical disability, and 11 in relation to correlates of depressive symptoms.

RESULTS

Complete datasets were available for 812 of the 2419 referred patients. The mean age of these 812 participants was 49.58 years (SD, 16.25), and most (56.5%) were female. The mean duration of pain was 84.43 months (SD, 117.56).

Box 1 shows mean scores for the study participants on each independent variable. A comparison of the 812 participants who had complete datasets with the 1607 patients who had incomplete datasets showed no differences in terms of sex ratio, but the incomplete dataset cohort were slightly older (mean age, 53.4 years; SD, 17.1) and had had a longer duration of pain (mean, 95 months; SD, 129.1). However, on the assessment measures, there were no significant differences between the two groups. Accordingly, we believe that the results of the study sample are generalisable to the full dataset.

1 Mean score (SD) for the 812 study participants on each independent variable

Variable	Score range	Mean score	SD
Physical disability (RMDQ)	0–24	12.21	5.58
Depressive symptoms (DASS)	0–42	13.61	11.54
Pain distress in the past week	0–10	6.42	2.41
Pain self-efficacy (PSEQ)	0–60	26.82	14.05
Pain severity (MPI)	0–6	3.99	1.10
Life control (MPI)	0–6	2.99	1.22
Support from significant others (MPI)	0–6	4.74	1.32
Fear of movement/(re)injury (TSK)	17–68	40.89	9.29
Use of unhelpful management strategies (PSMC)	0–72	34.35	10.25
Catastrophising (PRSS)	0–5	2.50	1.14

RMDQ = Roland Morris Disability Questionnaire. DASS = Depression Anxiety Stress Scales.
PSEQ = Pain Self-Efficacy Questionnaire. MPI = West Haven–Yale Multidimensional Pain Inventory.
TSK = Tampa Scale of Kinesiophobia. PSMC = Pain Self-Management Checklist.
PRSS = Pain-Related Self-Statements Scale. ◆

2 Multiple regression analyses after controlling for age, sex, and duration of pain: correlates of Depression Anxiety Stress Scales depression scores

Model	Predictor variables	R^2	R^2 change	F change	df_1	df_2	Significance of F change (P)*	Semi-partial correlation
1	Age							–0.020
	Sex	0.049	0.049	13.878	3	806	< 0.001	–0.104
	Pain duration							–0.022
2	Catastrophising (PRSS)	0.436	0.387	552.223	1	805	< 0.001	0.227
3	Life control (MPI)	0.545	0.109	191.778	1	804	< 0.001	–0.213
4	Physical disability (RMDQ)	0.575	0.030	57.014	1	803	< 0.001	0.092
5	Pain self-efficacy (PSEQ)	0.584	0.009	16.735	1	802	< 0.001	–0.083
6	Use of unhelpful management strategies (PSMC)	0.589	0.006	11.464	1	801	< 0.001	0.077
7	Support from significant others (MPI)	0.594	0.004	8.134	1	800	0.004	–0.065
8	Pain severity (MPI)							0.029
	Fear of movement/(re)injury (TSK)	0.595	0.001	0.889	3	797	0.45	–0.024
	Pain distress in the past week							–0.018

PRSS = Pain-Related Self-Statements Scale. MPI = West Haven–Yale Multidimensional Pain Inventory. RMDQ = Roland Morris Disability Questionnaire. PSEQ = Pain Self-Efficacy Questionnaire. PSMC = Pain Self-Management Checklist. TSK = Tampa Scale of Kinesiophobia.
* Significance level, $P < 0.05$. ◆

Correlates of DASS depression scores

Box 2 shows the results of multiple regression analyses after controlling for age, sex, and duration of pain, and shows that these three variables correlated significantly with DASS depression scores ($R^2_{(df = 3,806)} = 0.049$; F = 13.88; $P < 0.001$), and collectively contributed 4.9% to the variance. After controlling for these variables, the order in which variables were significantly associated with DASS depression scores were: catastrophising, life control, physical disability, pain self-efficacy, use of unhelpful management strategies, and support from significant others. The remaining variables (pain severity, fear of movement/(re)injury, and pain distress in the past week) collectively contributed 0.1% to the variance and had lower semi-partial correlations. These variables did not significantly correlate with DASS depression scores.

