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## Marital functioning, chronic pain, and psychological distress

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### Abstract

This study examined whether marital functioning variables related uniquely to psychological distress and diagnoses of depressive disorder independent of pain severity and physical disability. Participants were 110 chronic musculoskeletal pain patients. Hierarchical regression results showed that marital variables (i.e. marital satisfaction, negative spouse responses to pain) contributed significantly to depressive and anxiety symptoms over and above the effects of pain severity and physical disability. In contrast, marital variables were not significantly related to diagnoses of depressive disorder (i.e. major depression, dysthymia, or both) after controlling for pain variables. In multivariate analyses, physical disability and marital satisfaction were uniquely related to depressive symptoms whereas physical disability, pain severity, and negative spouse responses to pain were uniquely related to anxiety symptoms. Only physical disability was uniquely related to major depression. The results suggest that models of psychological distress in chronic pain patients might be enhanced by attributing greater importance to interpersonal functioning and increasing attention to anxiety.

### Keywords

Chronic pain; Marriage; Depression; Anxiety

## 1. Introduction

Marital discord and spouse responses to pain are positively related to pain intensity and physical disability (Ahern et al., 1985; Cano et al., 2000; Flor et al., 1987a,b; Kerns et al., 1990; Turk et al., 1992). Similarly, stressful marital interactions are associated with lower physical activity (Schwartz et al., 1994). Marital dissatisfaction, negative spouse responses, and poor family functioning are also associated with elevated depressive symptoms in pain clinic samples (Cano et al., 2000; Flor et al., 1987a,b; Kerns et al., 1990; Nicassio and Radojevic, 1993; Romano et al., 1997). Marital dissatisfaction might involve decreased intimacy and spousal support (Beach et al., 1990) whereas negative spouse responses may serve to punish social interaction with the spouse. Furthermore, marital dissatisfaction and negative spouse responses may contribute to social withdrawal, hopelessness, and depression in some patients.

However, research on the association between marital variables and depression has not often accounted for the relationship between pain and depression. It is conceivable that marital variables are not significant correlates of depressive symptoms once the effects of pain

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variables are controlled. Based on research showing that spousal support is related to depressive symptoms after controlling for pain (Schiaffino and Revenson, 1995), we expect that marital satisfaction and negative spouse responses to pain will be significantly related to depressive symptoms above and beyond the effect of pain severity and physical disability. These pain variables were selected because research has consistently shown that they are related to depressive symptoms (Brown, 1990; Cano et al., 2000; Kerns et al., 1990; Schiaffino and Revenson, 1995). We hypothesize that a similar pattern of findings will emerge for depressive disorder diagnoses as assessed with a structured interview. It is important to examine diagnoses in addition to depressive symptoms because there are qualitative differences between the two (Coyne, 1994). Furthermore, medical chart reviews and symptom checklists are insufficient to make diagnoses because they often lack information about symptom severity or clinical significance (Banks and Kerns, 1996; Romano and Turner, 1985). The few studies that assessed major depression through structured interviews showed that chronic pain was associated with an increased likelihood of major depression (Ohayon and Schatzberg, 2003; see Bank and Kerns, 1996 and Romano and Turner, 1985 for reviews); however, no studies have examined the relative importance of marital functioning.

Depression shares some symptoms with anxiety (e.g. difficulty concentrating) so it is difficult to determine whether pain and marital variables are related to depression, anxiety, or both. This comorbidity issue is complicated by the use of depression scales that include anxiety symptoms (Clark and Watson, 1991). We expect that pain and marital variables will also be related to anxiety. Attention to the physical sensations of pain may result in worry (Aldrich et al., 2000) and attention to physiological symptoms of anxiety (e.g. racing heart, sweating). Marital satisfaction and spouse responses may also be related to physiological manifestations of anxiety because research has shown that stressful marital interactions are related to physiological arousal (Kiecolt-Glaser and Newton, 2001).

