The Contribution of Job Satisfaction to the Transition From Acute to Chronic Low Back Pain

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ABSTRACT. Williams RA, Pruitt SD, Doctor JN, Epping-Jordan JE, Wahlgren DR, Grant I, et al. The contribution of job satisfaction to the transition from acute to chronic low back pain. Arch Phys Med Rehabil 1998;79:366-74.

Objective: To determine the extent to which job satisfaction predicts pain, psychological distress, and disability 6 months after an initial episode of low back pain (LBP).

Design: A longitudinal design was used to follow an inception cohort experiencing first-episode low back pain with assessment at 2 and 6 months after pain onset.

Setting: Urban medical center outpatient orthopedic clinic.

Patients: The consecutive sample was comprised of 82 men with initial-onset acute LBP (T6 or below, daily pain for 6 to 10 weeks).

Intervention: Usual orthopedic care.

Main Outcome Measures: The primary study outcomes were pain (Descriptor Differential Scale, Visual Analog Scales); disability (Sickness Impact Profile, Quality of Well-Being); and psychological distress (Beck Depression Inventory, Hamilton Rating Scale for Depression, Automatic Thoughts Questionnaire); predictor variables were orthopedic impairment (Waddell Physical Impairment Index) and job satisfaction (Job Descriptive Index, Work APGAR).

Results: Measures of job satisfaction, pain, disability, and psychological distress at baseline and 6 months after pain onset were separately reduced into factors using principle components factor analysis. In hierarchical multiple regression analyses, baseline job satisfaction significantly predicted variance in outcome scores at 6 months after pain onset, beyond the variance explained by control factors (demographics; baseline pain, mood, and disability; orthopedic impairment). Zero-order correlations between job satisfaction and orthopedic impairment were small and nonsignificant, suggesting that these two variables act independently in predicting outcome. Although type of work performed (desk work or work requiring light, moderate, or heavy lifting) and social position were correlated with job satisfaction at baseline, neither contributed to the prediction of outcome at 6 months.

Conclusions: Satisfaction with one's job may protect against development of chronic pain and disability after acute onset back pain and, alternatively, dissatisfaction may heighten risk of chronicity. Vocational factors should be considered in the rehabilitation of acute back injury.

LOW BACK PAIN is one of the most costly and prevalent medical conditions in the United States.[1-3] Psychosocial factors, perhaps even more strongly than medical factors, are thought to predispose individuals toward chronic pain disability.[4-6] Among psychosocial factors, job satisfaction has been identified as one of the potentially most significant predictors of back pain and disability. Retrospective and cross-sectional studies have found an association of back pain with job dissatisfaction.[7-10] Some prospective investigations also have demonstrated a relationship between reports of low back pain and ratings of job dissatisfaction.[11-13] Surrogates of job dissatisfaction, including a supervisor's negative appraisal, have also been identified as strong predictors of back pain claims.[7] On the other hand, prospective studies also have failed to identify correlations among job satisfaction ratings and either reports of back pain[14] or return to work after acute back injury.[15] Similarly, a recent cross-sectional study failed to find a relation between job satisfaction and disability.[16]

Admittedly, many of these studies have focused on prevalent pain, or disability claims, and have included individuals with antecedent histories of back pain, which itself potently predicts subsequent episodes.[5,6] It is possible, then, that job dissatisfaction itself is a consequence, rather than a predictor, of pain, or that unhappiness at work intervenes between pain perception and absenteeism.[10] Another approach to examining the relevance of job satisfaction would be to focus on its role in the transition from acute onset of pain to chronicity in persons without prior back histories who were assessed soon after pain commenced. If factors placing individuals at risk for chronicity could be identified early among persons with first-onset back pain, prompt interventions addressing these risks might reduce the duration of pain or hazard of subsequent disability.[17]

In a sample of men with first-onset low back pain, examined on average 8 weeks after pain began, we asked the following questions: (1) Is job satisfaction an independent predictor of low back pain outcome (pain, disability, and distress) 6 months after pain onset? (2) Is job satisfaction a surrogate for other job related factors, such as the type of work performed or job status,

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or does job satisfaction protect against the negative effects of sustaining a back injury, despite other job factors?

METHOD

Overview

This study is part of a larger research project designed to identify individuals at high risk for development of chronic back pain. An inception cohort of men with first onset back pain of 6 to 10 weeks' duration was recruited from a military medical care system (Naval Medical Center). This population and site were chosen because, in one location, a large sample of men at the age typical for first-onset back pain[18-20] could be identified early after pain onset, then followed in a "closed" health care system with the use of standardized management procedures for low back pain complaints. Throughout the study period, all subjects continued to receive usual medical care according to established orthopedic practices.[21-23] The research protocol was approved by the appropriate Institutional Review Boards.

