

The Role of Perceived Injustice in the Experience of Chronic Pain and Disability: Scale Development and Validation

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Abstract *Introduction* The primary objective of this research was to evaluate the psychometric properties of a questionnaire designed to assess perceived injustice associated with injury. *Methods* In Study 1, the 12-item Injustice Experience Questionnaire (IEQ) was administered to 226 individuals with musculoskeletal conditions. A subsample of 85 individuals were interviewed 1-year later about their ongoing symptoms and return to work status. In Study 2, the IEQ and other pain-related measures were administered on two separate occasions to 70 pain patients participating in a functional restoration rehabilitation program. *Results—Study 1* Principal components analysis yielded a two-component solution with eigenvalues greater 1. Item content of the two components reflected elements of blame and irreparability of loss. In cross sectional analyses, the IEQ was significantly correlated with measures of catastrophic thinking, $r = .75$, $P < .01$, fear of movement/re-injury,

$r = .58$, $P < .01$, depression, $r = .66$, $P < .01$, and pain severity, $r = .54$, $P < .01$. Cross-sectional regression analyses revealed that the IEQ, $\beta = .44$, $P < .01$, and the PCS, $\beta = .18$, $P < .05$, each contributed significant unique variance to the prediction of pain severity. The IEQ prospectively predicted return to work status, OR = .75, 95% CI = .58–.99, but not pain severity. *Results—Study 2* Analyses supported the test re-test reliability of the IEQ, $r = .90$, $P < .01$. Treatment-related changes in the IEQ were significantly correlated with an objective index of improved physical function, $r = .51$, $P < .01$. *Conclusions* The findings of these two studies support the construct validity of the IEQ and suggest that this measure might be a useful complement to psychosocial assessment of individuals with persistent pain conditions. Discussion addresses the processes through which perceived injustice might impact on disability and rehabilitation outcomes.

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The potential devastating consequences of musculoskeletal injury have been described in numerous reports [1, 2]. At least for some individuals, life following injury will be characterized by significant and persistent physical and emotional suffering [3, 4]. In addition, post-injury life might be replete with losses such as the loss of employment, the loss of financial security, loss of independence and loss of sense of identity [5–7]. Some of these losses might be temporary, while others might be permanent [8–10].

Particularly in situations where injury has occurred as a result of another's error or negligence, the injury victim might experience post-injury life with a sense of injustice [11]. Perceptions of injustice can ensue from acts or conditions that might cause someone to suffer hardship or loss

undeservedly [12, 13]. Research has shown that perceptions of injustice are likely to arise when an individual is exposed to situations that are characterized by a violation of basic human rights, transgression of status or rank, or challenge to equity norms and just world beliefs [14–16]. The experience of unnecessary suffering as a result of another's actions, or the experience of irreparable loss are likely to give rise to the perception of injustice [11].

Whether considered from philosophical, social, legal or psychological perspectives, writers have suggested that injustice demands retribution [13, 17]. Central to the process of litigation within 'tort' systems is the determination of fault and quantification of loss, and the exchange of financial resources as a proxy for retribution [17]. The extant literature on the deleterious effects of litigation on suffering and recovery suggests that high levels of perceived injustice might represent a risk factor for problematic recovery following musculoskeletal injury [18–21]. To date, the impact of perceptions of injustice on the trajectory of recovery following musculoskeletal injury has not been systematically investigated.

The primary aim of this research was to develop a reliable and valid measure of the perceived injustice associated with musculoskeletal injury. A 12-item self-report measure, the Injustice Experience Questionnaire (IEQ), was developed and administered to individuals who had sustained injuries in occupational or motor vehicle accidents. Two studies were conducted to evaluate the psychometric properties of the IEQ. Study 1 describes the development, factor structure, and construct validity of the IEQ. Study 2 focuses on issues related to the stability and sensitivity to change of the IEQ. Proceeding from the social psychological literature on perceived injustice, and observed relations between litigation and rehabilitation outcomes, there was a basis for predicting that high scores on a measure of perceived injustice might represent a prognostic indicator for poor outcomes following musculoskeletal injury [19, 22].

