Psychologically Based Occupational Rehabilitation:
The Pain-Disability Prevention Program

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Abstract:
Objectives: To describe the development, implementation, and preliminary outcome of the Pain-Disability Prevention (PDP) Program. The PDP Program is a 10-week cognitive–behavioral intervention program that aims to increase daily involvement in goal-directed activity and minimize psychological barriers to activity involvement after occupational injury. Workers’ Compensation Board claimants with soft tissue injuries to the back, who were still off work 6 weeks after injury and showed evidence of at least one “yellow flag,” were offered participation in the PDP Program. Design: A single-group, prospective treatment outcome analysis. Participants: Data from the first 104 claimants who participated in the PDP Program are summarized. Results: Participation in the PDP Program was associated with a 60% success rate, where success was defined as return to work (45%) or readiness to return to work (15%). Initial scores on measures of catastrophizing, fear of movement/reinjury, and depression afforded 92% correct classification of treatment outcome. Early treatment changes in catastrophizing and fear of movement/reinjury were also predictive of treatment outcome. Conclusions: The findings suggest that a psychologically based activity mobilization program can be an effective means of yielding reductions in psychological risk factors for occupational disability. Challenges to program implementation, fidelity to protocol, and issues related to cost efficacy are discussed. Key Words: Back pain—Pain-related disability—Secondary prevention.

Over the past decade, the field of occupational rehabilitation has witnessed the development of numerous secondary prevention programs for pain-related disability.1,2 Secondary prevention programs proceed from the view that pain-related disability can be prevented if rehabilitation interventions are initiated shortly after injury. The intuitive appeal of the concept of secondary prevention led to its enthusiastic endorsement by numerous leaders in the field of occupational rehabilitation.3–5 Outcome studies, however, reveal that programs initiated to date have yielded few benefits over those that would be expected from the natural course of recovery.2

This article describes the development, implementation, and preliminary outcome of a population-based secondary prevention program for pain-related occupational injuries in Nova Scotia, Canada. The Pain-Disability Prevention (PDP) Program differs from most secondary prevention programs, with its primary focus on psychological barriers to rehabilitation progress.

Background
It has become increasingly clear that psychological and social factors are significant determinants of pain...
and disability.\textsuperscript{1,5–7} Research has shown that there are few, if any, medical status variables that can reliably distinguish between persons who return to work and those who remain disabled after occupational soft tissue injuries.\textsuperscript{5} Traditional biomedical views of pain and disability have been abandoned in favor of biopsychosocial models.\textsuperscript{5,7} Biopsychosocial models share in common the view that a complete understanding of pain experience and pain-related outcomes will require consideration of physical, psychological, and social factors.\textsuperscript{5,7–9}

The importance of psychological factors in disability has been acknowledged in the field of rehabilitation, with psychology being represented as an integral component of many tertiary care multidisciplinary pain management programs.\textsuperscript{10} The rationale behind multidisciplinary pain management is that intervention strategies from several health disciplines are required to effectively tackle the complexity of physical and psychological problems associated with chronic pain and disability. The place of psychology within these programs has been varied, ranging from treatment aimed at reducing emotional distress, reducing tension and pain, and increasing coping skills.\textsuperscript{10,11}

**Secondary prevention of pain-related disability**

Activity mobilization has been a central theme in many secondary prevention programs for occupational back injury.\textsuperscript{1,5} Whether promoted through communication from primary care physicians,\textsuperscript{12} information pamphlets,\textsuperscript{13} or through direct intervention of physical therapists,\textsuperscript{14,15} injured workers have been urged to resume their regular activities as soon as possible.\textsuperscript{5}

Although the literature supports activity mobilization as an effective means of minimizing disability associated with pain,\textsuperscript{1,4,16–18} the magnitude of treatment effects has frequently been disappointing.\textsuperscript{2,20} The treatment effects associated with information provision, back education, or exercise have been sufficiently modest to lead many clinical investigators to question whether secondary prevention programs can be cost-effective.\textsuperscript{2,21–23}

Surprisingly, psychological treatment has been underrepresented in secondary prevention programs for occupational injury. It is perhaps owing to the predominantly “physical” conceptualization of activity mobilization that psychology has not been considered an essential intervention in the early stages of disability. But the role of psychological factors, both in facilitating and impeding activity mobilization, may have been underestimated. The neglect of psychological factors in the early stages of disability may be one of the reasons underlying the modest impact of secondary prevention programs.