## 2. Methods

### 2.1. Participants

Patient participants ( $N = 110$ ) were recruited from a midwestern university pain clinic specializing in spine problems. All patients were married and reported chronic (i.e. at least 6 month duration) musculoskeletal back pain ( $n = 101$ , 91.8%) and/or neck pain ( $n = 43$ , 39.1%) due to disc problems (e.g. herniated disc, degenerative disc disease), osteoarthritis, complications from surgery, and other problems. The vast majority of participants ( $n = 81$ , 73.6%) also reported pain in other sites (e.g. arms, legs).

Fifty-six percent ( $n = 62$ ) of the sample was female and 88.2% ( $n = 97$ ) was Caucasian. Patient participants reported a mean age of 46.28 ( $SD = 10.48$ ), mean marriage duration of 18.24 years ( $SD = 12.12$ ), and mean education level of 14.04 years ( $SD = 2.80$ ). On an average, they reported that their pain lasted 6.60 years ( $SD = 6.10$ ). In terms of work status, 42.72% ( $n = 47$ ) were working full- or part-time, 30% ( $n = 33$ ) were receiving worker's compensation or social security disability benefits, 30.9% ( $n = 34$ ) were unemployed, and 9% ( $n = 10$ ) were retired. These percentages do not add up to 100% because some participants endorsed more than one employment status. There were no significant gender differences on demographic variables.

We compared our sample to other married patients in the multidisciplinary clinic from which they were recruited on available demographic variables. There were no ethnic group or gender differences between the two samples. In addition, there were no significant differences on pain duration or education. However, our sample was significantly older than married patients from the clinic sample as a whole,  $P < 0.01$ . Specifically, the married patients in the entire clinic sample reported a mean age of 42.13 ( $SD = 7.35$ ).

## 2.2. Measures

**2.2.1. Marital adjustment test**—The 15-item marital adjustment test (MAT; Locke and Wallace, 1959) is commonly used as a measure of marital satisfaction. Higher scores indicate greater satisfaction whereas lower scores indicate greater marital discord with 100 used as a cut-off score. The MAT has demonstrated good validity, inter-item reliability, and test-retest reliability (MacEwen and Barling, 1988; O’Leary, 1987; Smith et al., 1990). For the current sample, inter-item reliability was excellent ( $\alpha = 0.91$ ). The mean marital satisfaction score for this sample was 108.52 (SD = 28.56), which falls within the range reported in other chronic pain studies (Cano et al., 2000; Flor et al., 1987a,b; Kerns et al., 1990).

**2.2.2. Multidimensional pain inventory**—The 52-item multidimensional pain inventory (MPI; Kerns et al., 1985) assesses a range of psychosocial variables that are associated with the chronic pain experience. The average of the four-item negative spouse responses to pain subscale is taken as an assessment of patients’ perceptions of the spouses’ responses to the patient when the latter is in pain. Only the negative spouse response subscale was used because research has shown a significant association between these responses and depressive symptoms but not between distracting or solicitous spouse responses and depressive symptoms (e.g. Cano et al., 2000; Kerns et al., 1990). Items included ‘ignore you’, ‘express irritation at you’, ‘express frustration at you’, and ‘express anger at you’. The average of the three-item pain severity subscale is used to assess pain severity and intensity. All subscales of the MPI have adequate construct and discriminant validity, internal consistency, and test-retest reliability (Kerns and Jacob, 1992; Kerns et al., 1985). Kerns et al. (1985) reported alphas of 0.78 and 0.72 for negative spouse responses and pain severity, respectively. In the current study, inter-item reliabilities for both scales were excellent (negative spouse responses:  $\alpha = 0.87$ , pain severity:  $\alpha = 0.86$ ). Participants reported an average of 1.70 (SD = 1.55) on the negative spouse responses subscale and mean pain severity was 3.85 (SD = 1.17), scores which are very similar to those found by Kerns et al. (1990).

