Expectancies Mediate the Relations Among Pain Catastrophizing, Fear of Movement, and Return to Work Outcomes After Whiplash Injury

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Abstract: Pain catastrophizing and fear of movement have been identified as key predictors of prolonged work disability after whiplash injury. However, little is known about the processes by which pain catastrophizing and fear of movement affect return to work. This study investigated the mediating role of expectancies on the relations between pain catastrophizing and return to work, and between fear of movement and return to work after whiplash injury. The study sample consisted of 154 individuals with whiplash injury who were enrolled in a multidisciplinary pain rehabilitation program. Participants completed measures of pain catastrophizing, fear of movement, and return-to-work expectancies after admission to a rehabilitation program. A follow-up telephone interview was used to assess work status 1 year after discharge. Consistent with previous research, analyses revealed that expectancies, pain catastrophizing, and fear of movement were significant predictors of return to work at 1-year follow-up. Regression analyses (bootstrapping) revealed that expectancies partially mediated the relation between catastrophizing and return to work. Expectancies completely mediated the relation between fear of movement and return to work. The significant predictive and mediating role of expectancies on return to work argues for the inclusion of expectancies as a specific target of intervention for individuals with whiplash injury.

Perspective: The findings suggest that expectancies might be part of the pathways by which pain catastrophizing and fear of movement affect return-to-work outcomes after whiplash injury. The findings argue for greater attention to return-to-work expectancies as a risk factor for problematic recovery outcomes as well as a target of intervention.

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Key words: Catastrophizing, fear of pain, expectancies, return to work, whiplash.

Whiplash-associated disorders (WAD) are the most common injury associated with rear end collision motor vehicle accidents. WADs account for 80% of accident-related soft tissue injuries. Epidemiologic studies indicate that the recovery trajectory after WAD can be prolonged, with as many as 50% of individuals reporting symptoms of neck pain 1 year after injury. As a function of persistent debilitating symptoms, 15 to 25% of individuals who sustain a WAD remain permanently disabled. Pain catastrophizing and fear of movement have been associated with problematic recovery outcomes after WAD. Pain catastrophizing has been defined as an exaggerated negative orientation to an actual or anticipated painful experience. Pain catastrophizing has been shown to predict greater disability in individuals with WADs, even when controlling for pain severity. Several studies have also shown that high levels of catastrophizing in individuals with WADs are associated with poorer response to rehabilitation interventions. Fear of movement refers to the avoidance of movement based on fear and has also been associated with problematic recovery after WAD. Prospective studies have shown that high scores on measures of fear of movement...
impede progress and recovery through the course of rehabilitation interventions.

Recent studies have pointed to the important role of expectancies as determinants of recovery trajectories after WAD. Holm et al. found a 4-fold increase in disability in individuals with WADs who did not expect to fully recover, compared with those who did expect to fully recover. Gehrt et al. reported that patients with WADs who did not expect to return to work in 6 weeks had 3-fold greater odds of being work disabled at 1-year follow-up than did those who expected to return to work.

There is a basis for proposing that expectancies might be the vehicle through which pain catastrophizing and fear of movement influence return-to-work (RTW) outcomes in individuals with WADs. For example, it has been suggested that high catastrophizers may possess pain schema consisting of negative cognitions regarding pain experiences, pain beliefs, and ability to cope with pain. Once activated, the pain schema of high catastrophizers are said to contribute to the development of negative expectancies about pain-related outcomes. Fear-avoidance models of pain and disability also suggest that fear can contribute to the emergence of negative expectancies, which may in turn contribute to avoidance of activity. Several investigations have shown that pain catastrophizing and fear of movement are correlated with various types of expectancies, such as pain expectancies, injury expectancies, and work-related expectancies.

There are important clinical implications to the study of mediational relations among psychological predictors of RTW outcomes in individuals with WADs. Identification of the key processes by which psychological factors affect RTW outcomes would permit streamlining assessment protocols to focus on variables with the highest predictive value. In addition, research examining the processes by which psychological variables affect RTW outcomes might help identify key targets for psychosocial interventions designed to improve recovery trajectories after WAD.

In the present study, individuals with WADs completed measures of pain, catastrophizing, and fear of movement within 1 week of their admission to a rehabilitation program. RTW status was assessed 1 year after treatment termination. Pearson correlations, t-tests, and regression analyses were conducted to assess the role of expectancies as mediators of the relations among pain-related psychological variables (ie, catastrophizing, fear of movement) and RTW status at 1-year follow-up.