Activity mobilization is a form of behavior change, and one that involves a complex interplay among several psychological variables. Information-based intervention programs such as medical advice or pamphlets often proceed from an overly simplistic view of the necessary conditions of behavior change, and, consequently, their impact on behavior change is often negligible.\textsuperscript{13} Physical therapy interventions circumvent some of the limitations of information-based interventions by providing direct guidance in activity involvement. These interventions, however, proceed from the assumption that performance of the physical maneuvers comprising a therapeutic exercise regimen will contribute to increased involvement in social, recreational, or occupational activities. There are indications that psychological factors may limit positive transfer effects of physical therapy interventions.\textsuperscript{24,25}

**Rationale for the Pain-Disability Prevention Program**

When persons become unemployed owing to injury, they lose a considerable degree of structure in their daily lives.\textsuperscript{26} A consequence of this loss of structure is a significant reduction in goal-directed activities and an increase in passive sedentary activities. Given that sedentary activities such as rest or watching television are associated with minimal physical or cognitive demands, they are frequently experienced as highly rewarding.\textsuperscript{27,28} The reward value of passive sedentary activities contributes further to a downward spiral of inactivity, deconditioning, and increased disability.\textsuperscript{3,25}

Several individual difference variables have also been associated with risk of pain-related disability, the most significant being pain catastrophizing,\textsuperscript{29} fear of movement/reinjury,\textsuperscript{25} pain beliefs,\textsuperscript{30} and depression.\textsuperscript{31} These variables have been shown to contribute to pain-related disability beyond the variance accounted for by medical status variables or pain itself. It is becoming clearer that pain catastrophizing, fear of movement/reinjury, pain beliefs, and depression may be significant barriers to activity involvement. These variables may play a role in maintaining disability beyond the expected recovery time for soft tissue injury.\textsuperscript{5} Unless they are targeted directly, rehabilitation progress may be compromised.

The development of the Pain-Disability Prevention (PDP) Program proceeded from the view that successful disability prevention would entail the re-establishment of a structured activity schedule and the reduction of psychological barriers to activity. The development of the PDP Program was also predicated on the idea that a viable secondary prevention program would need to embrace a population health philosophy, allowing for timely access to service by the entire population of individuals.
who require the service. To achieve this end, a community-based model of service delivery was adopted. 32,33

The PDP Program is a standardized, manual-driven intervention program that aims to maximize activity involvement after occupational injury. 34 In the first phase of the PDP Program, psychological obstacles to progress are targeted indirectly through activity monitoring, activity prescription, and graded activity participation. In the second phase, psychological obstacles to progress are targeted directly through techniques such as thought recording, reappraisal, and cognitive restructuring. The main components of the PDP Program are summarized in Table 1. Standardized assessments are conducted at pretreatment, mid-treatment, and treatment termination sessions. Clients complete measures of pain catastrophizing, fear of movement/reinjury, and depression.

In the summer of 2001, private sector psychologists throughout Nova Scotia were invited to attend a one-day training workshop on the PDP treatment protocol. As a result, there are currently more than 50 PDP-certified clinicians distributed widely across urban and rural regions of the province. The use of community-based resources for service delivery, particularly in rural regions, maximizes accessibility of service and minimizes the inconvenience to the client participating in treatment (e.g., travel, time loss).

The objective of this article was to present preliminary data on the outcome of the first 104 Workers’ Compensation Board (WCB) claimants with pain-related disability referred to the PDP Program. The questions of interest included:

1. Can a psychology-driven, community-based, activity mobilization intervention impact in a meaningful way on the outcome of occupational back injury?
2. Do levels of depression, fear of movement/reinjury and pain catastrophizing change as a function of participation in treatment? and
3. Do changes in levels of depression, fear of movement/reinjury, and pain catastrophizing afford significant prediction of treatment outcome?

MATERIALS AND METHODS

Participants

All claimants of the WCB of Nova Scotia who were off work for 6 weeks for back injury and showed evidence of at least one “yellow flag” (e.g., previous pain-related injury, emotional distress, pain as primary limiting factor to return-to-work), 35 were offered participation in the PDP Program. The study sample consisted of 104 participants (31 women, 73 men). All participants had sustained soft tissue injuries to the back in an occupational incident and were off work at the time of referral to the PDP Program. The mean age of the sample was 42.2 years (range, 17–55 years). The mean time off work at the time of the first treatment session was 18.3 weeks (range, 6–50 weeks).