Correlates of physical disability

Box 3 shows the results of multiple regression analyses after controlling for age, sex, and duration of pain, and shows that these three variables did not significantly contribute to physical disability ($R^2_{(df = 3,803)} = 0.009$; F = 2.30; $P > 0.05$), and collectively contributed 0.9% to the variance. After controlling for these variables, the order in which variables significantly correlated with physical disability (RMDQ scores) were: fear

3 Multiple regression analyses after controlling for age, sex, and duration of pain: correlates of physical disability (Roland Morris Disability Questionnaire) scores

Model	Predictor variables	R^2	R^2 change	F change	df_1	df_2	Significance of F change (P)*	Semi-partial correlation
1	Age							0.089
	Sex	0.009	0.009	2.299	3	803	0.08	0.019
	Pain duration							0.002
2	Fear of movement/(re)injury (TSK)	0.305	0.296	341.912	1	802	< 0.001	0.204
3	Pain self-efficacy (PSEQ)	0.440	0.135	193.878	1	801	< 0.001	–0.194
4	Pain severity (MPI)	0.470	0.030	45.131	1	800	< 0.001	0.116
5	Use of unhelpful management strategies (PSMC)	0.487	0.016	24.632	1	798	< 0.001	0.108
6	Depressive symptoms (DASS)	0.498	0.011	17.649	1	797	< 0.001	0.103
7	Catastrophising (PRSS)	0.499	0.002	0.576	4	793	0.63	–0.112
	Support from significant others (MPI)							0.033
	Pain distress in the past week							–0.004
	Life control (MPI)							–0.001

TSK = Tampa Scale of Kinesiophobia. PSEQ = Pain Self-Efficacy Questionnaire. MPI = West Haven–Yale Multidimensional Pain Inventory. PSMC = Pain Self-Management Checklist. DASS = Depression Anxiety Stress Scales. PRSS = Pain-Related Self-Statements Scale.
* Significance level, $P < 0.05$. ◆

4 Frequency of Depression Anxiety Stress Scales (DASS) depression subscale items experienced by the 812 study participants

DASS depression scale item (score range, 0–3)	Mean score	SD
I felt sad and depressed	1.28	1.07
I just couldn't seem to get going	1.23	1.01
I found it difficult to work up the initiative to do things	1.10	1.00
I felt downhearted and blue	1.04	1.01
I felt that I had nothing to look forward to	1.03	1.11
I couldn't seem to get any enjoyment out of the things I did	0.97	1.02
I was unable to become enthusiastic about anything	0.96	1.02
I couldn't seem to experience any positive feeling at all	0.96	1.01
I felt that I had lost interest in just about everything	0.91	1.05
I felt I wasn't worth much as a person	0.84	1.05
I could see nothing in the future to be hopeful about	0.84	1.05
I felt I was pretty worthless	0.79	1.05
I felt that life wasn't worthwhile	0.71	1.00
I felt that life was meaningless	0.62	0.98

of movement/(re)injury, pain self-efficacy, pain severity, use of unhelpful management strategies and, finally, depressive symptoms. The remaining variables (catastrophising, support from significant others, pain distress in the past week, and life control) collectively contributed 0.2% to the variance. These variables did not significantly correlate with physical disability.

Frequency of DASS depression subscale items experienced

Box 4 shows that the sample of 812 patients with pain more frequently experienced depression subscale items reflecting sadness, lack of initiative and anhedonia (inability to experience pleasure) than those reflecting low self-worth and meaningless of life.