**2.2.3. Sickness impact profile**—According to Kerns and Jacob (1992), the sickness impact profile (SIP; Bergner et al., 1981) is the most comprehensively tested instrument used in chronic pain samples. It is a psychometrically sound instrument with good convergent and discriminant validity as well as excellent inter-item (0.94) and test-retest (0.91) reliabilities (Bergner et al., 1981). The 45-item physical disability and functional impairment subscale assesses ambulation, mobility, and body care. The inter-item reliability of this subscale was excellent in the current study ( $\alpha = 0.93$ ). Mean level of physical disability was 12.61 (SD = 10.63).

**2.2.4. Mood and anxiety symptom questionnaire**—The 90-item mood and anxiety symptom questionnaire (MASQ; Watson and Clark, 1991) was developed to better isolate symptoms of depression from symptoms of anxiety. The MASQ has been tested in student, community, and adult substance abuse patient samples and has demonstrated good convergent and discriminant validity, reliability, and a stable factor structure (Watson et al., 1995a,b). Respondents indicate the degree to which they experienced symptoms within the past week. The general distress:depression subscale (12 items; e.g. disappointment, self-blame, hopelessness, sadness, worthlessness) and the anhedonic depression subscale (22 items; e.g. loss of interest, anhedonia) were combined to form a composite depressive symptom scale because these scales were highly correlated with one another,  $r = 0.82$ ,  $P < 0.0001$ . The general distress:anxiety subscale (11 items; e.g. worry, tension) and the anxious arousal subscale (17 items; e.g. startled easily, had hot or cold spells) were also combined because they were highly correlated,  $r = 0.78$ ,  $P < 0.0001$ . Retaining four separate subscales rather than using the two composite scales would have resulted in redundant results and increased chance of Type I error. In the current sample, the depressive and anxiety symptom subscales had excellent inter-item

reliability (depressive symptoms:  $\alpha = 0.96$ , anxiety symptoms:  $\alpha = 0.91$ ). Their modest correlation with one another ( $r = 0.54$ ,  $P < 0.01$ ) suggests that the scales are measuring aspects of psychological distress that are somewhat related but not entirely overlapping.

**2.2.5. Structured clinical interview for the DSM-IV**—The structured clinical interview for the DSM-IV (SCID; First et al., 1995) was administered to assess current major depressive episodes and dysthymia. The SCID is a valid diagnostic assessment instrument based on the Diagnostic and Statistical Manual for Mental Disorders-IV (DSM-IV; American Psychiatric Association, 1994). Diagnostic reliabilities for the SCID fall among the reliabilities reported for the NIMH Diagnostic Interview Schedule and the Schedule for Affective Disorders and Schizophrenia (Endicott and Spitzer, 1978; Robins et al., 1981). Interviewers were advanced clinical psychology graduate students who participated in a 6-week training conducted by the first author. Training included the use of SCID user's manuals, SCID training videotapes, and practice interviews until reliability was reached. Each interviewer passed a proficiency interview with the first author before interviewing participants. For the current study, inter-rater reliability was excellent ( $\kappa = 0.94$ ). Twenty-eight participants (25.5%) were diagnosed with current major depressive disorder, which is a slightly lower prevalence rate than that found in other chronic pain samples (30–54%; Romano and Turner, 1985). Eight participants (7.3%) were diagnosed with dysthymia. Thirty-one participants (28.2%) had major depression, dysthymia, or both. The anxiety disorder module of the SCID was not administered because the aim of the larger study was to examine comorbid chronic pain and depression.

