

Psychosocial Factors Related to Return to Work Following Rehabilitation of Whiplash Injuries

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Abstract

Introduction The present study examined the effects of pain chronicity on the responsiveness of psychosocial variables to intervention for whiplash injuries.

Methods Participants ($N = 75$) were work disabled patients with a diagnosis of Whiplash Grade II and were clients in a 10-week community-based, psychosocial intervention aimed at facilitating return to work. Individuals were classified as subacute (4–12 weeks; $N = 25$), early chronic (3–6 months; $N = 25$), and chronic (6–18 months; $N = 25$). Patients in the three groups were matched on sex (13 men, 12 women) and age (± 2 years). Patients completed measures of pain severity, self-reported disability, pain catastrophizing and fear of movement at pre-treatment, mid-treatment and post-treatment.

Results Return to work rates were 80, 72 and 32% for the subacute, early chronic and chronic groups, respectively. Individuals in the chronic group, compared to individuals in the subacute or early chronic groups, had significantly more elevated pre-treatment scores on measures of pain catastrophizing, $F(2, 74) = 9.6$, $P < .001$, and fear of movement, $F(2, 74) = 3.4$, $P < .05$. The magnitude of treatment-related reductions in

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catastrophizing, fear of movement and pain intensity was comparable across groups. However, individuals who were absent from work for more than 6 months showed the least amount of change in self-reported disability through the course of treatment.

Conclusions The findings suggest that self-reported disability is particularly resistant to change as the period of work disability extends over time. The findings emphasize the importance of early intervention and the need to develop strategies that specifically target disability beliefs in patients with whiplash injuries.

Keywords Chronicity · Whiplash · Rehabilitation outcomes · Psychosocial risk factors

Epidemiological studies of disability associated with musculoskeletal conditions reveal that the probability of returning to work decreases as the period of work absence increases [1, 2]. Although the bulk of research in this area has been conducted with individuals who have back pain, similar data have been reported for individuals with whiplash injuries [3, 4]. Spitzer et al. [4] compiled data from numerous sources in an effort to describe the trajectory of recovery following whiplash injury. They reported that by 4 weeks post-injury, approximately 50% of individuals had resumed pre-injury activities. At 12 weeks post-injury, approximately 75% of individuals had resumed their pre-injury activities. Individuals who remained disabled at 12 weeks post-injury were considered at high risk of becoming permanently disabled.

Clinical studies have yielded similar findings. In cohorts of individuals with musculoskeletal conditions admitted to rehabilitation programs, those with longer duration of work absence make fewer treatment gains [5–7]. Although the relation between chronicity and treatment response has been studied less extensively in individuals with whiplash injuries, available research indicates that the same relation exists [8].

A number of factors have been discussed as possible explanations for the relation between chronicity and poor rehabilitation outcomes [9]. For example, the severity of physical impairment might increase with duration of work absence, posing additional challenges to rehabilitation progress [10]. Loss of links to the workplace has been discussed as a contributor to poor rehabilitation outcomes following long-term work-disability [11]. Deterioration of skill set and increased perception of risk by employers also compromise individuals' potential for competitive employment as the period of work disability extends over time [12].

Research has yet to address the role of psychosocial risk factors as determinants of the relation between duration of work-disability and poor rehabilitation outcomes. Psychosocial factors such as pain catastrophizing, fear of movement and re-injury, and perceived disability have been linked prospectively to poor return to work outcomes [13]. It is possible that psychosocial risk profiles increase in severity as work-disability becomes chronic. It is also possible that psychosocial risk factors become more resistant to change as work-disability becomes chronic.

The present study examined the degree to which psychosocial risk factors might account for the relation between chronicity and poor return to work outcomes.

Determinants of return to work were examined in three groups of patients varying in terms of level of chronicity who participated in a community-based rehabilitation program. Consistent with the results of previous investigations, it was expected that the highest return to work rates would be observed in the subacute group, with decreasing return to work rates in the early chronic and chronic groups. Two questions were of central interest: (1) To what degree is increased duration of work-disability associated with more severe psychosocial risk profiles? and (2) Does the magnitude of changes in psychosocial risk factors (e.g., treatment response) vary as a function of duration of work disability?