DISCUSSION

DASS scores for depressive symptoms for our sample of patients with pain (mean, 13.61; SD, 11.54) were higher than those of a healthy community sample (mean, 5.06; SD, 7.57) and lower than those of a sample of (non-pain) patients with diagnosed mood disorders (mean, 17.24; SD, 11.79).[7] Only 30.3% of our patients with pain scored higher than the mean score of the mood disorder group.

Our finding that the severity of depressive symptoms in our sample of patients with chronic pain was best correlated with a combination of heightened catastrophising, reduced sense of control over life, increased physical disability, lower pain self-efficacy

beliefs, higher use of unhelpful self-management strategies, and lower perceived social support (after controlling for the possible effects of age, sex and duration of pain) is consistent with previous studies of patients with chronic pain.[26] Interestingly, and somewhat contrary to clinical expectations, pain severity, pain-related distress, and fear of movement/(re)injury were not significantly associated with depressive symptom severity.

Our finding that the severity of depressive symptoms was a significant but relatively smaller contributor to physical disability in this sample (after controlling for the possible effects of age, sex and duration of pain) is consistent with findings of some previous studies of patients with chronic pain, but not with some treatment studies, which found that depression level contributed to less significant improvement in pain-related disability.[11,27] It is not surprising that cognitive, pain and behavioural variables accounted for more physical disability than depressive symptoms but it is notable that social support (as measured by the MPI), sense of control over life, and catastrophising did not significantly contribute to physical disability. Taken together, these findings appear consistent with recent calls to treat both persisting pain and depression in patients presenting with both, rather than expecting treatment aimed at one to affect the other.[28]

Our finding that patients with pain reported that they more frequently experienced the depression subscale items reflecting sadness, lack of initiative and anhedonia

than those reflecting low self-worth and lack of meaning is consistent with some earlier research in similar samples of patients with chronic pain.[6,9] It is also interesting to compare these items to those endorsed by patients with both depression and medical illnesses, who invariably favour a cognitive formulation.[29]

Although it is likely that our findings are generalisable to patients with chronic pain and diagnosed depression, further research is needed to confirm this. A potential limitation of our study is the large number of assessment tools administered to patients who may have incurred some degree of fatigue, and this may have affected the reliability of responses obtained. However, as the measures are completed over the course of 3–4 hours, with opportunity for breaks, and given that our findings are consistent with those reported elsewhere, it seems unlikely this was a major factor. In addition, previous research from the same centre that included the same assessment tools suggests a high degree of reliability in the data obtained.[30]

Overall, our findings suggest that depressive symptoms, as measured by the DASS, were associated more strongly with cognitive variables than pain experience in our large sample of patients with chronic pain. Similarly, physical disability due to pain appears more related to fear of re-injury and low self-efficacy for activity when in pain than either depressive symptoms or pain intensity. These findings are consistent with previous correlational studies in similar populations,[20] but the small effect of depressive symptoms on disability is interesting, given previous findings that patients with both depression and pain are more recalcitrant to rehabilitative treatment than those without depression. Patients' endorsement of depression subscale items of the DASS may shed some light on this. The relatively high degree of endorsement of mood-related items versus those reflecting low self-worth and lack of a sense of meaning suggests differences in the experience of depressive symptoms in this population relative to those presenting in a mental health setting. This finding might also explain why relatively brief cognitive-behavioural interventions for pain that target unhelpful pain-related cognitions rather than longer-standing concerns about self-worth might also be effective for many patients with both depression and chronic pain.[26,31] Ultimately, our study reaffirms the view that depression is multifaceted, and that variations across clin-

ical presentations reflect putative "subtypes" of depression.[32]

COMPETING INTERESTS

In the past years, Gin Singh Malhi has served on advisory boards of pharmaceutical companies, received funding for research and has received honoraria for talks at sponsored meetings worldwide involving the following companies, which manufacture antidepressants: Eli Lilly, Janssen-Cilag, Organon (now part of Schering-Plough), Pfizer and Wyeth.

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