

Initial Depression Severity and the Trajectory of Recovery Following Cognitive-Behavioral Intervention for Work Disability

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Introduction: *The present study examined the recovery trajectories of a group of mildly depressed and moderately-severely depressed injured workers enrolled in a 10-week community-based rehabilitation program. Methods:* A sample of 168 individuals (75 women, 93 men) with a disabling musculoskeletal pain condition participated in the research. On the basis of BDI-II (1) scores at pre-treatment assessment, patients were classified as either mildly (BDI-II = 9–16; N = 68) or moderately-severely depressed (BDI-II >16; N: 100). **Results:** Both groups showed significant reductions in depression, but individuals in the (initially) moderately-severely depressed group were more likely to score in the depressed range of the BDI-II at post-treatment than individuals who were initially mildly depressed. For the mildly depressed group, early treatment reductions in pain catastrophizing, and perceived disability predicted improvement in depression scores. For the moderately-severely depressed group, none of the early treatment changes predicted improvement in depression; only late treatment reductions in pain catastrophizing and fear of movement/re-injury predicted improvement in depression. Chi-square analysis revealed that patients who were no longer depressed at post-treatment had the highest probability of returning to work (91%), followed by (post-treatment) mildly depressed patients (60%), and finally (post-treatment) moderately-severely depressed patients (26%), $\chi^2 = 38.9$, $p < 0.001$. **Conclusion:** *In order to maximize return to work potential, the content, structure and duration of rehabilitation programs requires modification as a function of the injured workers level of the depression severity.*

KEY WORDS: psychosocial risk factors; work disability; musculoskeletal disorders; depression; catastrophizing; fear; return to work.

Recent research suggests that depression increases the risk of prolonged work disability associated with musculoskeletal conditions (2,3). Individuals with pain-related musculoskeletal conditions who are depressed have sick leave duration that is twice as long as

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individuals with musculoskeletal conditions who are not depressed (4,5). Depression has also been associated with longer duration of wage replacement benefits following work injury or surgical intervention (2,6,7).

Recent research has shown that high levels of pre-treatment depression are predictive of poor return to work outcomes following participation in a multidisciplinary rehabilitation program (8). Vowles *et al.* (9) reported that post-treatment depression scores accounted for 28% of the variance in return to work outcomes. The evidence that has accumulated to date strongly suggests that depression can be considered a risk factor for poor rehabilitation outcome (3,10).

Multidisciplinary treatment programs with a cognitive-behavioral orientation are currently considered the treatment of choice for individuals suffering from disabling musculoskeletal conditions (11–14). Psychological interventions within these programs utilize a variety of techniques aimed at reducing the severity of depressive symptoms associated with pain. Interventions strategies such as thought monitoring, or cognitive re-structuring are typically used to modify the pessimistic or catastrophic thoughts that might contribute to the maintenance or exacerbation of depressive symptoms (15,16). Surprisingly, questions concerning the efficacy of cognitive behavioral interventions for depression associated with musculoskeletal conditions have yet to be systematically investigated. Previous research examining the relation between depression and rehabilitation outcome has been conducted on samples that were not selected on the basis of elevated depressive symptoms (9,17). The inclusion of non-depressed patients in analyses addressing treatment-related changes in depression limits the generalizability of findings to patients with clinical levels of depressive symptoms.

Beyond the research showing that depression predicts poor return to work outcomes, little is currently known about how depression severity influences the trajectory of recovery following musculoskeletal injury. While it is clear that depressive symptoms are an important target of interventions in rehabilitation, it is not clear whether current treatment approaches are equally well suited for individuals with varying levels of depressive symptom severity. For example, it is possible that current treatment approaches may yield benefit primarily for mildly depressed patients, while more severely depressed pain patients may respond less favorably to treatment approaches. It is also possible that the determinants of clinical improvement might differ as a function of the severity of depressive symptoms. The study of the recovery trajectories and determinants of improvement in different subgroups of depressed pain patients might provide important insights into ways in which treatment outcomes might be improved.