Participants

One hundred thirty-six consecutive men met inclusion criteria and completed the baseline assessments. Inclusion criteria for entry into the study were as follows: (1) age between 18 and 50 years; (2) back pain (T6 or below) that had been present "on a daily basis" for the previous 8 (± 2) weeks; (3) back pain as the only pain problem; (4) in good health, otherwise; and (5) available for the follow-up assessment period. Participants were excluded for the following reasons: (1) prior episode of back or other pain on a daily basis lasting 2 weeks or longer; (2) major medical illness (eg, insulin-dependent diabetes, chronic obstructive pulmonary disease); (3) taking medications known to affect mood (eg, antidepressants); (4) prior back surgery; or (5) pain secondary to neoplastic disease, osteomyelitis, or fracture, since the clinical course of these conditions differs from the "usual" back disorder. Eight eligible patients declined to participate. One hundred seventeen of this group participated in the 6-month follow-up assessment. Sixteen of these patients had surgery during the 6-month interim and were excluded because the medical care they received was substantially different. Nineteen patients were missing measures that precluded their inclusion in the analysis. The final sample, with complete data at baseline and 6 months after pain onset, consisted of 82 patients.

No systematic differences were detected (using *t* tests) between those who remained in the study sample and those who were excluded on the vast majority of baseline demographic, pain, disability, or distress variables. Participants not included in the final analyses were more likely to be married, to have fewer negative automatic thoughts, and to be more satisfied with their job in general than the remaining participant pool. After correction with Bonferroni adjustment for multiple testing, holding alpha at .05, none of these differences was significant.

As can be seen in table 1, the study sample consisted of generally married, high school educated, middle to lower middle class white men. Most (52%) reported pain localized to the back, although a significant minority (15%) had evidence of neurologic findings (eg, diminished muscle strength, reflexes, or spinal nerve root compression).

Table 1: Demographic and Orthopedic Characteristics of Men With Acute Low Back Pain (n = 82)

Age, mean (SD) yrs	30.5 (7.3)
Married, number (%)	57 (69.5%)
Education, mean (SD) yrs	12.8 (1.8)
Median annual Income	$20,000 to $30,000/yr
Ethnicity, *n* (%)	
White	55 (67.1%)
Black	11 (13.4%)
Asian/Native American	9 (11.0%)
Hispanic	5 (6.1%)
Other	2 (2.4%)
Orthopedic classification[24]	
Pain without radiation	43 (52.4%)
Pain with proximal radiation	15 (18.3%)
Pain with distal radiation	11 (13.4%)
Pain with radiation and neurologic signs	11 (13.4%)
Compression of spinal nerve root confirmed by specific imaging techniques	2 (2.4%)

Procedure

Potential participants were identified within 2 to 3 weeks of pain onset either through systematic review of attendees to a spine clinic or attendance at the educational program of the associated back school. Individuals whose pain had persisted for at least 6 weeks, which was the duration threshold for the parent study, were approached for enrollment.

Participants who consented to participate underwent a standardized orthopedic evaluation performed by an orthopedic specialist who assigned an orthopedic classification, based on the Task Force for Nomenclature of Spine Disorders,[24] using all available medical and laboratory information. Psychosocial data were obtained by a nurse or a psychology technician on the same day. The same battery of psychosocial and orthopedic assessments was readministered 6 months later.

Measures

A multiple-measurement strategy, whenever possible combining self-report and interview assessments, was used to enhance reliability of assessment of the research constructs.

Job satisfaction. Individual components of vocational satisfaction, as well as a global assessment of satisfaction, were measured using the Job Descriptive Index.[25] This 90-item self-report questionnaire assesses six facets of job satisfaction: the work itself, present pay, opportunities for promotion, supervision, coworkers, and overall satisfaction. For each of the subscales, item ratings are summed to create a total score that may range from 0 to 54. Internal consistency, convergent validity, and construct validity are excellent for the measure.[25] In the present study, internal consistency was high (Cronbach's alpha of the subscales ranged from .86 to .92). Normative data, stratified by education and job tenure, are available.[25] The facets of satisfaction associated with work, the job in general, supervision, and coworkers were used in the present study. (The other two subscales did not load adequately on the job satisfaction component derived from principal components factor analysis.) The Job Descriptive Index was given at baseline.

The modified Work APGAR[12] was used to obtain a single overall rating of job satisfaction. Based on the Family APGAR,[26,27] the Work APGAR is a brief seven-item scale that was developed to assess perceptions of support and enjoyment of tasks in the workplace. Each item is scored from 0 (hardly ever) to 2 (almost always). Item ratings are summed to create a total score ranging from 0 to 14. Cronbach's alpha in the present study was .86. The modified Work APGAR was given at baseline.