### 2.3. Procedure

Participants were recruited from a university-based pain clinic through fliers posted in the waiting room, psychologists and physicians working with the patients, and letters and phone calls to active patients. Eligible participants were at least 21-years-old, married to a spouse who was also interested in participating in the study, reported chronic musculoskeletal pain, and denied terminal illness. Two hundred and fifty-eight patients declined to participate in the study and 214 patients expressed interest in the study. Consent forms approved by the university institutional review board and surveys were sent to these patients and their spouses to complete. A cover letter instructed spouses to complete the surveys separately and to refrain from discussing their responses until after the patient interview. Each spouse sealed their consent form and survey in separate envelopes and patients returned the sealed envelopes at the time of their clinic interview. Couples were paid upon completion of the consent forms, surveys, and diagnostic interview. One hundred and ten couples completed the study but the data presented in this paper address only patient (not spouse) data. Most patients who showed initial interest but did not participate did not give reasons for why they did not complete the study (i.e. they did not show up for their appointments and did not return phone calls). However, some patients noted that they simply were no longer interested in the study ( $n = 50$ ), were too busy to participate ( $n = 13$ ), were frustrated by pain care ( $n = 7$ ), or their spouses declined to participate ( $n = 4$ ). Due to clerical error, demographic data of non-completers were not available to compare to that of completers.

## 3. Results

### 3.1. Correlations

Table 1 presents the correlations between depressive symptoms, anxiety symptoms, pain variables, and marital variables. A more conservative significance level,  $P < 0.01$ , was chosen to control for Type I error. Pain severity, physical disability, and negative spouse responses to pain were positively and significantly correlated with depressive and anxiety symptoms. Marital satisfaction was negatively and significantly correlated with depressive symptoms. The

association between marital satisfaction and anxiety approached significance,  $P < 0.04$ . Pain variables were not significantly correlated with marital variables.

### 3.2. Hierarchical regression: depressive symptoms

A hierarchical regression was used to test the hypothesis that marital variables contribute unique variance to depressive symptoms over and above the effects of pain severity and disability. This ordering of variables was chosen based on research showing that depression most often follows the onset of chronic pain (Banks and Kerns, 1996; Brown, 1990) and that physical symptoms often precede strain on relationships (Cohen and Rodriguez, 1995). Although depression can be measured accurately when retaining somatic symptom items in depressive symptom scales (Geisser et al., 1997), we also control the potential overlap between depression and somatic symptoms of pain (Novy et al., 1995) by including pain variables in the first step of analysis.

First, we examined the correlation between demographic variables (i.e. age, gender, years of education, work status) and the dependent variable (i.e. depressive symptoms) to determine whether demographics should be entered as covariates (Keppel, 1982). Education was significantly and negatively correlated with depressive symptoms,  $P$ 's  $< 0.01$ . Therefore, step 1 of the hierarchical regression included education, step 2 consisted of pain variables (i.e. pain severity and physical disability), and step 3 consisted of marital variables (i.e. marital satisfaction and negative spouse responses to pain). An exploratory step 4 consisted of the six interactions between marital and pain variables since previous research showed that marital satisfaction and negative spouse responses interacted in predicting depressive symptoms (Kerns et al., 1990; Turk et al., 1992).

As shown in Table 2, pain variables accounted for an additional 18% of the variance in depressive symptoms after controlling for education. Physical disability was uniquely correlated with depressive symptoms whereas pain severity no longer retained a significant and unique relationship with these symptoms (see Table 2). Marital variables contributed an additional 11% of the variance in depressive symptoms with marital satisfaction retaining a unique relationship with these symptoms. There was a trend for negative spouse responses to also have a unique relationship with depressive symptoms. Neither the interaction between marital satisfaction and negative spouse responses nor others between pain and marital variables were significant in relating to depressive symptoms. The interactions were not included in the table because, as a set, they accounted for less than 1% of the variance in depressive symptoms and because of their exploratory nature.

The regression was run again without the covariate of education to determine whether it affected the unique associations of pain severity and negative spouse responses to pain in relating to depressive symptoms. Results showed that the unique effects of pain and negative spouse responses on depressive symptoms remained nonsignificant. Similarly, interactions remained nonsignificant. In the case of negative spouse responses, the omission of pain variables resulted in a significant albeit smaller coefficient than found in Table 1. Pain severity's overlap with physical disability and negative spouse responses' overlap with physical disability and marital satisfaction appear to partially account for the significant correlations of pain and negative spouse responses with symptoms.