Methods

Subjects

Analyses were conducted on the results of assessments completed on a sample of 75 work disabled patients (39 men, 36 women) with a diagnosis of Whiplash Grade II. All participants had sustained injuries in a rear-end motor vehicle accident. All participants were enrolled in a 10-week community-based, psychosocial intervention aimed at facilitating return to work. Participants were drawn from four rehabilitation clinics in eastern Canada. On the basis of duration of work disability, individuals were classified as subacute (4–12 weeks; $N = 25$), early chronic (3–6 months; $N = 25$), and chronic (6–18 months; $N = 25$). Patients in the three groups were matched on sex (13 men, 12 women) and age (± 2 years). For the purposes of the present study, individuals were considered for participation only if they were employed prior to their motor vehicle accident.

Procedure

All participants were enrolled in the Progressive Goal Attainment Program (PGAP). Referrals for PGAP were received from family physicians or case managers of motor vehicle insurers. Individuals were considered for participation only if they scored above the 50th percentile on at least one of the risk factors targeted by treatment program. Individuals who did not meet inclusion criteria for PGAP were followed as per case management policy of the insurers. No information was available on the rehabilitation outcomes of individuals who were not enrolled in PGAP. Participants in this study were only screened for admission to PGAP on one occasion. In other words, there were no cases where participants did not satisfy inclusion criteria while they were in the subacute period, but later satisfied inclusion criteria when they were in the chronic period.

PGAP is a standardized, manual-driven intervention program that aims to maximize activity involvement in individuals who are work-disabled due to a pain condition. Clients meet individually with the PGAP clinician on a weekly basis for approximately 1 h. In this program, activity scheduling and graded activity involvement are used as techniques to reduce catastrophic thinking, fear of

movement and perceived disability. The treatment program is intended as a disability-reduction intervention and not as a pain management intervention. For a more detailed description of the treatment program, the reader is referred to www.pdp-pgap.com [8].

Through the addition of PGAP to existing medical and physical therapy interventions, the objective is to create virtual multidisciplinary teams at the community-based level. Individuals are considered candidates for PGAP if they score within the risk range (i.e., above the 50th percentile) on at least one of the psychosocial measures targeted by the program. All patients in the present study were also participating in a functional restoration physical therapy program and were being followed by a primary care physician. The functional restoration physical therapy program was characterized by a sport medicine approach consisting primarily of joint manipulation, active range of motion exercises and strengthening exercises, progressively increasing in intensity. Standardized assessments of pain severity, pain catastrophizing, fear of movement/re-injury and perceived disability were conducted at pre-treatment, mid-treatment, and treatment termination.

Measures

Catastrophizing

The Pain Catastrophizing Scale (PCS); [14] was used to assess catastrophic thinking in relation to pain. On this scale, respondents are asked to rate the frequency with which they experience 13 different thoughts and feelings related to pain. The PCS has been shown to be internally reliable (coefficient alpha = .87) and to be associated with heightened pain, self-reported disability as well as employment status. The 50th percentile cut off score for participant selection was 20.

Fear of movement/re-injury

The Tampa Scale for Kinesiophobia (TSK); [15] was used to assess fear of movement and re-injury. The TSK is a 17-item questionnaire that has been shown to be internally reliable (coefficient alpha = .77) and to be associated with various indices of behavioral avoidance and self-reported disability. The 50th percentile cut off score for participant selection was 39 [16].

Perceived disability

The Pain Disability Index (PDI); [17, 18] 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, and life support). The PDI has been shown to be internally reliable and significantly correlated with objective indices of disability. The 50th percentile cut off score for participant selection was 37.

Pain severity

The Pain Rating Index of the McGill Pain Questionnaire (MPQ); [19] was used to assess current pain severity. The Pain Rating Index (PRI) is a weighted sum of all pain adjectives endorsed, and is considered one of the more reliable and valid indices of an individual's pain [20].

Return to work

Return to work status was assessed by telephone interview 4 weeks following termination of the treatment program. Clients were asked the following questions: (1) Have you returned to full-time work? (2) If no, have you returned to part-time work? (how many hours per week?), and (3) Have you returned to the same employment you had prior to your injury? The interviewer was an office assistant who was blind to treatment condition and the hypotheses of the study. For the purposes of the present study, clients were classified as having returned to work if they had returned to full time pre-injury employment or alternate employment and the salary indemnity claim was deemed closed by the insurer. All other clients were classified as not having returned to work.

Results

Sample characteristics

Characteristics of the sample are presented in Table 1. There were no significant differences among groups in age, $F(2, 72) = 1.1$, ns, distribution of pain symptoms, $\chi^2 = 1.2$, ns, distribution of occupational categories, $\chi^2 = .94$, ns, or physical occupational demands, $F(2, 72) = .77$, ns.