Study 1

The item content of the IEQ was derived primarily from two sources of information: (1) the research team's clinical practice in the treatment of individuals who had sustained musculoskeletal injuries, and (2) focus group discussions with psychologists providing intervention services for individuals for individuals who had sustained musculoskeletal injuries. The approach to scale development was similar to that adopted in our previous work where the items used in the scale were as close as possible to actual verbalizations of clients, as opposed to items phrased in relation to a particular theoretical framework [23].

A sample of patients with persistent pain as a result of an occupational injury or a motor vehicle accident were asked to complete the IEQ. Participants were also asked to complete other measures of known psychological correlates of pain. The IEQ was expected to show significant relations with other psychological variables associated with pain such as catastrophic thinking, fear of movement/e-injury, depression, and self-reported disability. The construct validity of the IEQ was addressed by examining the degree of shared variance between the IEQ and conceptually-related variables. The discriminant validity and conceptual distinctiveness of the IEQ was addressed by examining the 'unique' contribution the IEQ to the prediction of pain, depression, functional recovery and return to work.

Method

Participants

The participant sample consisted of 226 individuals with musculoskeletal conditions who were referred for assessment at one of three multidisciplinary pain rehabilitation clinics. At the time of evaluation, participants were work-disabled due to an occupational accident ($n = 163$) or a motor vehicle accident ($n = 63$). All participants were receiving wage indemnity benefits at the time of referral. Sample characteristics are presented in Table 1.

Procedure

The research program was approved by the research ethics committees of the *Université de Montréal* and the *Centre de recherche interdisciplinaire en réadaptation du Montréal métropolitain (CRIR)*. Participants signed a consent form as a condition of participation in the research. Participants were asked to complete several questionnaires as part of their initial assessment. One year following the initial assessment, a subsample of individuals, who were initially assessed during the subacute period of recovery, were contacted by telephone and were asked to answer questions relevant to their current symptoms and occupational status. Participants were compensated \$25 for completing the questionnaires and the telephone interview.

The Development of a Measure of Perceived Injustice

A series of focus group meetings were held with a total of 44 psychologists in Eastern Canada who specialized in the treatment of persistent pain disorders. The focus groups were held as part of a larger project examining psychologists' experiences as providers of insured services for

Table 1 Sample characteristics: Study 1

Characteristic	Work accident		Motor vehicle		Total	P
	N = 163		N = 63			
Sex						
Male	77	47%	31	49%	108	
Female	86	53%	32	51%	119	
Age	41.4	(8.8)	35.2	(9.5)		.001
Primary pain site						
Neck	30	18%	63	100%	93	
Back	115	71%	0	0%	115	
Other sites	18	11%	0	0%	18	.001
Number pain sites	1.4	(.7)	2.0	(.7)		.001
Occupation						
Labor	66	40%	18	29%	84	
Health	53	33%	17	27%	70	
Food	12	7%	8	13%	20	
Transportation	9	5%	9	14%	18	
Clerical/Admin	23	14%	11	17%	34	ns
Physical demands	2.2	(.7)	2.1	(.7)		ns

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

Numbers in parentheses are standard deviations

individuals who sustained disabling injuries in occupational or motor vehicle accidents. For the purposes of the present report, clinicians were asked to discuss the impact of perceived injustice on the recovery process. In these discussions, perceived injustice was conceptualized as an appraisal cognition or set of cognitions comprising elements of attributions of blame, magnitude of loss and irreparability of loss [11, 24]. Clinicians were provided with examples of items that were generated by members of the research team. Through these discussions, clinicians were encouraged to recall phrases expressed by their clients that mapped onto the different elements of perceived injustice. Twelve items were retained for which consensus was achieved that the items reflected some aspect of perceived injustice.