### 3.3. Hierarchical regression: major depressive disorder and dysthymia

Similar analyses were conducted on diagnoses of depressive disorder (i.e. major depression, dysthymia). We examined the bivariate relationship between each variable and depressive disorder to parallel the correlational analyses presented earlier. The  $t$ -tests showed that depressed participants reported more pain and disability, and more marital dissatisfaction and

negative spouse responses than nondepressed participants,  $P$ 's  $< 0.02$  (see Table 3). The effects were large for pain variables and medium for marital variables according to Cohen (1988). Results were similar when conducting the analysis on major depression only.

We then tested for covariates. Participants with less education were significantly more likely to be diagnosed with major depression,  $P < 0.001$ . No diagnostic differences were found on age, gender, or work status. Therefore, step 1 of the hierarchical logistic regression included education, step 2 included pain variables, step 3 included marital variables, and step 4 included interactions between pain and marital variables. As shown in Table 4, pain variables accounted for an additional 14% of the variance in depressive disorder over and above the effect of education. Physical disability retained a significant and unique relationship with depressive disorder. A regression without education resulted in similar findings. That is, the significant correlation between pain severity and depression shown in Table 1 is likely due to physical disability. Marital variables did not account for a significant portion of the variance in depressive disorder. Interactions between the pain and marital variables were not significant as a set or individually and are not presented in the table for simple presentation. Analyses conducted on major depression alone resulted in the same pattern of results.

Additional regressions without education and pain variables resulted in a significant relationship between the block of marital variables and depressive disorder ( $R^2 = 0.12$ ,  $\chi^2$  (df = 2) = 9.17,  $P < 0.01$ ) but neither marital variable was uniquely related to depressive disorder. An analysis including education but no pain variables showed a similar result. In other words, the relationship between the marital variables and depressive disorder is probably accounted for by their relationships with pain variables.

### 3.4. Hierarchical regression: anxiety symptoms

Education was included in step 1 of the anxiety analysis because it was significantly related to anxiety symptoms,  $P < 0.01$ . Pain variables comprised step 2, marital variables comprised step 3, and interactions comprised step 4. Pain severity and disability accounted for an additional 21% of the variance in anxiety symptoms over and above the effect of education (see Table 5). Indeed, this is the only distress type to which both pain severity and disability were uniquely related. Despite the amount of variance contributed by pain variables, marital variables were also related to anxiety symptoms, accounting for 9% of the variance. Negative spouse responses to pain were uniquely related to anxiety symptoms. Interactions between the pain and marital variables were not significant whether or not education was included in the analysis. They are not included in the table because of the exploratory nature of the hypothesis and to simplify presentation. Furthermore, the interactions as a set only accounted for approximately 2% of the variance. Marital satisfaction continued to be nonsignificant when regressions were rerun without education and without pain variables.

## 4. Discussion

The purpose of this study was to test whether marital functioning contributed uniquely to different types of psychological distress and diagnoses of depression. As expected, marital variables accounted for incremental variance in depressive and anxiety symptoms beyond that accounted for by pain variables. That is, symptoms of psychological distress in chronic pain patients is better explained by both pain and marital variables rather than by pain variables alone. While pain and marital variables were bivariate related to major depression, only pain variables were significantly related to major depression in the regression analysis. The modest correlation between depressive and anxiety symptoms along with the different patterns of multivariate relationships for depressive and anxiety symptoms support models that distinguish between different types of distress (e.g. Clark and Watson, 1991).