Return to work

Participants in the subacute group (80%) and the early chronic group (72%) were significantly more likely to return to work following completion of the intervention program than participants in the chronic group (32%), $X^2 = 13.9$, $P < .001$. Participants in the subacute and early chronic groups did not differ significantly from each other on return-to-work rates.

Pre-treatment scores on pain and psychosocial risk factors

A series of one-way analyses of variance (ANOVA) were conducted to examine whether the different groups differed on pre-treatment measures of pain and psychosocial risk. There were no significant group differences in pain severity, $F(2, 72) = 1.5$, ns, or perceived disability, $F(2, 72) = .08$, ns. Significant group differences were found for pre-treatment scores on pain catastrophizing, $F(2, 72) = 9.6$, $P < .001$, and fear of movement/re-injury, $F(2, 72) = 3.4$, $P < .05$.

Table 1 Sample characteristics

Characteristic	Subacute (4–12 weeks)		Early chronic (3–6 months)		Chronic (6–18 months)		Total
	<i>N</i>		<i>N</i>		<i>N</i>		
Sex							
Male	13	52%	13	52%	13	52%	39
Female	12	48%	12	48%	12	48%	36
Age	42.6 (9.4)		39.1 (7.3)		41.1 (8.2)		
Weeks work absence	10.6 (2.7)		21.2 (3.6)		41.41 (18.0)		
Pain site							
Neck	25	100%	25	100%	25	100%	75
Back	12	48%	14	56%	16	64%	42
Occupation							
Labor	9	36%	8	32%	5	20%	22
Health	7	28%	5	20%	7	28%	19
Food	3	12%	6	24%	3	12%	12
Transportation	3	12%	4	16%	6	24%	13
Clerical/Admin	3	12%	2	8%	5	20%	10
Physical demands	2.2 (.64)		2.1 (.75)		2.3 (.62)		

Note: Physical demands: 1 = light/sedentary, 2 = moderate, 3 = heavy

Numbers in parentheses are standard deviations

Post-hoc multiple comparisons (Student Newman–Keuls) revealed that participants in the chronic group obtained significantly higher pre-treatment scores on pain catastrophizing than participants in the subacute or early chronic groups. The latter two groups did not differ significantly from each other. Participants in the chronic group also obtained significantly higher scores on fear of movement/re-injury than participants in the subacute group.

Trajectories of change in pain and psychosocial risk factors

Figure 1 shows the changes in scores on measures of pain, perceived disability, pain catastrophizing and fear of movement/re-injury. Separate repeated measures ANOVAs were conducted for pain and each psychosocial risk factor. A two-way (group \times time) ANOVA on MPQ scores yielded significant main effects for group, $F(2, 72) = 4.8, P < .01$, and time, $F(2, 144) = 10.9, P < .001$. Percentage reductions in pain from pre-treatment to post-treatment were 25%, 14% and 0% for the subacute, early chronic and chronic groups, respectively.

A two-way (group \times time) ANOVA on perceived disability scores yielded significant main effects for group, $F(2, 72) = 3.1, P < .05$, time, $F(2, 144) = 28.1, P < .001$, and a significant group by time interaction, $F(4, 144) = 3.1, P < .01$. Tests of simple effects revealed that while the three groups did not differ significantly on pre-treatment perceived disability scores, subacute and early chronic participants