Method

Participants
The study sample consisted of 198 consecutive referrals recruited from 6 physiotherapy clinics. Participants were considered eligible if they had a primary diagnosis of WAD and were currently work disabled. All participants had been employed before their injury and were receiving salary indemnity through a no-fault provincial insurance system (Société de l’assurance automobile du Québec). Of the 198 individuals who met the inclusion criteria, only 154 were successfully contacted for follow-up interview. The final sample consisted of 154 participants (81 men and 73 women). The age of the participants ranged from 20 to 60 years (mean = 36.4 years, standard deviation [SD] = 9.2 years). The mean duration of work disability at the time of enrolment was 15.30 weeks (SD = 9.64 weeks).

Procedure
Participants were enrolled in a standardized 7-week multidisciplinary rehabilitation program. The intervention team consisted of a physiotherapist, an occupational therapist, and a psychologist. The interventions within the multidisciplinary program included exercise, education, and instruction in self-management skills. The exercise intervention was individually tailored to participants’ needs, whereas the education and instruction in self-management intervention were offered in a standardized group format. Potential participants received a letter describing the study procedures, and those who were interested were asked to contact a clinic coordinator. Participants were invited to sign a consent form as a condition for participating in the study. Participants provided demographic information and completed self-report measures of pain severity, pain catastrophizing, fear of movement, and RTW expectancies. Participants were contacted by telephone 1 year after program completion and asked to rate their current pain severity and to report their current RTW status. The research program was approved by the research ethics committees of the Centre de recherche interdisciplinaire en réadaptation du Montréal métropolitain. Participants were compensated $25 for completing the questionnaires.

Measures

Pain Severity and Distribution
The Pain Rating Index of the McGill Pain Questionnaire (MPQ-PRI) was used as a measure of pain. The MPQ-PRI is a weighted index of pain adjectives that were endorsed by the participant. Scores on the MPQ-PRI range from 0 to 78, with higher scores reflecting more severe pain. The MPQ-PRI has been shown to be a reliable and valid index of an individual’s pain experience. Participants completed a body drawing to indicate the distribution of their pain symptoms. The number of painful body sites was also recorded.

Pain Catastrophizing
The Pain Catastrophizing Scale (PCS) was used as a measure of catastrophic thinking related to pain. The PCS is a 13-item questionnaire that describes different thoughts and feelings that individuals may experience when they are in pain. The PCS yields a total score that ranges from 0 to 52, with high scores indicating higher levels of catastrophizing. Research indicates
that the PCS has high internal consistency (coefficient $\alpha = .87$)\(^{35}\) and is associated with heightened pain severity and reduced likelihood of returning to work.

**Fear of Movement**

The Tampa Scale for Kinesiophobia (TSK) was used as a measure of pain-related fear of movement.\(^{31}\) The TSK is a 17-item questionnaire that contains statements reflecting worries or concerns about the consequences of participating in physical activity. Scores range from 17 to 68, with higher scores indicating a higher degree of fear of movement. The TSK has been shown to be internally consistent (coefficient $\alpha = .77$)\(^{69}\) and to be associated with behavioral avoidance and disability.\(^{16,58}\)

**RTW Expectancies**

Participants were asked to rate the likelihood that they would resume some form of employment over the next month (“How likely is it that within the next month you will have resumed some form of employment?”). Participants indicated their responses on a scale with the end points (0%) “not at all likely” to (100%) “extremely likely”.

**Demographic Information and Follow-Up Interview**

Participants provided information regarding their age, marital status, level of education, duration of work disability, and employment. At the 1-year follow-up interview, participants were asked if they had returned to work, whether they had been able to maintain employment, and about the type of employment in which they were currently involved. Participants were classified as having successfully returned to work if they had returned to work after their injury and maintained work at 1-year follow-up.