Pain. Current and typical pain intensities were each rated using a separate visual analogue scale (VAS). The VAS

is commonly used in pain assessment and consists of a 100-mm line anchored with 0, "no pain," and 100, "unbearable pain." Subjects completed these scales by placing a mark across each line to indicate the intensity of their current and most typical pain. Higher scores are indicative of greater intensity. Marks were measured and coded as the number of millimeters from "no pain."

The Descriptor Differential Scale (DDS)[28] separates pain sensory intensity from pain unpleasantness. The self-administered DDS has demonstrated excellent reliability and validity.[28] In the present study, internal consistency was high (Cronbach's alpha ranged from .95 to .97 for the two scales at the two assessment points). Additionally, the validity of the DDS for both clinical and experimental conditions is known[29] and has been proven to be quite sensitive to small differences in stimulus intensity.[30] Possible scores for each dimension of intensity and unpleasantness range from 0 to 20.

Disability. The Sickness Impact Profile (SIP)[31,32] is a 136-item self-report questionnaire that provides a standardized evaluation of the degree to which pain interferes with "usual daily activities." It addresses 12 discrete areas of disability and contains summary scores for physical impairment, psychosocial difficulty, and overall impact of pain.[31,32] The SIP has been validated for use in back pain populations.[33] In the present study, internal consistency of the summary scores was high (Cronbach's alpha ranged from .84 to .94 for the summary scores at the two assessment points). Scores reflect the "percentage" of disability associated with daily activities and may range from 0 to 100%.

The Quality of Well Being Index (QWB)[34-36] is an interviewer-administered measure of health status. A total score is derived that ranges from 0 to 1, with higher scores indicative of greater well being. The validity and reliability of the QWB are well established.[36,37] In the present study, Cronbach's alpha was .91 and .90 at baseline and 6 months.

Psychological distress. The Hamilton Rating Scale for Depression (HRSD)[38] is a clinical rating of the severity of depressive symptoms administered by a trained observer. The measure has well-documented validity[39] with interrater reliability up to .72 for individual items.[40] In the present study, Cronbach's alpha was .84 and .78 at baseline and 6 months. Scores may range from 0 to 62, with higher scores reflective of greater depressive symptoms.

The Beck Depression Inventory (BDI)[41] is a 21-item self-administered questionnaire to assess severity of depressive symptoms. The items are clinically derived and have undergone extensive reliability and validation studies.[42] Internal consistency estimates of reliability have been high (Cronbach's alpha > 0.9) in most evaluations.[43] Cronbach's alpha was .89 and .87 at baseline and 6 months in the present study. Scores may range from 0 to 63, with higher scores indicative of more severe levels of depression.

The Automatic Thoughts Questionnaire (ATQ)[44] consists of 30 self-referent negative statements. Scores are reflective of distressing cognitions and are related to subclinical[44] and clinical depression.[45] Items are relatively specific to depressive affect.[46] Reliability and validity is high for the measure.[44] In the present study, Cronbach's alpha for the scale was .96 and .94 at baseline and 6 months. Total scores are an average of the items and may range from 1 to 5. Higher scores are indicative of more frequent depressive cognitions.

Orthopedic impairment. The Waddell Physical Impairment Index (WPII)[47] is a standardized, validated, provider-administered protocol for assessing the severity of orthopedic disease in back disorders. The measure provides an estimate of proportion of impairment in back function as a result of spine disorder. Scores may range from 0 to 50. The measure administered at 6 months was used.

Statistical Analyses

Statistical analyses were performed using Statistical Package for the Social Sciences software (SPSS/PC+).[48] Analyses were conducted in several steps. First, descriptive analyses were used to characterize the sample on the baseline and 6-month outcome measures. Second, principal components factor analysis (PCA) was used to combine and reduce the multiple measures of the constructs of interest (pain, disability, distress, job satisfaction, overall clinical outcome) into stable, unitary components. Third, zero-order correlations were calculated to examine the cross-sectional and longitudinal relationships among the principal components and predictors at baseline and 6 months. Finally, hierarchical multiple regression analyses were used to demonstrate the association of job satisfaction to outcome 6 months after pain onset.

RESULTS

Descriptive Analyses

Table 2 contains means, standard deviations, and ranges for the baseline and 6-month measures. Measures that compose the baseline job satisfaction, 2-month, and 6-month pain, disability, and distress constructs, as well as the 6-month predictor variable orthopedic impairment (ie, WPII) are presented. Compared with scale norms for the Job Descriptive Index, study participants scored, on average, below the 25th percentile on their satisfaction with the actual work they perform in their jobs. Their reports of satisfaction with supervisors and coworkers were, on average, between the 25th and 50th percentile. Participants reported mild to moderate baseline pain, disability, and distress, with considerable variability in their ratings. In contrast, 6-month pain ratings, disability, and psychological distress were relatively mild overall; nevertheless, there continued to be a considerable range of pain, disability, and distress. Average orthopedic impairment at 6 months was mild (ie, WPII = 6; scores ranged from 0 to 18 out of a possible 50).