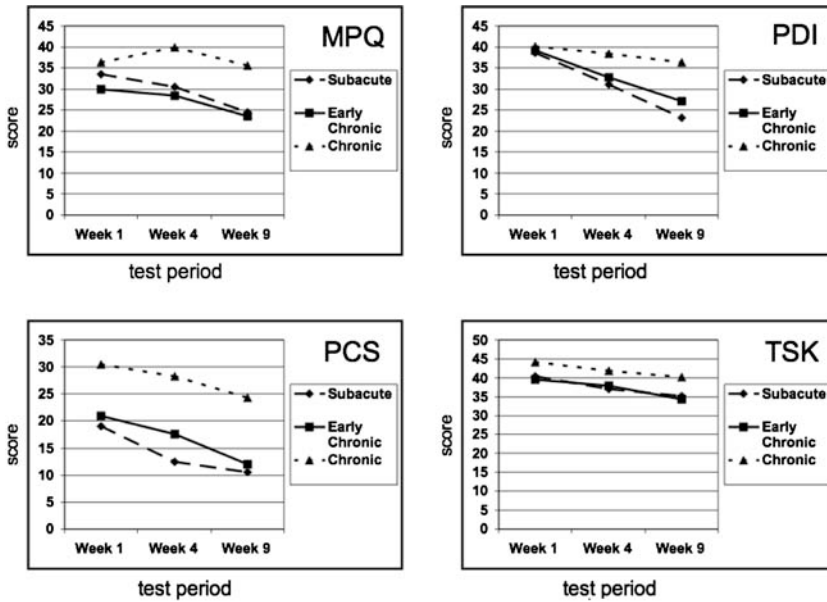


Fig. 1 Trajectories of change on measures of pain (MPQ), self-reported disability (PDI), pain catastrophizing (PCS) and fear of movement (TSK). Note: MPQ = McGill Pain Questionnaire, PDI = Pain Disability Index, PCS = Pain Catastrophizing Scale, TSK = Tampa Scale for Kinesiophobia

obtained significantly lower perceived disability scores than participants in the chronic group at mid-treatment, $P < .05$, and post-treatment assessments, $P < .001$. Percentage reductions in perceived disability from pre-treatment to post-treatment were 28%, 31% and 12% for the subacute, early chronic and chronic groups, respectively.

A two-way (group \times time) ANOVA on catastrophizing scores yielded significant main effects for group, $F(2, 72) = 21.5, P < .001$ and time, $F(2, 144) = 30.0, P < .001$. Although all groups showed reductions in catastrophizing scores through the course of treatment, the chronic group consistently scored higher than the subacute and early chronic groups at all test periods. Percentage reductions in pain catastrophizing from pre-treatment to post-treatment were 39, 39 and 10% for the subacute, early chronic and chronic groups, respectively (Table 2).

Table 2 Pre-treatment scores on pain and psychosocial risk factors

	Subacute (4–12 weeks)	Early chronic (3–6 months)	Chronic (6–18 months)	<i>P</i>
MPQ–PRI	33.4 (12.9)	29.8 (13.3)	36.4 (13.4)	.22
PDI	38.6 (12.7)	39.1 (13.5)	40.1 (11.3)	.91
PCS	19.0 (9.4)	20.1 (8.4)	30.4 (11.5)	.001
TSK	40.4 (6.5)	39.5 (5.6)	44.2 (11.3)	.04

Numbers in parentheses are standard deviations

A similar pattern was observed for fear of movement/e-injury. A two way (group \times time) ANOVA yielded main effects for group, $F(2, 72) = 4.8, P > .01$, and time, $F(2, 144) = 18.2, P < .001$. Significant reductions in scores were observed in all three groups but the chronic group obtained significantly higher scores at all three test periods. Percentage reductions in fear of movement/re-injury from pre-treatment to post-treatment were 12, 12 and 8% for the subacute, early chronic and chronic groups, respectively.

Discussion

Numerous investigations have revealed a relation between chronicity and poor treatment outcome [4, 8]. Although numerous factors have been discussed as potential explanations for this relation, systematic efforts to examine the variables that underlie this relation have been few. To our knowledge, this is the first study to provide evidence that psychosocial variables play a role in determining why chronicity might impact negatively on rehabilitation outcomes.

One of the main findings of this study was that chronicity was associated with a more severe psychosocial risk profile. Individuals who were work disabled for more than 6 months began treatment with higher scores on measures of pain catastrophizing and fear of movement/re-injury than individuals who were work disabled for less than 6 months. In previous research, pain catastrophizing and fear of movement/re-injury have been shown to be associated with heightened risk of prolonged pain and disability associated with musculoskeletal conditions [13, 21]. It has also been shown that reductions in pain catastrophizing and fear of movement/re-injury are significant determinants of return to work following rehabilitation for musculoskeletal conditions, including whiplash [8, 22].

Although all groups showed comparable reductions in pain catastrophizing and fear of movement/re-injury, at treatment termination, participants in the chronic group had significantly higher scores on the PCS and the TSK than participants in the subacute and early chronic groups. There are indications that absolute scores on measures of pain catastrophizing and fear of movement/re-injury at treatment termination might be more important determinants of return-to-work than the magnitude of treatment-related reductions on these measures [22]. If this is the case, then the present findings suggest that risk factor targeted interventions for individuals with work absence greater than 6 months might need to be longer, or more aggressive. Multi-pronged approaches that combine a variety of techniques (e.g., graded activity involvement, exposure, cognitive restructuring) might be more effective than such techniques used in isolation, particularly for individuals with more chronic conditions.