**Approach to Data Analysis**

Means and SDs were computed on the sample characteristics and variables related to the study hypotheses. Initial analyses were conducted to compare participants who were and were not successfully contacted for the follow-up interview. The results of the analyses revealed that the groups did not differ significantly on any of the study variables. t-Tests for independent samples were used to compare women and men on study measures. Pearson correlations and t-tests were conducted to assess the relationship of the key study variables (pain catastrophizing, fear of movement, expectancies, and RTW status). To assess the mediating role of expectancies, a series of regression analyses were conducted following Preacher and Hayes’ bootstrapping methodology for testing indirect effects.\(^{42,43}\)

The mediation hypotheses of this study proposed that the pathway between pain catastrophizing and RTW, and the pathway between fear of movement and RTW, would be mediated by expectancies. To test the mediational hypotheses, the following relations were examined (Fig 1): 1) the relation between the predictors (ie, pain catastrophizing and fear of movement) on the proposed mediator (expectancies; path a); 2) the relation between the proposed mediator (ie, expectancies) on the outcome (ie, RTW status) while controlling for the predictors (ie, pain catastrophizing and fear of movement; path b in Fig 1); 3) the total effect of the predictors (ie, pain catastrophizing and fear of movement) on the outcome (ie, RTW status; path c); and 4) the direct effect of the predictors (ie, pain catastrophizing and fear of movement) on the outcome (ie, RTW status) after controlling for the proposed mediator (ie, expectancies; path c'). The mediation analyses controlled for age, sex, duration of disability, and number of injury sites. Sobel mediation tests were used to determine whether the indirect effect of the predictors on the outcome, through the proposed mediator, was significant.\(^{47}\) In the current study, the bootstrapping procedure was used to produce 95% confidence intervals (CIs) of the indirect effects obtained with 5,000 bootstrap resamples.\(^{44}\) Bootstrapping is a nonparametric resampling technique used to estimate indirect effects without the requirement of distributional assumptions.\(^{42}\) In bootstrapping, the indirect effect is significantly different from 0 at $P < .05$ (2-tailed) if 0 is not within the 95% CIs. The 95% bias-corrected and accelerated CIs are considered the most stringent test for computing indirect effects. All variables were standardized before performing any statistical analysis. Data analysis was performed using SPSS version 21.0 (IBM, Armonk, NY).

**Results**

**Sample Characteristics**

Demographic information and mean scores on measures of pain, pain catastrophizing, fear of movement, and expectancies are presented in Table 1. The mean scores on pain catastrophizing, fear of movement, and expectancies were comparable (within 1 SD) with those reported in previous research.\(^{3,9,51}\) Women had significantly higher RTW expectancies than men ($t(152) = 3.0, P = .003$). Men and women did not differ significantly with respect to pain catastrophizing ($t(152) = .35, P = .772$), fear of movement ($t(152) = -.98, P = .329$), pain severity ($t(152) = -.51, P = .610$), or duration of disability at the time of enrolment ($t(152) = -.065, P = .948$). At 1-year follow-up, 63% of men and 70% of women had returned to work ($\chi^2 = .817, P = .366$). Most (90%) participants who returned to work returned to their preinjury employment.
As shown in Table 2, correlational analyses among continuous variables revealed a significant positive relationship between pain catastrophizing and fear of movement. Results also showed that expectancies were significantly negatively correlated with both pain catastrophizing and fear of movement. t-Tests were used to examine the relationship between the binary variable (RTW status) and the key study variables (pain catastrophizing, fear of movement, and expectancies). As presented in Table 3, results showed that lower scores on pain catastrophizing and fear of movement, and higher scores on expectancies, were associated with successful RTW.

**Mediation Analyses**

Multiple regression analyses were conducted to assess the first 3 components of the proposed mediation models. All paths within the model (Fig 2) were significant; a negative relationship was found between pain catastrophizing and expectancies and between fear of movement and expectancies (path c), and expectancies had a positive association with RTW status (path b). Both pain catastrophizing and fear of movement were negatively associated with RTW status, indicating that as levels of pain catastrophizing and fear of movement increased, successful RTW was less likely (path c).

The results of the first mediation analysis confirmed the mediating role of RTW expectancy interactions on the relation between pain catastrophizing and RTW status at follow-up ($\beta = -.53; \text{CI} = -.86 \text{to} -.23$). In addition, the results indicated that the direct effect of pain catastrophizing on RTW status at follow-up remained significant ($\beta = -.74, t(254) = -2.92, P = .004$ (path c)) when controlling for RTW expectancy interactions, suggesting partial mediation. The Sobel test of mediation effect (path c) was significant for the mediation of pain catastrophizing ($z = -3.50, P < .001$), and Nagelkerke pseudo $R^2$ indicated that the final model accounted for approximately 43.8% of the total variance.