Procedure

Case workers screened WCB files and offered participation to claimants who met the inclusion criteria. If the claimant agreed to participate, he or she received a copy of the PDP Client Workbook and the PDP Information Video. The claimant’s family physician also received a copy of the PDP Information Video to familiarize the physician with the program, and to ensure that there were no medical contraindications to participation in an activity mobilization intervention.

Claimants were asked to review the video before their first session. Claimants were scheduled to attend 10 weekly sessions and were asked to keep a log of daily

TABLE 1. Main components of the Pain-Disability Prevention Program

| Maintaining an activity log |
| Activity scheduling |
| The walking program |
| Increasing activity involvement |
| Overcoming psychological obstacles to activity involvement |


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activities throughout the program. Clinicians conducted weekly sessions according to guidelines in the PDP Treatment Manual. Assessments were completed on three separate occasions: weeks 1, 4, and 10.

**Process measures**

*Catastrophizing*

The Pain Catastrophizing Scale (PCS) is a 13-item questionnaire that assesses fear of movement related to pain. The PCS has been shown to be internally reliable (coefficient $\alpha = 0.87$) and to be associated with heightened pain, self-reported disability, and employment status.

*Fear of movement/reinjury*

The Tampa Scale for Kinesophobia (TSK) is a 17-item questionnaire that assesses fear of (re)injury due to movement. The TSK has been shown to be internally reliable (coefficient $\alpha = 0.77$) and to be associated with various indices of behavioral avoidance and self-reported disability.

*Depression*

The Beck Depression Inventory II (BDI-II) is a commonly used self-report measure of depression. The BDI-II has been shown to be a reliable (coefficient $\alpha = 0.84$) and valid index of depressive symptoms in chronic pain patients and primary care medical patients.

**Primary outcome variable**

Return-to-work was the primary outcome variable, on the basis of which participants were classified as treatment successes or treatment failures. Treatment success was defined as return to work or readiness to return to work at termination of the treatment program. Persons who returned to work yet discontinued treatment before completion of the program ($n = 6$) were also classified as treatment successes. Those who did not return to work and indicated they were not ready to return to work after program termination were considered treatment failures. Persons who discontinued the program owing to medical complications ($n = 5$), lack of interest ($n = 2$), nonadherence ($n = 5$), or illiteracy ($n = 4$) were also classified as treatment failures. At the time of this writing, follow-up data were not available.

**RESULTS**

*Outcome measures*

At termination of treatment, 45% of participants had returned to their preinjury employment. An additional 15% of individuals had contacted their employer to initiate return-to-work. The remaining 40% of individuals reported that they were still unable to return to work at the termination of treatment. Age was related to treatment outcome, $t(102) = 2.0, P < 0.05$, where treatment successes ($M = 40.6, SD = 10.6$) were significantly younger than treatment failures ($M = 44.5, SD = 6.0$). Time since injury was related to treatment outcome, $t(102) = 2.0, P < 0.05$, where treatment successes ($M = 16.3$ weeks, $SD = 10.4$) had been off work for a shorter period of time than treatment failures ($M = 21.0$ weeks, $SD = 12.4$).

**Process measures**

Changes in process measures are presented in Table 2 for the subsample of 80 claimants for whom complete data were available at all three assessment points. Test results were converted to percentile scores to simplify cross-measure comparisons. Percentile scores were derived from norms gathered from similar work-injured populations.

A two-way (measures x time) analysis of variance revealed significant reductions in depression, fear of movement/reinjury and pain catastrophizing over the course of treatment ($F_{2,158} = 34.9, P < 0.001$). A significant main effect for measures was also obtained ($F_{2,158} = 21.3, P < 0.001$), where depression scores were greater (relative to the normative population) than scores on pain catastrophizing and fear of movement/reinjury.