The present study examined the recovery trajectories of a group of mildly depressed and moderately to severely depressed injured workers enrolled in a 10-week community-based rehabilitation program. Individuals were considered for the intervention only if they scored in the depressed range on a screening measure of depressive symptoms. Analyses addressed whether initial depressive symptom severity influenced treatment response and return to work outcomes. Analyses also examined the determinants of treatment response in patients with mild and moderate to severe depression.

PARTICIPANTS

A sample of 168 individuals (75 women, 93 men) with a disabling musculoskeletal pain condition, and who showed evidence of clinically significant depressive symptoms

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participated in the research. All participants had sustained a work-related soft tissue injury and were currently receiving WCB wage replacement benefits. The mean age of the sample was 41.2 years with a range of 20–60 years. The mean duration of work absence was 26.6 weeks with a range of 4–76 weeks. The most common injury site was the back (70%), followed by upper extremities (12%), lower extremities (10%) and neck (8%). All participants were enrolled in a community-based secondary prevention program aimed at maximizing return to work potential. On the basis of pre-treatment scores on the Beck Depression Inventory-II (1), patients were classified as either mildly (BDI-II = 9 to 16; $N = 68$) or moderately-severely depressed (BDI-II > 16; $N: 100$).

PROCEDURE

Participants in this research had been referred to a cognitive behavioral risk-factor targeted intervention for work disability. The Pain-Disability Prevention (PDP) Program—Revised (18) is a 10-week standardized intervention aimed at minimizing psychosocial barriers to rehabilitation progress in individuals suffering from painful musculoskeletal conditions. Standardized assessment included measures of pain severity, catastrophic thinking, fear of movement/re-injury, perceived disability and depression. Assessments were conducted at pre-treatment (Week 1), mid-treatment (Week 4) and post-treatment (Week 9).

The PDP Program (Revised) was modified from its original version (8) following a series of focus groups with psychologists who had participated as community-based clinicians for the program during its first year of implementation. The revised program differs from the original version primarily in its adoption of a modular approach to intervention. The PDP-R Program comprises four treatment modules targeting specific risk factors for prolonged pain and disability 1) pain catastrophizing, 2) fear of movement/re-injury, 3) perceived disability and 4) depression. The depression module is implemented when initial assessment reveals that an individual obtained a score in the clinical range of the Beck Depression Inventory—II (score greater than or equal to 9). Components of the depression module include the modification of catastrophic thinking, activity scheduling with a focus on success and mastery experience, and life role resumption.

The PDP-R Program was provided by 45 psychologists widely distributed in community clinics throughout the province of Nova Scotia, Canada. The PDP-R Program was provided as an addition to usual medical management and physical therapy. The addition of the PDP-R Program to traditional rehabilitation treatment is intended to establish “virtual” multidisciplinary teams at the community-based level (10). Community-based psychologists were asked to forward copies of PDP-R Program assessment results (identified only by claim number) to our research center. The PDP-R Program assessment results were then linked to the WCB administrative database.

Treatment was discontinued once an individual had returned to work. In other words, the interventions were designed to run for a maximum of 10 weeks but could be terminated once return to work was achieved. As such, individuals who discontinued prior to 10 weeks and returned to work are not considered treatment dropouts. For the purposes of the present study, only individuals who discontinued treatment prior to 10 weeks and did not return to work were considered dropouts. All participants completed the first two assessments. Fifteen individuals discontinued treatment prior to the final (Week 9) assessment and returned to work; 10 individuals discontinued treatment prior to the final assessment and

did not return to work. These cases were retained for analyses with the last observation on dependent measures carried forward.

MEASURES

Pain Severity

The McGill Pain Questionnaire (MPQ) (19) was used as a measure of current pain severity. Respondents were asked to endorse adjectives that best describe their pain experience. The Pain Rating Index (PRI) is a weighted sum of all adjectives endorsed, and has been shown to be a reliable and valid index of an individual's pain experience (20).

Depression

The Beck Depression Inventory II (BDI –II) (1) was used to measure severity of depressive symptoms. The BDI-II consists of 21 items describing various symptoms of depression. Respondents were asked to endorse phrases that best described how they had been feeling during the past 2 weeks. The BDI-II has been shown to be a reliable and valid index of depressive symptoms in patients with musculoskeletal conditions (8,9,21).