The results of the second mediation analysis confirmed the mediating role of RTW expectancy interactions on the relation between fear of movement and RTW status at follow-up ($\beta = -.39; \text{CI} = -.64 \text{to} -.11$). Results indicated that the direct effect of fear of movement on RTW status at follow-up became nonsignificant

As shown in Table 2, correlational analyses among continuous variables revealed a significant positive relationship between pain catastrophizing and fear of movement. Results also showed that expectancies were significantly negatively correlated with both pain catastrophizing and fear of movement. t-Tests were used to examine the relationship between the binary variable (RTW status) and the key study variables (pain catastrophizing, fear of movement, and expectancies). As presented in Table 3, results showed that lower scores on pain catastrophizing and fear of movement, and higher scores on expectancies, were associated with successful RTW.

**Table 1. Sample Characteristics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%) or Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain intensity</td>
<td>15.18 (12.08)</td>
</tr>
<tr>
<td>Successful RTW</td>
<td>102 (66.2%)</td>
</tr>
<tr>
<td>Work disability (wk)</td>
<td>15.30 (9.64)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>15 (9.7%)</td>
</tr>
<tr>
<td>High school</td>
<td>45 (29.2%)</td>
</tr>
<tr>
<td>Trade school</td>
<td>25 (16.2%)</td>
</tr>
<tr>
<td>College</td>
<td>44 (28.6%)</td>
</tr>
<tr>
<td>University</td>
<td>25 (16.2%)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
</tr>
<tr>
<td>Laborer</td>
<td>43 (27.9%)</td>
</tr>
<tr>
<td>Driver</td>
<td>10 (6.5%)</td>
</tr>
<tr>
<td>Nursing</td>
<td>31 (20.1%)</td>
</tr>
<tr>
<td>Trade</td>
<td>26 (16.9%)</td>
</tr>
<tr>
<td>Sales</td>
<td>7 (4.5%)</td>
</tr>
<tr>
<td>Administrative/clerical</td>
<td>37 (24.0%)</td>
</tr>
<tr>
<td>Injury site</td>
<td></td>
</tr>
<tr>
<td>Back</td>
<td>126 (81.8%)</td>
</tr>
<tr>
<td>Neck</td>
<td>121 (78.6%)</td>
</tr>
<tr>
<td>Upper extremity</td>
<td>89 (57.8%)</td>
</tr>
<tr>
<td>Lower extremity</td>
<td>31 (20.1%)</td>
</tr>
<tr>
<td>Pain catastrophizing</td>
<td>14.27 (10.77)</td>
</tr>
<tr>
<td>Fear of movement</td>
<td>39.40 (7.29)</td>
</tr>
<tr>
<td>RTW expectancies</td>
<td>75.81 (29.46)</td>
</tr>
</tbody>
</table>

NOTE. N = 154. Work disability = duration of work disability; injury site categories are not mutually exclusive.

As shown in Table 2, correlational analyses among continuous variables revealed a significant positive relationship between pain catastrophizing and fear of movement. Results also showed that expectancies were significantly negatively correlated with both pain catastrophizing and fear of movement. t-Tests were used to examine the relationship between the binary variable (RTW status) and the key study variables (pain catastrophizing, fear of movement, and expectancies). As presented in Table 3, results showed that lower scores on pain catastrophizing and fear of movement, and higher scores on expectancies, were associated with successful RTW.

**Table 2. Correlations Among Pain Catastrophizing, Fear of Movement, and Expectancies**

<table>
<thead>
<tr>
<th>Scales</th>
<th>Pain Catastrophizing</th>
<th>Fear of Movement</th>
<th>Expectancies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain catastrophizing</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Fear of movement</td>
<td>$.481*$</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Expectancies</td>
<td>$.489*$</td>
<td>$.303*$</td>
<td>—</td>
</tr>
</tbody>
</table>

*P < .001.

**Table 3. t-Test Results Comparing Pain Catastrophizing, Fear of Movement and Expectancies on RTW Status**

<table>
<thead>
<tr>
<th>Scales</th>
<th>RTW M (SD)</th>
<th>Non-RTW M (SD)</th>
<th>T-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain catastrophizing</td>
<td>10.64 (8.91)</td>
<td>21.40 (10.62)</td>
<td>6.63*</td>
</tr>
<tr>
<td>Fear of movement</td>
<td>38.09 (7.41)</td>
<td>41.96 (6.37)</td>
<td>3.38*</td>
</tr>
<tr>
<td>Expectancies</td>
<td>85.98 (20.60)</td>
<td>31.99 (31.99)</td>
<td>7.76*</td>
</tr>
</tbody>
</table>

*P < .001, degrees of freedom = 152.