**Predictors of outcome**

The predictive value of initial and changes scores on psychological measures were examined in the subsample of 80 claimants for whom complete data were available at all three assessment points. A stepwise discriminant function analysis was conducted to examine whether initial scores on psychological measures predicted treatment outcome. All three variables met minimal criterion ($P < 0.05$) for entry into the analysis. The PCS entered in the first step of the analysis ($Wilks \lambda = 0.63, F_{1,78} = 34.5, P < 0.001$), followed by the BDI-II ($Wilks \lambda = 0.56, F_{2,77} = 22.4, P < 0.001$), and the TSK ($Wilks \lambda = 0.51, F_{5,76} = 18.0, P < 0.001$). Classification analysis, using group size as prior probability, revealed that the discriminant function afforded 92% correct prediction of treatment outcome.

A separate stepwise hierarchical discriminant analysis was conducted to determine whether early changes in psychological variables predicted treatment outcome. Changes in pain catastrophizing, fear of movement/reinjury, and depression over the first 4 weeks of treatment were used as predictors. The TSK$_{change}$ entered in the first step of the analysis ($Wilks \lambda = 0.92, F_{1,78} = 4.5, P < 0.01$), followed by the PCS$_{change}$ ($Wilks \lambda = 0.79, F_{2,77} = 6.8, P < 0.01$). The BDI-II$_{change}$ did not meet minimal criterion for entry in the analysis. Classification analysis revealed 82% correct classification of treatment outcome.
A three-way (measures × time × treatment outcome) mixed analysis of variance was performed to examine further treatment-related changes as a function of treatment outcome. This analysis yielded significant time and measures main effects ($F_{1,79} = 13.2, P < 0.001$; and $F_{2,158} = 22.8, P < 0.001$). Of particular interest were the significant main effect for treatment outcome ($F_{1,79} = 20.1, P < 0.001$) and the three-way interaction ($F_{2,158} = 2.7, P < 0.05$). As shown in Figure 1, initial values on dependent measures, and treatment-related changes varied as a function of treatment outcome. Specifically, values on dependent measures were significantly higher for treatment failures, even at pretreatment assessment. Additionally, significant reductions in fear of movement/reinjury, and depression were observed only in the group of individuals who were classified as treatment successes. In other words, high scores on measures of fear of movement/reinjury, and depression at pretreatment assessment were associated with treatment resistance and the persistence of pain-related disability.

**TABLE 2. Treatment-related changes in process measures**

<table>
<thead>
<tr>
<th>Assessment period</th>
<th>Pretreatment</th>
<th>Midtreatment</th>
<th>Termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCS</td>
<td>51.2 (22.5)</td>
<td>40.1 (28.3)</td>
<td>33.5 (29.8)</td>
</tr>
<tr>
<td>TSK</td>
<td>49.4 (20.7)</td>
<td>36.7 (26.5)</td>
<td>33.3 (25.2)</td>
</tr>
<tr>
<td>BDI-II</td>
<td>63.7 (27.3)</td>
<td>58.4 (32.3)</td>
<td>49.6 (34.1)</td>
</tr>
</tbody>
</table>

$N = 80$. Values are percentile scores; numbers in parentheses are standard deviations.

PCS, Pain Catastrophizing Scale; TSK, Tampa Scale for Kinesiophobia; BDI-II, Beck Depression Inventory II.

**DISCUSSION**

Before addressing questions of the efficacy of a community-based treatment program, two conditions must be met: (1) treatment implementation must be feasible and (2) treatment format and content must be acceptable to the consumer population.32,33 These were two areas of concern when the PDP Program was launched. Several colleagues questioned the feasibility of coordinating the activities of a group of private sector psychologists, and many others were concerned that a psychological intervention for occupational injury would not be well received. The experience of the PDP Program to date indicates that it is possible to establish a coordinated province-wide network of clinicians for community-based service provision. The program results also suggest that a psychological treatment program is acceptable to the majority of injured workers to whom it is offered. Only 7% of individuals enrolled in the program discontinued owing to lack of interest or nonadherence.
To have a potential impact on the population pain-disability problem, it is necessary to establish a mechanism whereby all candidates for treatment are able to access treatment in a timely fashion.45,46

Tertiary care institutions are not well suited for addressing population health problems due to accessibility (e.g., location, wait lists) and cost issues.45 In the development of the PDP Program, the decision was made to tap into the existing private psychological service sector, which was widely distributed across the province. By using existing community resources for service delivery, there were minimal infrastructure costs associated with launching or maintaining the program. The community-based approach ensured that service access was maximized while keeping service delivery costs at a minimum.