Pain variables accounted for 14–22% of the variance in depressive symptoms, anxiety symptoms, and depressive disorders. However, there were differences in how each pain variable related to distress. Physical disability was uniquely related to depressive symptoms, depressive disorder, and anxiety symptoms whereas pain severity was uniquely related to anxiety symptoms only. Follow-up analyses showed that the effect of pain severity on depression was accounted for by physical disability. Patients reporting heightened physical disability may have fewer opportunities for reinforcement of positive affect. Hopelessness theory (Abramson et al., 1989) would also suggest that negative self-appraisals and pessimistic beliefs about treatment success might contribute to depression. Physical disability may also focus attention on perceptions of helplessness and worry. Whereas the sensory aspects of pain may elicit fear, attention to and anticipation of pain, and an urge to avoid increased pain (Aldrich et al., 2000; Eccleston and Crombez, 1999; McCracken and Gross, 1993), they may not result in loss of pleasure or depression.

As a set, marital variables accounted for 11% of the variance in depressive symptoms and 9% of the variance in anxiety symptoms. However, only marital satisfaction retained its significant relationship with depressive symptoms. Negative perceptions about the marriage may contribute to hopelessness, anhedonia, and depressed mood because of loneliness, loss of spousal support, and fewer opportunities for the reinforcement of positive affect by the spouse. In contrast, only negative spouse responses were significantly associated with anxiety symptoms. Marital variables that relate more directly to pain and that may function in an operant manner (e.g. spouse responses) may be more strongly related to anxiety because they might heighten patients' concerns about the impact of pain on the relationship and serve to reinforce this perception. Although negative spouse responses to pain were also related to depressive symptoms in the correlational analyses, analyses showed that the effects of negative spouse responses were partially accounted for by physical disability and marital satisfaction. Cano et al. (2000) found a similar result with marital satisfaction and negative spouse responses in another sample of pain patients. Perhaps spouse responses have an indirect effect on depression by exacerbating anxiety symptoms and problematic interactions in the marriage, further increasing the likelihood of spouse withdrawal. Additional studies on the role of negative spouse responses and other marital variables may shed light on the associations between spousal interchanges, activity limitations, and types of symptoms as well as the temporal relationships between anxiety and depression.

Although marital variables were related to symptoms of depression and anxiety, they were not independently related to depressive disorder once pain variables were entered. Perhaps power to detect marital effects was not sufficient. Alternatively, marital events with more serious consequences for the marriage may be important in diagnoses of depression. For instance, research with community women has shown that severe marital stressors such as infidelity and threats of separation, not marital satisfaction, are related to major depression (Cano and O'Leary, 2000). Another hypothesis is that elevated depressive symptoms as a result of marital dissatisfaction and negative spouse responses increase the risk of depressive disorder. Regardless, these results show that the correlates of continuous and categorical measures of depression are different and that further exploration into the debate about the dimensionality of depression in chronic pain samples is needed.

We did not find any significant interactions between pain and marital variables in relating to distress. Previous studies have found that the interaction between spouse responses and marital satisfaction is related to depressive symptoms (e.g. Kerns et al., 1990; Turk et al., 1992). The lack of an interaction in the current study could be a result of differences in sample demographics (e.g. gender), measures used, or limited power to detect interactions.



This was one of the few published studies to examine the relationship between physical disability and marital satisfaction or negative spouse responses. Yet we did not find a significant association between marital variables and either of the pain variables. Some researchers have found significant relationships between marital variables and pain severity whereas others have not (e.g. Cano et al., 2000; Flor et al., 1987a,b; Kerns et al., 1990; Turk et al., 1992). The reason for the mixed results in the literature is unclear. Although most samples consist of pain clinic patients that report marital satisfaction and pain levels similar to ours, other differences between samples may account for the mixed findings (e.g. referral patterns into the pain clinics). Alternatively, consistent relationships may be found only for behavioral or operant constructs that measure specific aspects of marital functioning and pain. For instance, research has demonstrated a link between stressful marital interactions or spouse reinforcement and patient pain behaviors or disability (Romano et al., 1992, 1995; Schwartz et al., 1994). Continued research on how chronic pain affects relationships and vice versa is an important element of developing a comprehensive perspective of the social context of pain and psychological distress.