Principal Components Analysis

PCA was used to condense multiple measures of the variables of interest into single estimates of the theoretical constructs (job satisfaction, pain, disability, distress, and overall clinical outcome) under investigation.[49] Multiple measures were combined to provide more stable estimates of each of the relevant constructs. Separate analyses were conducted to create each principal component. Measures were selected for inclusion in a component if they were theoretically and empirically related to the construct (see appendix A for the correlation matrix of the raw scores). Data transformations (eg, square root) were performed to normalize the distributions of the disability and distress principal components. The resulting components of pain, disability, and distress were combined using PCA to create an "overall" clinical status component at baseline and 6 months.

The measures that comprise each component are presented (table 3) with the factor loadings for each measure included in parentheses in the text. Principal components are shown in capital letters with a 2 (baseline) or 6 (6-month outcome) to designate assessment time point. The factor loadings demonstrate the degree of the relationship between the specific measures and the components to which they were assigned. The eigenvalues describe the cumulative variance accounted for by

Table 2: Men with Acute Low Back Pain (n = 82) at 2 Months and 6 Months After Pain Onset

Measures	2 Months			6 Months		
	Mean	SD	Range	Mean	SD	Range
Job satisfaction						
Work APGAR	9.59	3.70	2-14			
Satisfaction with job in general	34.27	14.88	0-54			
Satisfaction with work on job	27.92	13.03	3-54			
Satisfaction with supervision	38.17	15.08	4-54			
Satisfaction with coworkers	38.85	13.70	3-54			
Pain						
DDS–intensity	10.71	3.79	2-19.29	7.34	5.26	0-19.58
DDS–unpleasantness	9.90	4.13	1-18.75	6.68	5.21	0-19.83
VAS–current pain	40.92	22.59	2-94.00	28.42	24.57	0-92.00
VAS–typical pain	47.09	21.29	6-91.00	29.26	25.09	0-85.00
Disability						
Quality of well-being	.60	.05	.50-.81	.68	.10	.56-1.0
SIP–physical impairment	8.30	8.19	0-42.06	4.14	6.01	0-33.36
SIP–psychosocial impairment	11.43	14.20	0-78.15	6.74	11.57	0-60.16
SIP–other impairment	17.47	11.99	0-61.98	10.06	9.65	0-43.11
Distress						
Beck Depression Inventory	8.60	6.95	0-29.00	5.05	5.61	0-20.00
Hamilton Rating Scale for Depression	8.84	5.84	0-25.00	4.70	4.12	0-17.00
Automatic Negative Thoughts	1.90	.74	1.10-4.57	1.64	.50	1.03-3.60
Orthopedic impairment at 6 months						
Waddell Physical Impairment Index				6.52	5.09	0-18

the factor across measures within that factor, whereas the percent of variance explained provides an estimate of the average variability explained by the principle component across measures. Baseline job satisfaction (JOB SATISFACTION-2) was comprised of the following measures: Work APGAR (.83), and the Job Descriptive Index scales of Satisfaction with Job in General (.90), Satisfaction with Work on Job (.87), Satisfaction with Supervision (.77), and Satisfaction with Co-Workers (.80).

Baseline pain (PAIN-2) included the following measures: Descriptor Differential Scale–Intensity (.87), Descriptor Differential Scale–Unpleasantness (.82), current pain VAS (.88), and typical pain VAS (.82). Baseline disability (DISABILITY-2)

Table 3: Factor Loadings of the Principle Components at Baseline and 6 Months

Measures	2 Months			6 Months		
	Factor Loading	Eigenvalue	Percent Variance	Factor Loading	Eigenvalue	Percent Variance
Job satisfaction						
Work APGAR	.83	3.46	69.3			
Satisfaction with job in general	.90					
Satisfaction with work on job	.87					
Satisfaction with supervision	.77					
Satisfaction with coworkers	.80					
Pain						
DDS–Intensity	.87	2.88	71.9	.94	3.49	87.2
DDS–Unpleasantness	.82			.93		
VAS–Current Pain	.88			.94		
VAS–Typical Pain	.82			.93		
Disability						
Quality of well-being	−.69	2.80	70.1	−.68	2.79	69.7
SIP–physical impairment	.90			.89		
SIP–psychosocial impairment	.84			.80		
SIP–other impairment	.90			.95		
Distress						
Beck Depression Inventory	.93	2.59	86.5	.92	2.41	80.2
Hamilton Rating Scale for Depression	.93			.89		
Automatic Negative Thoughts	.93			.88		
Overall clinical outcome						
Pain	.68	1.89	63.1	.90	2.39	79.6
Disability	.84			.90		
Distress	.84			.88		

included the following measures: Quality of Well-being average health status (−.69) and SIP subscales of Physical Impairment (.90), Psychosocial Impairment (.84), and Other Impairment (.90). Baseline distress (DISTRESS-2) included the following measures: Beck Depression Inventory (.93), Hamilton Rating Scale for Depression (.93) and Automatic Negative Thoughts (.93). Baseline overall clinical outcome (OVERALL CLINICAL OUTCOME-2) was created from the separate components of PAIN-2 (.68), DISABILITY-2 (.84), and DISTRESS-2 (.84).