**Figure 2. Mediation models of pain catastrophizing and fear of movement on RTW by expectancies (N = 154).**
Nagelkerke pseudo expectancies lead to activity avoidance.\textsuperscript{33,69,70} The in the exacerbation of symptoms; in turn, these individuals to expect that physical activity will result WADs. Fear-avoidance models predict that fear leads movement affects RTW outcomes in individuals with tancies might be the vehicle through which fear of movement affects disability after total knee arthroplasty. Another study\textsuperscript{56} showed that expectancies mediated the relation between catastrophizing and pain disability after total knee arthroplasty. The emerging body of literature is consistent in showing that fear of movement affects disability through its influence on expectancies.

The findings of the present study showed that RTW expectancies partially mediated the relation between pain catastrophizing and RTW status. To our knowledge, no previous study has examined the mediating role of expectancies on the relation between catastrophizing and RTW in individuals with WAD. However, studies have examined the mediating role of expectancies in the relation between catastrophizing and other pain-related outcomes. For example, Sullivan et al\textsuperscript{48} reported that expectancies partially mediated the relation between pain catastrophizing and disability after total knee arthroplasty.

### Identification of the Cut-Off Score for RTW Expectancies Scores

A receiver operating characteristic analysis was conducted to identify the expectancy cut-off score that best associated with successful RTW at 1-year follow-up. The area under the curve was significant and indicated that 80.2% of the time, individuals who had not returned to work had obtained an expectancy score lower than 77.5%. Participants with expectancy scores equal to or greater than 77.5% were classified in the high expectancy group, whereas participants with scores less than 77.5% were classified in the low expectancy group. The sensitivity was .745, the specificity was .712, and the mean predictive value (specificity + sensitivity)/2 for predicting RTW status at follow-up was .729. The results were similar to those reported by Carriere et al\textsuperscript{12} in a sample of individuals with work-related musculoskeletal injuries.

### Discussion

This study joins a growing literature pointing to the important role of psychological factors in the prediction of recovery and rehabilitation trajectories after WAD.\textsuperscript{5,9,51} We replicated previous research showing that psychological variables such as pain catastrophizing and fear of movement are significant predictors of RTW in individuals with WADs.\textsuperscript{6,57,61} Our findings are also consistent with previous research showing that expectancies significantly predict RTW after WAD. The findings extend previous research in showing that expectancies partially mediate the relation between pain catastrophizing and RTW and fully mediate the relation between fear of movement and RTW. An expectancy cut-off score of 77.5% best distinguished those who had successfully returned to work at 1-year follow-up.

The findings of the present study suggest that expectancies might be the vehicle through which fear of movement affects RTW outcomes in individuals with WADs. Fear-avoidance models predict that fear leads individuals to expect that physical activity will result in the exacerbation of symptoms; in turn, these expectancies lead to activity avoidance.\textsuperscript{13,69,70} The mediating role of expectancies on the relation between fear of movement and RTW outcomes has not yet been investigated in individuals with WADs. However, several investigations have addressed the predictions of the fear-avoidance models using measures of self-efficacy, which may be considered a proxy for expectancies.\textsuperscript{1,11,19} Self-efficacy has been defined as the degree of confidence that an individual has about ability to execute a particular behavior to achieve desired outcomes.\textsuperscript{52} It has been suggested that self-efficacy beliefs and expectations lead to outcome expectancies and influence behavior.\textsuperscript{3,52} Soderlund et al\textsuperscript{48} found that self-efficacy fully mediated the relation between fear of movement and pain-related disability in individuals with WADs. Similarly, Woby et al\textsuperscript{72} also found that self-efficacy fully mediated the relation between fear and pain-related disability in individuals with low back pain. The emerging body of literature is consistent in showing that fear of movement affects disability through its influence on expectancies.

In the present study, catastrophizing remained a significant predictor of RTW outcomes, even when controlling for expectancies. These findings suggest that catastrophizing might also affect RTW outcomes through processes that are unrelated to expectancies. In previous research, catastrophizing has been shown to be associated with disability-relevant variables, such as heightened pain behaviors,\textsuperscript{62} pain intensity,\textsuperscript{46} increased analgesic use,\textsuperscript{11} and misuse,\textsuperscript{35} longer hospital stays,\textsuperscript{27} and prolonged bed rest.\textsuperscript{67} These factors, potentially triggered by high catastrophizing, might affect RTW outcomes, independent of their influence on expectancies.