Several issues concerning the participants and methodology must be addressed. First, the majority of participants were women. A female majority was advantageous because chronic musculoskeletal pain research has traditionally focused on male patients. Female patients may be more successful in coercing their spouses to participate and may feel more comfortable talking about pain and distress than male patients. There were no gender differences in psychological distress, which suggests that our findings may be replicable in a predominantly male sample. Second, the participants were older than the married clinic sample from which they were recruited. Older patients may be more likely to see the value of research participation. Third, entry into the study was the result of self-selection. It is possible that patients who did not respond to advertisements or who did not complete the study experienced more pain, marital problems, or depression than those who completed the study. It is important to determine whether our results can be replicated in younger and in more distressed samples. Fourth, this study was cross-sectional. We tested a psychosocial perspective of the statistical contribution of pain and marital variables to psychological distress and have described our results in terms of variance accounted for rather than in causal terms. However, it is possible that depression leads to marital dissatisfaction and physical disability whereas anxiety makes it difficult for patients to disengage from attending to sensory pain and negative responses from others. Last, anxiety disorders were not assessed. Research on anxiety disorders in pain patients is recommended based on our anxiety symptom findings and the research on psychiatric comorbidity. Anxiety disorders often precede major depression and only 5% of major depression or dysthymia cases have no current or lifetime history of anxiety disorders (Brown et al., 2001). Longitudinal studies may provide information about the temporal course of psychiatric disorder in pain patients and whether marital functioning and pain variables affect risk of psychiatric comorbidity.

Nevertheless, the results of this study support operant and cognitive-behavioral theories of pain (Fordyce, 1976; Turk et al., 1983) and depression (Banks and Kerns, 1996; Beach et al., 1990). That is, perceptions and behaviors directly involving the pain problem as well as the interpersonal context are important in relating to symptoms of psychological distress. Our results suggest that marital functioning, often a minor player in existing models of pain and depression, should have a larger role in models of comorbid chronic pain and psychological distress. Marital satisfaction especially, is not explicitly included in models of pain even though pain is seen as occurring within a social context. An integration of couples models of depression (e.g. Beach et al., 1990), interpersonal theories of depression (e.g. Joiner and Coyne, 1999), and social support models (e.g. Cohen and Willis, 1985) with existing models of pain and psychological distress appears to be a reasonable goal. Expanding models to include anxiety is also warranted. Furthermore, our results suggest that some focus on the couple may provide

incremental benefit in treating psychological distress. Researchers have shown that increases in marital satisfaction during treatment follow-up are related to better long-term outcomes for pain patients whose spouses participated in treatment than for patients whose spouses did not participate (Keefe et al., 1999). However, pain research has not yet made marital satisfaction or spouse responses important targets of treatment.

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Table 1

Correlations between pain, marital, and psychological distress variables

	1	2	3	4	5	6
1 Pain severity	—					
2 Physical disability	0.52 <sup>***</sup>	—				
3 Marital satisfaction	-0.02	-0.12				
4 Negative spouse responses	0.06	0.17	-0.57 <sup>***</sup>	—		
5 Depressive symptoms	0.37 <sup>***</sup>	0.46 <sup>***</sup>	-0.36 <sup>***</sup>	0.37 <sup>***</sup>	—	
6 Anxiety symptoms	0.49 <sup>***</sup>	0.48 <sup>***</sup>	-0.20	0.38 <sup>***</sup>	0.54 <sup>*</sup>	—

N = 110.

<sup>\*</sup>  $P < 0.01$ .<sup>\*\*\*</sup>  $P < 0.0001$ .