Measures

Perceived Injustice

The Injustice Experience Questionnaire (IEQ) is a 12-item questionnaire that addresses the degree to which individuals perceive their post-injury life as being characterized by injustice. The instructional set of the IEQ is as follows:

When injuries happen, they can have profound effects on our lives. This scale was designed to assess how

your injury has affected your life. Listed below are 12 statements describing different thoughts and feelings that you may experience when you think about your injury. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you think about your injury.

Respondents were asked to indicate the degree to which they experienced each of 12 different thoughts and feelings described in the item content on a 5-point scale with the endpoints (0) *not at all* and (4) *all the time*.

Catastrophizing

The Pain Catastrophizing Scale (PCS; [23]) consists of 13 items describing different thoughts and feelings that individuals may experience when they are in pain. The PCS has been shown to have high internal consistency (coefficient alpha = .87), and to be associated with heightened pain, disability as well as employment status [23, 25, 26].

Fear of Movement/Re-Injury

The Tampa Scale for Kinesiophobia (TSK; [27]) 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 = .77; [28]). The TSK has been associated with various indices of behavioral avoidance and disability [25, 29, 30].

Depression

The Beck Depression Inventory II (BDI; [31]) was used to measure severity of depressive symptoms. The BDI-II consists of 21 items describing various symptoms of depression. Respondents are asked to endorse phrases that best describe how they have been feeling during the past two weeks. The BDI-II has been shown to be a reliable and valid index of depressive symptoms in chronic pain patients [25, 32, 33].

Self-Reported Disability

The Pain Disability Index (PDI; [34]) assesses the degree to which respondents perceive themselves to be disabled in seven different areas of daily living (home, social, recreational, occupational, sexual, self-care, life support). For each life domain, respondents are asked to provide perceived disability ratings on 11-point scales with the endpoints (0) *no disability* and (10) *total disability*. The PDI has been shown to be internally reliable and significantly correlated with objective indices of disability [35, 36].

Pain Severity

The McGill Pain Questionnaire (MPQ; [37]) was used to assess current pain severity. On this measure, participants are asked to endorse adjectives that best describe their current pain experience. The Pain Rating Index (PRI) is a weighted sum of all adjectives endorsed, and is considered one of the more reliable and valid indices of an individual's pain experience [38].

Follow-up and Return to Work

A subsample of 85 patients who were initially assessed in the subacute period of recovery (4–12 weeks) were contacted by telephone 12 months following their initial assessment. The telephone interview included questions concerning the patients' current level of pain, current treatment involvement, current occupational status and, for patients who had returned to work, the number of days missed since returning to work. Of interest was the prognostic value of initial IEQ scores in the prediction of long-term pain and occupational disability.

Analytic Approach

A principal components analysis was performed to assess the underlying structure of the IEQ. Coefficient alpha [39] was computed to assess the internal consistency of the IEQ. Construct validity was assessed by comparing IEQ scores of individuals who had been injured in a work accident with individuals who had been injured in a motor vehicle accident. In rear collision motor vehicle accidents, blame is typically ascribed to the vehicle striking the rear portion of another vehicle. In work-related accidents, blame is more difficult to ascribe since the worker is often injured in an activity that he/she might have initiated. On the basis of probable ascription of fault, it was expected that individuals who had been injured in motor vehicle accidents would experience higher levels of perceived injustice than individuals who had been injured in a work accident.

Construct validity was also assessed by examining Pearson correlations between the IEQ and the PCS, BDI-II, TSK, PDI and MPQ. Given that appraisal of the severity of injury is a component of the IEQ, it was expected that the IEQ would be correlated with pain severity, pain catastrophizing, fear of movement and self-reported disability. Given that irreparability of loss is a component of the IEQ, it was expected that the IEQ would be correlated with depression. Direct multiple regression analyses were used to address the discriminant validity of the IEQ. The question of interest was whether the IEQ contributed significantly to the prediction of pain, depression, and self-reported disability beyond the variance accounted for by

other known correlates of pain outcomes. Multiple and logistic regressions were used to evaluate the prognostic value of the IEQ in the prediction of long-term pain and occupational disability.