The 6-month outcome of pain (PAIN-6) included the following measures: Descriptor Differential Scale–Intensity (.94), Descriptor Differential Scale–Unpleasantness (.93), current pain VAS (.94), and typical pain VAS (.93). The 6-month outcome of disability (DISABILITY-6) included the following measures: Quality of Well-being average health status (−.68) and SIP subscales of Physical Impairment (.89), Psychosocial Impairment (.80), and Other Impairment (.95). The 6-month outcome of distress (DISTRESS-6) included the following measures: Beck Depression Inventory (.92), Hamilton Rating Scale for Depression (.89) and Automatic Negative Thoughts (.88). The 6-month overall clinical outcome (OVERALL CLINICAL OUTCOME-6) was created from the separate components of PAIN-6 (.90), DISABILITY-6 (.90), and DISTRESS-6 (.88).

Correlational Analyses

Zero-order correlations were performed among the four principal components (PAIN-6, DISABILITY-6, DISTRESS-6, and OVERALL CLINICAL OUTCOME-6) and six predictor variables (JOB SATISFACTION-2, Waddell Physical Impairment Index, PAIN-2, DISABILITY-2, DISTRESS-2, and OVERALL CLINICAL OUTCOME-2). These correlation coefficients are presented in table 4. At baseline, the construct of PAIN-2 was correlated with DISABILITY-2 and DISTRESS-2 (r values = .36, .36, respectively, $p < .001$). DISABILITY-2 and DISTRESS-2 also were correlated .60 ($p < .001$). A similar picture emerged at 6 months. The construct of PAIN-6 was again correlated with DISABILITY-6 and DISTRESS-6 (r values = .73, .67, respectively, $p < .001$), and DISABILITY-6 and DISTRESS-6 also were correlated .69 ($p < .001$). By contrast, JOB SATISFACTION-2 and 6-month orthopedic impairment were not correlated ($r = -.03$).

Zero-order correlations among demographic variables and six month outcome measures revealed that ethnicity was significantly associated with DISTRESS-6 ($r = -.32, p < .01$; minority ethnicity related to increased distress). All other associations were non-significant: age, years of education, marital status, household income and orthopedic classification. Ethnicity was retained as a control variable in the hierarchical regression analyses.

Regression Analyses

To assess the contribution of baseline job satisfaction to patient outcome 6 months after low back pain onset, four separate hierarchical multiple regression equations were developed using PAIN-6, DISABILITY-6, DISTRESS-6, and OVERALL CLINICAL OUTCOME-6 as dependent variables. To control for initial levels of pain, disability, distress, and overall outcome, baseline component scores were entered first into the equation. Ethnicity was entered next. To control for continuing physical limitations that may be contributing to six month outcome, orthopedic impairment was entered third in each equation. JOB SATISFACTION-2 was entered as the final predictor. The results of the regression analyses are presented in tables 5 and 6.

Forty-seven percent of the total variance in PAIN-6 was explained by the set of PAIN-2, ethnicity, orthopedic impairment, and JOB SATISFACTION-2. PAIN-2 accounted for 25% of the variance ($p < .001$). Ethnicity was not significant, and orthopedic impairment accounted for 15% ($p < .001$) of the variance in PAIN-6. JOB SATISFACTION-2 explained an additional 7% of the variance ($p < .01$) above and beyond the other predictors.

Forty-eight percent of the total variance in DISABILITY-6 was explained by the set of DISABILITY-2, ethnicity, orthopedic impairment, and JOB SATISFACTION-2. DISABILITY-2 explained 32% of the variance ($p < .001$). Ethnicity accounted for an additional 3% of the variance, which was not significant at conventional levels ($p < .10$). Orthopedic impairment accounted for an additional 6% of the variance ($p < .01$), while JOB SATISFACTION-2 accounted for an additional 7% of the variance ($p < .01$) in DISABILITY-6.