Catastrophizing

The Pain Catastrophizing Scale (PCS) (22) was used to assess catastrophic thinking related to pain. Respondents were asked to rate the frequency with which they experienced each of 13 different thoughts and feelings when in pain. The PCS has been shown to have high internal consistency (coefficient $\alpha = 0.87$), and to be associated with heightened pain, disability and employment status (8,22,23).

Fear of Movement/Re-Injury

The Tampa Scale for Kinesiophobia (TSK) (24) was used to assess fear of movement and re-injury associated with pain. Respondents were asked to indicate their level of agreement with each of 17 statements reflecting worries or concerns about the consequences of participating in physical activity. The TSK been shown to be internally reliable (coefficient $\alpha = 0.77$) (25), and to be associated with indices of behavioral avoidance and disability (8,26,27).

Perceived Disability

The Pain Disability Index (PDI) (28) was used to assess the degree to which respondents perceived themselves to be disabled in seven different areas of daily living (home, social, recreational, occupational, sexual, self-care, life support). The PDI has been shown to be internally reliable and significantly correlated with objective indices of disability (29,30).

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Table I. Sample Characteristics at Time of Admission to Treatment

	Severity of depression		<i>p</i>
	Mild	Moderate/severe	
Sample size	<i>N</i> = 68	<i>N</i> = 100	
Men/women	38/30	55/45	ns
Age (years)	42.2 (9.9)	40.7 (8.0)	ns
Injury site	68% back	73% back	ns
Work absence	23.5 weeks (11.7)	28.8 weeks (15.6)	0.05
MPQ	31.0 (13.0)	36.2 (14.4)	0.05
PCS	23.3 (8.8)	30.8 (10.5)	0.001
TSK	40.5 (6.6)	44.1 (8.4)	0.01
PDI	39.6 (10.8)	44.2 (13.4)	0.05
BDI-II	11.8 (1.9)	25.3 (8.2)	0.001

Note. MPQ: McGill Pain Questionnaire Pain Rating Index; PCS: Pain Catastrophizing Scale; TSK: Tampa Scale for Kinesiophobia; PDI: Pain Disability Index; BDI-II: Beck Depression Inventory-II.

Return to Work

Return to work status was assessed 4 weeks following termination of the PDP-R Program. Return to work information and claim status were obtained from WCB files. Clients were classified as having returned to work if they had returned to full time pre-injury employment or alternate employment, and their claim was closed. All other clients were classified as not having returned to work.

RESULTS

Sample Characteristics

Demographic information and mean scores on risk factor measures are presented in Table I. Age and gender distribution were comparable for mildly and moderately-severely depressed groups. At the time of initial assessment, moderately-severely depressed pain patients had been off work for a longer period of time, $t(166) = 2.4$, $p < 0.05$, reported more severe pain, $t(166) = 2.3$, $p < 0.05$, and obtained higher scores on measures of pain catastrophizing, $t(166) = 4.9$, $p < 0.001$, fear of movement/re-injury, $t(166) = 2.9$, $p < 0.01$, and perceived disability, $t(166) = 2.3$, $p < 0.05$.

Individuals who dropped out of the treatment program (i.e., discontinued the treatment program and did not return to work) ($n = 10$) obtained significantly higher scores on measures of depression, $t(166) = 2.2$, $p < 0.05$, catastrophic thinking, $t(166) = 3.0$, $p < 0.01$, and perceived disability, $t(166) = 2.4$, $p < 0.05$.

Trajectory of Recovery

Figure 1 shows the trajectory of recovery of mildly and moderately-severely depressed patients through the course of the treatment program. These data were analyzed as a two-way mixed factorial with level of depression (mild, moderate-severe) as the between-groups factor, and time (week 1, 4 and 9) as the within-groups factor. Analysis revealed significant