**Table 2**  
Hierarchical regression: depressive symptoms

	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>
Step 1				
Education	-2.33	0.86	-0.24	-2.62 <sup>**</sup>
	$F(1; 108) = 7.32; R^2 = 0.06^{**}$			
Step 2				
Pain severity	1.18	0.74	0.16	1.59
Disability	0.84	0.25	0.35	3.42 <sup>***</sup>
	$F \text{ change } (2, 106) = 12.20, \Delta R^2 = 0.18^{***}, R^2 = 0.24^{***}$			
Step 3				
Marital satisfaction	-0.19	0.09	-0.21	-2.21 <sup>*</sup>
Negative spouse responses	0.74	0.41	0.18	1.79 <sup>†</sup>
	$F \text{ change } (2, 104) = 9.21, \Delta R^2 = 0.11^{***}, R^2 = 0.35^{***}$			

<sup>†</sup>  $P < 0.08$ ,

\*  $P < 0.05$ ,

\*\*  $P < 0.01$ ,

\*\*\*  $P < 0.001$ .

**Table 3**  
Means and standard deviations of pain and marital variables in depressed and nondepressed participants

Variable	Depressive disorder				<i>t</i> (108)	<i>d</i>
	Absent		Present			
	<i>M</i>	( <i>SD</i> )	<i>M</i>	( <i>SD</i> )		
Pain severity	10.91	(3.59)	13.19	(2.80)	-3.19**	-0.71
Physical disability	9.95	(9.52)	19.40	(10.40)	-4.56***	-0.95
Marital satisfaction	112.80	(23.79)	97.63	(36.36)	2.57*	0.49
Negative spouse responses	5.78	(5.68)	9.52	(6.69)	-2.95**	-0.60

\*  $P < 0.05$ ,

\*\*  $P < 0.01$ ,

\*\*\*  $P < 0.001$ .

**Table 4**  
Hierarchical logistic regression: depressive disorder

	<i>B</i>	<i>SE</i>	<i>Exp (B)</i>	<i>Wald</i>
Step 1				
Education	-0.28	0.10	0.75	7.99**
$\chi^2$ model (df = 1) = 10.34***, $R^2 = 0.13$				
Step 2				
Pain severity	0.08	0.09	1.07	0.70
Disability	0.07	0.03	1.08	6.28*
$\Delta\chi^2$ (df = 2) = 12.63***, $\chi^2$ model (df = 3) = 22.97***, $\Delta R^2 = 0.14$ ; $R^2 = 0.27$				
Step 3				
Marital satisfaction	-0.01	0.01	0.99	1.17
Negative spouse responses	0.05	0.05	1.05	0.89
$\Delta\chi^2$ (df = 2) = 5.38, $\chi^2$ model (df = 5) = $R^2 = 0.33$ 28.35***, $\Delta R^2 = 0.07$ ;				

Since the exact  $R^2$  cannot be computed with logistic regression, estimated effect size for each step and the model is represented by Nagelkerke's  $R^2$ .

\*  $P < 0.05$ ,

\*\*  $P < 0.01$ ,

\*\*\*  $P < 0.001$ .



**Table 5**

## Hierarchical regression: anxiety symptoms

	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>
Step 1				
Education	-1.92	0.54	-0.33	-3.59 <sup>***</sup>
	$F(1, 108) = 12.89; R^2 = 0.11$ <sup>***</sup>			
Step 2				
Pain severity	1.41	0.45	0.30	3.16 <sup>**</sup>
Disability	0.42	0.15	0.27	2.85 <sup>**</sup>
	$F$ change (2, 106) = 16.79, $\Delta R^2 = 0.21$ <sup>***</sup> , $R^2 = 0.32$ <sup>***</sup>			
Step 3				
Marital satisfaction	0.01	0.05	0.03	0.27
Negative spouse responses	0.84	0.25	0.32	3.33 <sup>***</sup>
	$F$ change (2, 104) = 7.46, $\Delta R^2 = 0.09$ <sup>***</sup> , $R^2 = 0.41$ <sup>***</sup>			

<sup>†</sup>  $P < 0.08$ ,

\*  $P < 0.05$ ,

\*\*  $P < 0.01$ ,

\*\*\*  $P < 0.001$ .