Fifty-one percent of the total variance in DISTRESS-6 was explained by the set of DISTRESS-2, ethnicity, orthopedic impairment, and JOB SATISFACTION-2. DISTRESS-2 accounted for 41% of the variance ($p < .001$). Ethnicity accounted for an additional 4% of the variance ($p < .05$). Orthopedic impairment explained 4% of the variance ($p < .05$) above and beyond that. However, JOB SATISFACTION-2 only accounted for an additional 2% of the variance in DISTRESS-6 after the other variables had been entered, which was not significant ($p < .10$).

Fifty-six percent of the total variance in OVERALL CLINICAL OUTCOME-6 was explained by this set of OVERALL CLINICAL OUTCOME-2, ethnicity, orthopedic impairment, and JOB SATISFACTION-2. OVERALL CLINICAL OUTCOME-2

Table 4: Zero-Order Correlations Between Predictors and 6-Month Outcomes for Men With Acute Low Back Pain (n = 82)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Predictors									
1. JOB SATISFACTION-2									
2. Orthopedic impairment at 6 months	−.03								
3. PAIN-2	−.20	.25							
4. DISABILITY-2	−.38†	.28	.36†						
5. DISTRESS-2	−.53†	.20	.36†	.60†					
6. OVERALL CLINICAL OUTCOME-2	−.47†	.30*	.68†	.85†	.84†				
6-month outcomes									
7. PAIN-6	−.35*	.50†	.50†	.37†	.42†	.53†			
8. DISABILITY-6	−.44†	.42†	.35*	.57†	.53†	.62†	.73†		
9. DISTRESS-6	−.44†	.33*	.38†	.43†	.64†	.61†	.67†	.69†	
10. OVERALL CLINICAL OUTCOME-6	−.46†	.46†	.46†	.51†	.60†	.66†	.90†	.90†	.88†

* $p < .01$; † $p < .001$; only correlations with $p < .001$ are statistically significant using Bonferroni adjustment.

Table 5: Prediction of Outcome 6 Months after Pain Onset

Step	Variable	Overall R^2	*F*	*df*	β^1	R^2 Change	*F* Change
Prediction of pain at 6 months after pain onset (PAIN-6)							
1	PAIN-2	.25	27.17*	(1,80)	.35*	.25	27.17*
2	Ethnicity	.25	13.49*	(2,79)	.00	.00	0.11
3	Orthopedic impairment	.40	17.45*	(3,78)	.40*	.15	19.16*
4	JOB SATISFACTION-2	.47	17.37*	(4,77)	−.28†	.07	10.66†
Prediction of disability at 6 months after pain onset (DISABILITY-6)							
1	DISABILITY-2	.32	37.67*	(1,80)	.37*	.32	37.67*
2	Ethnicity	.35	21.27*	(2,79)	−.11	.03	3.63§
3	Orthopedic impairment	.41	18.18*	(3,78)	.29†	.06	8.16†
4	JOB SATISFACTION-2	.48	17.72*	(4,77)	−.28†	.07	10.03†
Prediction of distress at 6 months after pain onset (DISTRESS-6)							
1	DISTRESS-2	.41	56.31*	(1,80)	.48*	.41	56.31*
2	Ethnicity	.45	32.61*	(2,79)	−.18‡	.04	5.64‡
3	Orthopedic impairment	.49	24.71*	(3,78)	.20‡	.04	5.33‡
4	JOB SATISFACTION-2	.51	19.63*	(4,77)	−.16§	.02	2.75§

β^1 = full model β values.
* $p < .001$; † $p < .01$; ‡ $p < .05$; § $p < .10$.

accounted for 44% of the variance ($p < .001$). Ethnicity was not significant in this equation. Orthopedic impairment explained 7% of the variance ($p < .001$). After accounting for these other predictors, JOB SATISFACTION-2 explained an additional 4% ($p < .01$) of the variance in OVERALL CLINICAL OUTCOME-6.

Correlates of Job Satisfaction

To better understand the role that job satisfaction plays in the persistence of low back pain, we examined the type of work performed by participants, both before and after the onset of pain. Type of work performed was classified as desk work, or work requiring light, moderate, or heavy lifting. We also examined an estimate of social position (military rank), to see whether this explained the relation between job satisfaction and outcome. Type of work performed before pain onset was related to age ($r = -.41, p < .001$), military rank ($r = -.46, p < .001$), type of work performed since pain onset ($r = .37$, $p < .001$), and JOB SATISFACTION-2 ($r = .-.29$, $p < .05$). In addition to the relation with type of work performed before pain onset, military rank was correlated with age ($r = .65$, $p < .001$), education ($r = .51$, $p < .001$), and JOB SATISFACTION-2 ($r = .39$, $p < .001$). However only JOB SATISFACTION-2 was correlated with the 6-month outcomes of pain, disability, distress, and overall outcome, with further analysis revealing no difference in magnitude of effect among the correlations between the subscales comprising JOB SATISFACTION-2 and the 6-month outcomes. Social position (military rank) and type of work performed were not correlated with 6-month outcomes, either in correlational analyses or when entered separately into regression equation analyses after controlling for baseline variables and ethnicity.