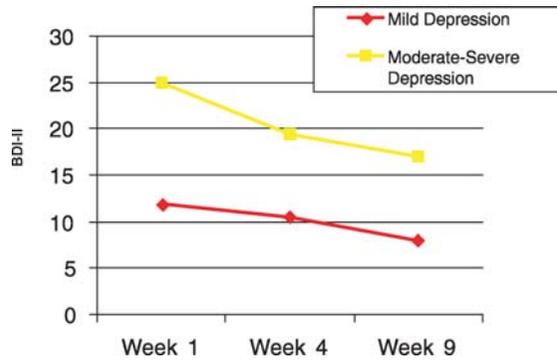


Fig. 1 Changes in depressive symptoms as a function of initial depression severity

main effects for level of depression, $F(1, 166) = 85.7, p < 0.001$, Time, $F(2, 332) = 51.6, p < 0.001$, and a significant interaction, $F(2, 332) = 7.8, p < 0.001$. Simple effects tests revealed significant reductions in depression for the moderately-severely depressed group, $F(2, 198) = 31.9, p < 0.001$, and the mildly depressed group, $F(2, 134) = 21.2, p < 0.001$. However, the magnitude of reduction in depression scores was greater in the moderately-severely depressed group ($M = 8.0, SD = 8.8$) than in the mildly depressed group ($M = 3.9, SD = 4.5$), $t(166) = 3.1, p < 0.001$. Analyses further revealed that although moderately-severely depressed patients showed more marked reductions in depression, a higher proportion of individuals from the moderately-severely depressed group still scored within the depressed range (BDI-II > 9) at post-treatment (81%), compared to the mildly depressed group (45%), $\chi^2(2) = 32.0, p < 0.001$.

Determinants of Treatment Response

Change scores on risk factor measures (pain severity, pain catastrophizing, fear of movement/re-injury, perceived disability) were computed and used as predictors of improvement in depression. Separate change scores were computed for the first half (week 1–week 4) and second half (week 4–week 9) of treatment. Separate regression analyses were conducted for mildly depressed and moderately-severely depressed groups. Pre-treatment depression scores and duration of work absence were entered in the first step of the analyses, followed by early treatment changes in risk factor measures, and finally late treatment changes in risk factor measures. Post-treatment depression was the dependent variable. By controlling for pre-treatment depression, significant predictors of post-treatment depression can be construed as predictors of improvement in depression. The results of these analyses are presented in Table II.

For the mildly depressed group, early, $F(4, 61) = 6.9, p < 0.01$, and late, $F(4, 57) = 2.5, p < 0.05$, changes in risk factor measures accounted for significant variance in post-treatment depression scores. Early treatment changes on psychosocial risk factors measures accounted for three times as much variance in post-treatment depression as late treatment changes. Due to shared variance among risk factor measures, not all measures contributed unique variance to the prediction of improvement in depression. Examination of the beta weights for the final regression equation revealed that early treatment reductions in pain

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Table II. Regression Analyses Predicting Post-Treatment Depression Scores

	Mildly depressed		Moderately-severely depressed	
	B	R^2_{change}	B	R^2_{change}
Step 1				
BDIT1	0.40**		0.42**	
Duration	0.11	0.14**	0.03	0.26**
Step 2				
Early treatment				
MPQ12	0.01		-0.02	
PCS12	-0.35**		-0.03	
TSK12	-0.02		-0.13	
PDI12	-0.34**	0.26**	-0.16	0.09**
Step 3				
Late treatment				
MPQ23	0.11		-0.14	
PCS23	-0.14		-0.20*	
TSK23	-0.10		-0.21*	
PDI23	-0.19	0.08*	-0.02	0.17**

Note. Standardized beta weights are from the final regression equation. BDIT1 = Pre-treatment Beck Depression Inventory score. Values entered in Step 2 are pre-to-mid treatment change scores on psychosocial risk factor measures. Values entered in Step 3 are mid-to-post treatment change scores on psychosocial risk factor measures. * $p < 0.05$, ** $p < 0.01$.

catastrophizing and perceived disability contributed significant unique variance to post-treatment depression scores. None of the late treatment changes contributed significant unique variance to the prediction of post-treatment depression scores.