Results

Sample Characteristics

Demographic and injury-related information for participants who had been injured in occupational accidents ($n = 163$) and motor vehicle accidents ($n = 63$) is summarized in Table 1. Participants who were injured in a motor vehicle accident were significantly younger than participants who were injured in a work accident, $t(224) = 4.5$, $P < .001$. For individuals who sustained injuries in a work accident, 71% identified the lower back as the primary pain site; for individuals who sustained injuries in a motor vehicle accident, 100% identified the neck as the primary pain site, $\chi^2 = 27.4$, $P < .001$. Participants who sustained injuries in a motor vehicle accident reported significantly more pain sites than individuals who were injured in a work accident, $t(224) = 5.4$, $P < .001$. Sex distribution was comparable across injury type, $\chi^2 = .98$, ns.

Structure of the IEQ

A principal components analysis (PCA) with oblique rotation yielded a two-component solution with eigenvalues greater than 1. The loadings of the pattern matrix are presented in Table 2. The first component, labeled *severity/irreparability of loss* accounted for 54% of the total variance. The second component, labeled *blame/unfairness* accounted for 9% of the total variance. Four items loaded on both components. The correlation between the two components was .45. Due to the overlap in item content of the two factors, separate subscales were not derived. The coefficient alpha for the total IEQ was .92. As shown in Table 2, item-total correlations ranged from .50 to .81.

Construct Validity

As expected, individuals who had been injured in a motor vehicle accident obtained higher scores on the IEQ than individuals who had been injured in a work accident, $t_{IEQ}(224) = 4.3$, $P < .001$. These results are presented in Table 3. Individuals who were injured in motor vehicle accidents did not differ significantly from individuals who were injured in work accidents on their scores on measures of pain severity, $t_{MPQ}(224) = 1.1$, ns, catastrophizing, $t_{PCS}(224) = 1.2$, ns, depression, $t_{BDI-II}(224) = 1.6$, ns, or self-reported disability, $t_{PDI}(224) = .5$, ns.

Table 2 IEQ Rotated factor loadings (pattern matrix)

Item #		Severity/irreparability	Blame/unfairness	Item/total <i>r</i>
IEQ3	I am suffering because of someone else's negligence		.83	.50
IEQ7	It all seems so unfair		.53	.77
IEQ9	Nothing will ever make up for what I have gone through	.49	.50	.81
IEQ10	I feel as if I have been robbed of something very precious	.46	.53	.81
IEQ11	I am troubled by fears that I may never achieve my dreams	.42	.53	.77
IEQ12	I can't believe this has happened to me	.47	.48	.79
IEQ1	Most people don't understand how severe my condition is	.91		.63
IEQ2	My life will never be the same	.74		.77
IEQ4	No one should have to live this way	.54		.67
IEQ5	I just want my life back	.80		.70
IEQ6	I feel that this has affected me in a permanent way	.75		.78
IEQ8	I worry that my condition is not being taken seriously	.71		.70
Cronbach's alpha (Total = .92)				

Factor loadings greater than .40 are displayed; Values in bold are factor loadings greater than or equal to .50

Table 3 Scores on pain-related psychological measures: Study 1

	Work accident <i>N</i> = 163	Motor vehicle accident <i>N</i> = 63	<i>P</i>
MPQ-PRI	24.3 (15.6)	26.6 (15.7)	ns
PDI	38.7 (15.1)	40.0 (14.9)	ns
PCS	21.7 (13.4)	24.2 (13.7)	ns
TSK	41.6 (9.9)	41.7 (8.9)	ns
IEQ	17.3 (12.2)	25.1 (11.8)	.001

Numbers in parentheses are standard deviations

Table 4 Correlations among pain-related psychological measures

Variable	1	2	3	4	5
1. IEQ					
2. PCS	.75**				
3. BDI-II	.66**	.65**			
4. TSK	.58**	.65**	.54**		
5. PDI	.44**	.55**	.46**	.41**	
6. MPQ	.54**	.48**	.44**	.33**	.50**

Note: *N* = 226; ** *P* < .01

As shown in Table 4, the IEQ was significantly correlated with pain severity, catastrophizing, fear of movement, perceived disability, and depression. Men (*M* = 21.7, *SD* = 12.5) obtained higher scores on the IEQ than women (*M* = 18.0, *SD* = 12.3), *t*(224) = 2.5, *P* < .05.