DISCUSSION

The results of this study add to the evidence suggesting that job satisfaction may be a factor in the transition from an acute episode of back pain to a persisting pain condition 6 months later. Job satisfaction at baseline was associated with better overall clinical outcome at 6 months, above and beyond overall clinical status at baseline and 6-month orthopedic impairment. Greater job satisfaction at the time of initial back pain predicted better overall clinical outcome 6 months later, including reduced pain and disability after controlling for baseline levels of these factors and current orthopedic impairment. There also was a trend for greater job satisfaction to predict reduced psychological distress at 6 months after controlling for initial psychological distress and current orthopedic impairment.

This study also suggests a mechanism relating job satisfaction, pain chronicity, and disability. Because job satisfaction, type of work performed, and social position were related cross-sectionally, but only job satisfaction was predictive of outcome 6 months later, it appears that job satisfaction is not a surrogate for type of work performed or social position. Instead satisfaction with work may protect against negative back pain

Table 6: Prediction of Overall Clinical Outcome (Pain, Disability, Distress) at 6 Months After Pain Onset (OVERALL CLINICAL OUTCOME-6)

Step	Variable	Overall R^2	*F*	*df*	β^1	R^2 Change	*F* Change
1	OVERALL CLINICAL OUTCOME-2	.44	61.60*	(1,80)	.43*	.44	61.60*
2	Ethnicity	.45	32.24*	(2,79)	−.10	.01	2.06
3	Orthopedic impairment	.52	28.38*	(3,78)	.31*	.07	11.83*
4	JOB SATISFACTION-2	.56	25.06*	(4,77)	−.24†	.04	7.74†

β^1 = full model β values.
* $p < .001$; † $p < .01$.

outcomes for individuals performing all types of work, perhaps by providing an incentive for individuals to continue to work. Daily work may help protect individuals against the risk of physical deconditioning and preoccupation with pain. The factors that contribute to satisfaction with work deserve further study, however. In addition, these results suggest that ethnic background or cultural differences may contribute to recovery or transition to chronic pain. Because minority ethnicity predicted continuing distress at 6 months (which held even when type of work and social position were included) its relationship to chronicity warrants additional research.

This work employed several methodologic strategies recommended to enhance the validity of the findings from investigation of back pain disorder,[50,51] including a longitudinal design, standardized measurement of pain, disability, and emotional distress, and careful evaluation of orthopedic status. By studying an inception cohort with a first episode of back pain, we were better able to control for the potential influence of previous pain problems on job satisfaction, since it otherwise could be argued that recurrent back pain heightened job dissatisfaction. Further, because all patients were recruited through a "closed" medical system, treatment received during the course of the study was relatively standardized. Finally, by controlling for baseline levels of pain, disability, and distress in the analyses, we were able to show the unique contribution of initial job satisfaction to 6-month outcome, beyond what might be explained by the relation of these baseline variables to initial job satisfaction.

Although there were methodologic advances in the design of the present study, there also were important limitations. First, all participants were young men; these findings should be applied cautiously to women. Second, the sample was recruited from outside the usual community, further limiting the generalizability of these findings. Nevertheless, the ages and social position of the sample probably reflect the demographics of men in the general population at high risk for back pain disorders. Third, although early referral to a centralized spine clinic was encouraged, it is possible that some potential participants continued to receive care from their primary care provider and were not recruited into the study. Finally, this project assessed self-reports of satisfaction with work, whereas other research has studied perhaps more "objective" predictors—actual work performance and negative supervisor evaluations—of back pain claims and complaints.[12,13] The relation of job satisfaction to work performance, negative supervisor evaluations, and work environment cannot be determined by our results, but this study suggests that vocational factors may be important in the early phases of the transition to chronic pain. In any case, in the clinical setting, standardized assessment of job satisfaction can be easily and promptly accomplished, overcoming potential difficulties in obtaining a review of actual work or supervisor assessment.

To the extent that satisfaction with one's work may play a protective role in the development and maintenance of pain chronicity, interventions directed at job satisfaction, instead of pain relief, may hold significant promise for decreasing the likelihood of transition to chronic pain and disability after an initial back pain episode. Interventions designed to rehabilitate workers with low back problems and vocational retraining programs should be investigated as key components of a comprehensive acute pain rehabilitation program. Further research is necessary to determine the most useful elements of interventions targeted at worker dissatisfaction.