For the moderately-severely depressed group, early, $F(4, 93) = 3.4$, $p < 0.01$, and late treatment reductions, $F(4, 89) = 7.9$, $p < 0.001$, in risk factor measures accounted for significant variance in post-treatment depression scores. Only late treatment reductions in pain catastrophizing and fear of movement/re-injury contributed significant unique variance to the prediction of post-treatment depression. None of the early treatment changes contributed significant unique variance to the prediction of post-treatment depression.

Depression and Return to Work

Consistent with previous research, chi-square analysis revealed that (initially) moderately-severely depressed patients had a lower probability of returning to work (50%) than (initially) mildly depressed patients (73%), $\chi^2 = 9.3$, $p < 0.01$. The relation between post-treatment depression scores and return to work was also examined. On the basis of post-treatment BDI-II scores, patients were classified as non-depressed (BDI-II < 9), mildly depressed (BDI-II = 9 to 16), or moderately-severely depressed (BDI-II > 16). Chi-square analysis revealed that patients who were no longer depressed at post-treatment had the highest probability of returning to work (91%; $n = 51/56$, followed by (post-treatment) mildly depressed patients (60%; $n = 33/55$), and finally (post-treatment) moderately-severely depressed patients (26%; $n = 14/53$), $\chi^2 = 38.9$, $p < 0.001$.

DISCUSSION

The results of the present study join a growing literature pointing to the important role of depressive symptoms in the rehabilitation of individuals with disabling musculoskeletal

conditions (9,17). Consistent with the results of previous research on psychological risk factors for pain-related disability, high initial levels of depression were associated with poorer return to work outcomes following intervention (3). Individuals with moderate to high levels of depression at pre-treatment were approximately 50% less likely to return to work than individuals with mild levels of depression at pre-treatment.

Consistent with research on treatment-related determinants of return to work, lower post-treatment levels of depression were associated with a higher probability of return to work (9). Scoring in the non-depressed range of the BDI-II at post-treatment was associated with a three-fold increase in the probability of returning to work, compared to individuals who continued to score in the moderate-severe range at post-treatment. These findings highlight the importance of targeting depressive symptoms in order to facilitate recovery from disabling musculoskeletal conditions.

Post-treatment levels of depression appear to be more important determinants of return to work than the magnitude of improvement in depression. Individuals in the moderately-severely depressed group showed greater reductions in depression through the course of treatment, yet their prognosis for returning to work was still worse than that of the mildly depressed group. Successful rehabilitation may depend not only on the reduction of depressive symptoms, but on whether depressive symptoms can be reduced below clinical threshold.

The findings of the present study suggest that individuals with more severe depressive symptoms might require treatment for longer period of time than is typically provided in pain rehabilitation programs. The patients who were initially in the moderately-severely depressed group showed significant reduction in depression scores through the course of treatment but most still scored within the depressed range at the end of the 10-week treatment program. One approach to enhancing rehabilitation outcomes for patients with high depression scores might be to initiate treatment for depression prior to enrolment in a pain rehabilitation program.

Regression analyses were conducted to examine the degree to which early and late treatment changes in psychosocial risk factors predicted depression outcomes. For the mildly depressed group, early treatment reductions in pain catastrophizing and perceived disability contributed significant unique variance to treatment-related depression outcomes. This pattern of findings is consistent with the predictions of cognitive models of depression (31). Prior to its emergence in the pain literature, catastrophizing had been discussed primarily within the context of cognitive theories of depression (32). For example, in Beck's (31) cognitive model of emotional disorders, catastrophizing is viewed as a "cognitive distortion" that might contribute to the precipitation and maintenance of depressive symptoms.

Interventions aimed at modifying depressogenic cognitions are expected to yield reductions in depressive symptoms (31,33,34). The results of this study suggest that intervention techniques designed to reduce the frequency of catastrophic thinking and modify individuals' appraisals of their level of disability might be important components of the successful treatment of mildly depressed pain patients. This pattern of findings is largely consistent with that reported by Burns *et al.* (17).

A different pattern of findings emerged for the moderately-severely depressed group. First, late treatment changes in psychosocial risk factors accounted for twice the variance in depression outcomes as early treatment changes. The opposite was true for the mildly

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depressed group. For the moderately-severely depressed group, late treatment changes in pain catastrophizing and fear of movement/re-injury contributed significant unique variance to the prediction of post treatment depression scores.