The present research also showed that chronicity was associated with more modest changes in pain severity and self-reported disability. Modest but significant reductions in pain severity were observed in the subacute and early chronic groups. No change in pain symptoms was observed in the chronic group. The program of intervention used in this study is primarily aimed at reducing pain-related disability and does not contain any techniques specifically designed to reduce pain. The pain

reductions observed in the subacute and early chronic groups might simply be a reflection of the natural history of recovery from musculoskeletal conditions [23]. It is also possible that the activity focus of the intervention might have contributed to recovery-promoting mechanisms. The absence of change in pain symptoms in the chronic group might suggest that activity mobilization does not contribute to pain reduction once chronicity has become established.

It is important to note however that pain reduction might not be a pre-requisite to successful re-integration into the workplace. Previous research on psychosocial interventions for work disability suggests that disability reduction and return to work can be achieved in the absence of significant changes in pain severity [13]. Such findings should not be interpreted as minimizing the importance of effective pain management in patients with musculoskeletal conditions. However, they do question traditionally held assumptions about the need to eradicate pain prior to promoting return to function.

Perceived disability was another variable that appeared resistant to change for participants in the chronic group. In the program of intervention used in the present study, perceived disability is targeted by progressively increasing the participant's activity involvement over the course of the treatment program. The objective is to create a reality that is inconsistent with participants' beliefs in their level of disability, thereby augmenting the probability that beliefs will change. This approach to changing disability beliefs appeared to be successful for participants in the subacute and early chronic groups, yielding reductions in perceived disability of 28 and 31%, respectively. The same treatment approach used with participants in the chronic group yielded only a 12% reduction in perceived disability scores.

Although research has supported the view that disability beliefs are significant determinants of disability associated with musculoskeletal conditions, little research has been conducted on the efficacy of different intervention techniques for changing disability beliefs [24–26]. The present findings suggest that techniques that are effective in changing disability beliefs in the early stages of chronicity might not be effective in later stages of chronicity. More research will be required on methods of changing disability beliefs in order to improve rehabilitation outcomes for individuals with more chronic conditions.

It is important to consider that the intervention program used in the present study was designed to target only three psychosocial risk factors for prolonged pain and disability; namely pain catastrophizing, fear of movement/re-injury and perceived disability. These do not represent an exhaustive list of psychosocial risk factors for pain and disability. They were chosen as targets of intervention on the basis of research highlighting their relevance to return-to-work outcomes and their amenability to change through intervention. It is possible that the treatment resistance of participants in the chronic group might be due to the presence of other psychosocial risk factors not assessed in the context of this intervention. For example, it is known that expectancies for successful rehabilitation are significant determinants of treatment outcome [27]. Individuals in the chronic group have not only been absent from work for a more extended period of time, but they have likely experienced a higher frequency of treatment failures. The experience of repeated failures might impact negatively on the participants' ability to adopt expectancies

for positive outcomes in a rehabilitation program. For these individuals, interventions aimed at modifying negative expectancies might be an important element of an intervention program. Little is currently known about methods for changing negative outcome expectancies in individuals with chronic musculoskeletal conditions.

A number of limitations of the present study deserve comment. First, the study was not intended as a clinical trial and as such, no statement can be made about the efficacy of the intervention program used. Since all participants are selected on the basis of elevated scores on risk factor measures, regression to the mean could partially account for observed reductions in risk factor scores. For results pertinent to the efficacy of the Progressive Goal Attainment Program, the reader is referred to Sullivan et al. [8]. The modest sample size also presents limitations to the statistical procedures that might have been adopted to examine in greater depth the processes contributing to differential outcomes in three groups. Finally, no information was available on work retention beyond 4 weeks post-termination, thus return to work rates must be interpreted with caution.

In spite of these limitations, this study provides preliminary findings about the nature of psychosocial factors that might underlie treatment resistance in individuals with chronic musculoskeletal conditions. The results suggest that for individuals with work absence greater than 6 months, intervention programs will need to target pain catastrophizing and fear of movement/re-injury for a longer duration or in a more aggressive fashion. Treatment outcomes for individuals with work absence greater than 6 months might be improved with more effective pain management and more effective methods of changing disability beliefs. These findings highlight the importance of providing whiplash patients with timely access to risk factor targeted interventions before these risk factors become treatment resistant. Future research addressing the differential determinants of treatment response in participants with varying levels of chronicity will be required to enhance the impact of rehabilitation interventions.

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