One of the challenges to assessing the impact of community-based intervention programs is ensuring adequate fidelity to the treatment protocol. Although clinicians can be trained to deliver a structured intervention, there is little assurance that the content of treatment sessions will be consistent with treatment manual guidelines. Several strategies were used to maximize the consistency of treatment delivery in the PDP Program. First, all claimants were provided with the PDP Information Video. The PDP Information Video features interviews with medical and rehabilitation experts on the factors that contribute to successful recovery from occupational injury. The information content emphasizes the benign nature of most soft tissue injuries, the importance of activity involvement, the dangers of liberal use of analgesics, and briefly describes the goals of the PDP Program. The video was initially conceived as a vehicle for providing important medical and rehabilitation information that is difficult to communicate effectively within the time constraints of typical physician visits. The video format is more engaging than text-based media and ensures that the same medical and rehabilitation information is provided to all participants.

The PDP Client Workbook also serves to increase the probability of fidelity to treatment protocol. The daily recording format is sufficiently structured to maintain consistency in treatment direction, but sufficiently open to accommodate varying pace of treatment progression. Although the PDP Client Workbook was not intended as a self-help book, it contains detailed information on the basics of activity planning, structured scheduling, and strategies for overcoming barriers to activity involvement. The PDP Client Workbook also provides the client with a summary of the central themes of the treatment sessions.

The results of the present research join a growing literature suggesting that psychological interventions can play an important role in minimizing disability due to pain.13,47 Analyses revealed that a psychologically based activity mobilization program can have a meaningful impact on return-to-work after occupational back injury. Approximately half the participants in the PDP Program returned to work by the end of the 10-week program. An additional 15% of individuals had indicated that they had contacted (or were ready to contact) their employer to initiate return-to-work.

The absence of a comparison group limits the nature of conclusions that can be drawn from the treatment outcome results. The precise magnitude of treatment-specific effects can only be addressed within the context of a randomized clinical trial. Nevertheless, the presence of yellow flags and an average off-work duration of 18 weeks suggest that the population under study was at high risk for prolonged disability. Comparison of the present results to a similar sample of claimants for a 10-week period before the implementation of the PDP program showed an 18% return-to-work rate. As such, the return-to-work rate associated with participation in the PDP Program would be considered very promising.

Participation in the PDP Program was also associated with significant reductions in known psychological risk factors for pain-related disability. Over the course of treatment, levels of pain catastrophizing, fear or movement/reinjury, and depression decreased significantly. These data suggest that a psychologically based activity mobilization program can be an effective means of yielding reductions in psychological risk factors for occupational disability.

Findings revealed that treatment outcome varied as function of initial values on psychological measures. The results of a discriminant function analysis showed that 92% of treatment successes and failures could be predicted on the basis of initial values on measures of catastrophizing, fear of movement/reinjury, and depression. In addition, examination of treatment changes in the first four weeks of treatment indicated that individuals with initial high scores on fear of movement/reinjury and depression did not show significant reduction in scores and were more likely to remain off work at termination of treatment.

The PDP Program is structured such that psychological barriers to rehabilitation are targeted only indirectly in the first phase of treatment through increasing activity involvement. Techniques directly targeting psychological barriers to rehabilitation progress such as cognitive restructuring or reappraisal are introduced only in the second phase of treatment. A primarily behavioral approach to activity mobilization may be sufficient to decrease levels of depression, fear of movement/reinjury, and pain catastrophizing for persons whose initial scores
on these measures are in the moderate range. For persons with initial high scores on these measures, more direct focus on psychological barriers may be required early in treatment to effect positive treatment outcome.

In summary, preliminary results on the implementation of the PDP Program indicate that it is feasible to establish a province-wide network of psychologists to deliver a standardized activity mobilization intervention for injured workers. Experience also suggests that the majority of injured workers considered as candidates for the program are willing to participate in psychological treatment. The findings indicate promising return-to-work rates for a population at high risk for prolonged disability. Questions concerning the magnitude of treatment-specific effects, the maintenance of treatment gains, and client suitability for treatment await further study. The adoption of a psychology-driven, community-based model of secondary prevention for pain-related disability may prove to be a cost-effective approach to the management of one of the most costly population health problems currently facing North American society.

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