Traditional cognitive models of depression have not specifically addressed the role of pain-related fears as potential determinants of depression. However, a cognitive-model of pain-related disability proposed by Vlaeyen and Linton (35) suggests possible mechanisms by which pain-related fears might impact on depressive symptoms. The model proposes that following the onset of pain symptoms, individuals who engage in catastrophic thinking will be more likely to develop pain related fears, leading to activity avoidance, disability, and depression. Although the Vlaeyen and Linton (35) model focuses more on the determinants of disability as opposed to depression, the model suggests that reductions in pain catastrophizing and pain-related fears should result in lower levels of depression. The present findings are consistent with this prediction.

Although pain catastrophizing and fear of movement/re-injury have been discussed as related constructs, and have been shown to be significantly correlated, they nevertheless made independent contributions to treatment-related reductions in depression. It is possible that reductions in pain catastrophizing and pain-related fears might impact on depression through different processes. Numerous investigations have shown that negative cognitions such as catastrophic thinking are intricately linked to depressive symptoms (36–39). Clinical and experimental research shows clearly that reductions in negative cognitions yield improvements in mood (33,40). Pain-related fears might impact on depression indirectly by contributing to activity avoidance. Consistent with behavioral models of depression, reduced activity might result in fewer opportunities to experience success or mastery experiences (41,42).

One of the clinical implications of this research is that while cognitive approaches aimed at minimizing negative cognitions might be sufficient to yield positive outcomes in mildly depressed pain patients, interventions that also target pain-related fears might be necessary to facilitate recovery in individuals with more severe depressive symptoms. The incorporation of techniques such as graded activity involvement or activity exposure into pain rehabilitation programs might improve depression outcomes, particularly for patients with more severe depressive symptoms (43).

Some degree of caution must be exercised in the interpretation of the findings of the present study. First, individuals were classified as mildly or moderately-severely depressed based on a self-report measure as opposed to diagnostic interview. Diagnostic interview is considered the gold standard for the diagnosis of depressive disorders (44,45). However, it was not possible to obtain DSM IV diagnoses for the participants in the treatment program from which the study sample was derived (46). Community-based psychologists providing the PDP-R Program attend a two-day workshop to become familiar with the treatment protocol. Community-based psychologists vary greatly with respect to their training background and many have not been formally trained in diagnostic interviewing. It has not been possible within the context of the training workshop to include training on diagnostic interviewing. Replication of the present findings in a sample where depression is assessed through diagnostic interview will be needed before strong statements can be made about the relation between depression severity and the trajectory of recovery. An additional limitation is that the study did not include a follow-up evaluation. Immediate post-treatment outcomes do not necessarily reflect long-term outcomes. Predictors of return

to work outcomes are not necessarily the same as predictors of work retention. Since outcomes were determined on the basis of WCB administrative data, once a claim was closed (e.g., return to work), no resources were available for follow up.

It is important to note that the study design did not comprise a no-treatment control group. As such, it is not possible to draw any conclusions about the impact of the treatment program on changes in risk factor measures or return to work. The possibility that observed changes were the result of a natural trajectory of recovery or the influence of other factors not systematically assessed or controlled cannot be ruled out. Linking observed changes to aspects of the treatment program must await replication in a controlled clinical trial.

Despite these limitations, the results of the present research suggest that initial levels of depression are significant determinants of treatment response, and return to work outcomes. Individuals with more severe initial levels of depression might require participation in treatment specifically aimed at managing depressive symptoms prior to enrolment in rehabilitation programs. The findings highlight the importance of screening for depression as an integral component of treatment planning for individuals suffering from disabling musculoskeletal conditions. If replicated, the findings of this study suggest that the treatment needs of individuals with more severe levels of depression, both with respect to duration and content, might differ from individuals with mild depression or no depression. The findings of the present study suggest that techniques that target the tendency to catastrophize about one's pain as well as pain-related fears might be important components of treatment programs for pain patients with more severe levels of depression. There is an urgent need for clinical trials assessing the efficacy of different approaches to the treatment of depression for patients with concomitant depression and disabling musculoskeletal disorders.

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