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APPENDIX A: CORRELATION MATRIX OF THE RAW SCORES

Measure	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
JOB SATISFACTION–2																										
(1) Work APGAR																										
(2) Satisfaction with Job in General	.65†																									
(3) Satisfaction with Work on Job	.65†	.82†																								
(4) Satisfaction with Supervision	.52†	.65†	.50†																							
(5) Satisfaction with Co-Workers	.63†	.59†	.59†	.56†																						
PAIN–2																										
(6) DDS–Intensity	−.08	−.17	−.15	.06	.00																					
(7) DDS–Unpleasantness	−.17	−.25	−.13	−.11	−.05	.77†																				
(8) VAS–Current Pain	−.14	−.18	−.18	−.18	−.16	.64†	.55†																			
(9) VAS–Typical Pain	−.09	−.21	−.19	−.27	−.11	.53†	.46†	.79†																		
DISABILITY–2																										
(10) Quality of Well Being	.15	.09	.04	.14	.07	−.30*	−.32*	−.22	−.25																	
(11) SIP–Physical Impairment	−.39†	−.31*	−.25	−.44†	−.24	−.14	.31*	.29*	.31*	−.55†																
(12) SIP–Psychosocial Impairment	−.40†	−.35*	−.30*	−.42†	−.37†	.08	.25	.23	.19	−.34*	.69†															
(13) SIP–Other Impairment	−.35*	−.22	−.22	−.35*	−.36†	.24	.32*	.33*	.33*	−.51†	.73†	.74†														
DISTRESS–2																										
(14) Beck Depression Inventory	−.54†	−.49†	−.42†	−.44†	−.47†	.15	.31*	.33*	.30*	−.30*	.44†	.69†	.51†													
(15) Hamilton Rating Scale for Depression	−.40†	−.39†	−.29*	−.35*	−.40†	.18	.36†	.20	.23	−.34*	.45†	.69†	.55†	.81†												
(16) Automatic Negative Thoughts	−.47†	−.44†	−.35*	−.46†	−.47†	.13	.32*	.26	.23	−.18	.41†	.68†	.47†	.79†	.79†											
PAIN–6																										
(17) DDS–Intensity	−.29*	−.34*	−.29*	−.19	−.11	.35*	.33*	.26	.34*	−.42†	.34*	.19	.23	.32*	.30*	.18										
(18) DDS–Unpleasantness	−.36†	−.41*	−.34*	−.25	−.20	.38†	.45†	.32*	.38†	−.38†	.31*	.19	.24	.35*	.32*	.22	.91†									
(19) VAS–Current Pain	−.24	−.30*	−.29*	−.21	−.19	.46†	.42†	.45†	.45†	−.37†	.31*	.27	.24	.38†	.34*	.32*	.80†	.77†								
(20) VAS–Typical Pain	−.33*	−.35*	−.33*	−.20	−.24	.45†	.44†	.45†	.45†	−.36†	.28*	.26	.24	.45†	.40†	.39†	.78†	.76†	.93†							
DISABILITY–6																										
(21) Quality of Well Being	.25	.24	.18	.12	.11	−.22	−.27	−.10	−.21	.37†	−.25	−.21	−.29*	−.27	−.28	−.17	−.72†	−.63†	−.58†	−.59†						
(22) SIP–Physical Impairment	−.32*	−.32*	−.29*	−.35*	−.33*	.17	.31*	.31*	.34*	−.45†	.59†	.49†	.43 †	.41†	.36*	.41†	.52†	.47†	.67†	.62†	−.50 †					
(23) SIP–Psychosocial Impairment	−.39†	−.40†	−.29*	−.34*	−.47†	.16	.31*	.25	.25	−.32*	.44†	.49†	.42 †	.48†	.41†	.44†	.40†	.43†	.38†	.43†	−.29*	.60†				
(24) SIP–Other Impairment	−.40†	−.34*	−.32*	−.36	−.36†	.20	.34*	.26	.36*	−.50†	.54†	.45†	.49†	.50†	.41†	.37†	.61†	.59†	.60†	.60†	−.57†	.81†	.73†			
DISTRESS–6																										
(25) Beck Depression Inventory	−.43†	−.41†	−.39†	−.32*	−.38†	.19	.39†	.33*	.39†	−.23	.36*	.44†	.36*	.63†	.50†	.51†	.58†	.66†	.60†	.62†	−.42†	.49†	.54†	.57†		
(26) Hamilton Rating Scale for Depression	−.32*	−.24	−.17	−.29*	−.19	.20	.36†	.26	.28	−.20	.25	.25	.25	.48†	.46†	.43†	.50†	.53†	.58†	.62†	−.46†	.43†	.34*	.48†	.75†	
(27) Automatic Negative Thoughts	−.38†	−.34*	−.29*	−.40†	−.35*	.12	.39†	.25	.31*	−.26	.37†	.33*	.29*	.44†	.37†	.53†	.35*	.48†	.54†	.50†	−.36†	.53†	.39†	.48†	.71†	.65†

* $p < .01$; † $p < .001$; two-tailed significance.