Little is known about how RTW expectancies develop in work-disabled individuals who have sustained whiplash injuries. Conceptual models\textsuperscript{2,29} addressing the ontology and influence of expectancies have distinguished between response expectancies and behavioral outcome expectancies. Response expectancies refer to predictions about the probability of occurrence of nonvolitional responses such as pain, sleep, and emotional reactions.\textsuperscript{29} Although nonvolitional responses are considered to occur automatically, the expectation of their occurrence can have a significant impact on experience.\textsuperscript{29,30} Recent theorizing suggests that response expectancies might be inextricably linked to emotions such as anxiety or fear.\textsuperscript{26} For individuals with high pain-related fears, response expectancies for increased pain or injury exacerbation might be automatically elicited after exposure to a fear-relevant stimulus.\textsuperscript{65}
Behavioral outcome expectancies are distinguished from response expectancies in that they involve responses that are under volitional control. In the present study, participants’ predictions about their future resumption of occupational activities would be considered behavioral outcome expectancies. The results of a qualitative study by Stewart et al52 suggest that RTW expectancies might be constructed on the basis of work-disabled individuals’ perceived lack of control over the RTW process, concerns about the inability to perform occupational tasks, perceived lack of workplace accommodations, lack of recognition of the impact of injury, and fear of movement and reinjury. If fear plays a central role in emergence of RTW expectancies, and if expectancies for increased pain are inextricably linked to fear, this might explain why the relation between fear of movement and RTW was completely mediated by expectancies. Given the consistency with which RTW expectancies have been shown to predict RTW outcomes, more research is needed to clarify how RTW expectancies emerge and how they relate to other domains of expectancies that are linked to emotions such as anxiety and fear.45

Bandura2,4 has suggested that expectancies affect behavior by interfering with the investment of effort and motivation required to achieve an outcome. Low expectancies might also diminish an individual’s persistence or efforts toward goal pursuits.32 In individuals with WAD, negative expectancies might lead to reduced motivation for participating in rehabilitation interventions. Low motivation consequent to negative expectancies could also take the form of noncompliance, nonadherence, or missed appointments for treatments intended to promote recovery. In addition, clients’ verbalizations of negative expectancies might have a negative impact on the quality of the working alliance with the treating clinician.

Clinical investigators3,21,26,39,40 have suggested that expectancies should be a target of intervention in individuals with WADs. No research has been conducted addressing the most effective means of changing negative RTW expectancies. The results of the present study suggest that intervention techniques designed to reduce catastrophic thinking and fear of movement might be effective in modifying RTW expectancies.

Experience-based and informational techniques have also been discussed as potentially useful techniques for changing expectancies.12,52 Vlaeyen et al68 have suggested that patients may learn to alter their expectancies of pain through graded exposure. Others7,13 have suggested that early educational interventions that include reassurance and encouragement to resume activity may be beneficial in changing RTW expectancies. To advance clinical practice in this area, more research is needed on the effectiveness of interventions aimed at modifying RTW expectancies.

Caution must be exercised in the interpretation of these findings. The correlational design of this study places limits on the nature of the conclusions that can be drawn about the causal and sequential relations among study variables. A number of inclusion criteria (eg, previously employed, participating in a multidisciplinary rehabilitation intervention) were used to maximize the homogeneity of the study sample. The inclusion criteria used in the study necessarily affect the generalizability of the findings. Data for this study were derived from patients enrolled in a multidisciplinary rehabilitation program. Multidisciplinary treatment is part of the repertoire of services made available to a few individuals with WADs. The data were collected in a region operating under a no-fault system and might not be generalizable to regions operating under a tort system. RTW is an outcome that is influenced by numerous social, workplace, and economic factors that were not assessed in this study.

Conclusions

Despite these limitations, the current study advances knowledge regarding the mediating role of expectancies on RTW outcomes after WADs. The results showed that expectancies fully mediated the relation between fear of movement and RTW and partially mediated the relation between catastrophizing and RTW status. The significant predictive role of expectancies for RTW outcomes argues for the inclusion of measures of RTW expectancies in the standard assessment protocols for individuals who have sustained WADs and for the inclusion of RTW expectancies as a specific target of intervention.

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