The correlations among the pain-related psychological measures were slightly higher than those that have been typically reported in previous research [40]. The correlation between the IEQ and the PCS (*r* = .75) was particularly high raising concerns that perceived injustice might be largely redundant with catastrophizing. The

magnitude of this correlation was unexpected given that perceptions of injustice have not been addressed in theoretical discussions of catastrophizing [41]. To address the question of conceptual distinctiveness among measures, a series of regression analyses were conducted examining the shared and unique variance contributions of the IEQ, the PCS and the TSK to the prediction of pain outcomes, namely pain severity, depression and self-reported disability. In these analyses, age, sex and duration of pain were entered in the first step of the regressions. As shown in Table 5, the IEQ and the PCS each contributed significant unique variance to the prediction of pain severity (Regression 1). The IEQ and the PCS each contributed significant unique variance to the prediction of depression, even when controlling for pain severity (Regression 2). The PCS and the TSK, but not the IEQ, each contributed significant unique variance to the prediction of self-reported disability.

Prospective Relations Between Perceived Injustice and Pain Outcomes

A subsample of 85 participants (29 men, 56 women: 64 work accidents, 21 motor vehicle accidents) who had initially been assessed during the subacute period (4–12 weeks) of recovery were contacted 12 months following their initial assessment. A subacute sample was chosen for prospective analyses since these individuals had a higher probability of returning to work than individuals with more chronic conditions, and the results would be most pertinent to the development of secondary prevention interventions. A total of 140 were selected for follow-up interview of which 90 (64%) were successfully contacted. Individuals who were successfully contacted did not differ significantly

Table 5 Regression analyses examining the relation between perceived injustice and pain outcomes

	<i>B</i>	<i>R</i> ² _{change}	<i>F</i> _{change}	<i>P</i>	<i>r</i>
<i>Regression 1: Dependent = MPQ-PRI</i>					
Step 1					
Age	.08				.09
Sex	.01				.08
Duration	.04	.02	1.6 (3, 222)	.18	.10
Step 2					
IEQ	.44**				.54**
PCS	.18*				.48**
TSK	.06	.29	31.4 (3, 219)	.001	.31**
<i>Regression 2: Dependent = BDI-II</i>					
Step 1					
Age	.03				.04
Sex	.07				.17
Duration	.09	.03	2.0 (3, 222)	.10	.03
Step 2					
MPQ-PRI	.08	.14	39.4 (1, 221)	.001	.44**
Step 3					
IEQ	.31**				.67**
PCS	.21**				.65**
TSK	.11	.23	29.4 (3, 218)	.001	.54**
<i>Regression 3: Dependent = PDI</i>					
Step 1					
Age	.03				.08
Sex	.07				.03
Duration	-.14*	.01	1.2 (3, 222)	.30	-.08
Step 2					
MPQ-PRI	-.33**	.25	78.4 (1, 221)	.001	.50**
Step 3					
IEQ	.03				.45**
PCS	.34**				.55**
TSK	.19*	.13	16.6 (1, 218)	.001	.42**

Note: *N* = 226. For each regression, standardized beta weights are from the final regression equation

* *P* < .05; ** *P* < .01

from those who could not be reached on age, type of employment, type of injury, or any of the measures assessed at the first assessment. Women were more likely to be successfully contacted than men, $\chi^2 = 3.1$, *P* < .05. Change of residence was the most common reason (65%) for unsuccessful contact. This degree of mobility is not atypical for maritime regions where work availability is seasonal. Of the 90 individuals who were successfully contacted, 85 agreed to participate. Participants received \$25 for participating in the telephone interview. The mean age of the follow-up sample was 39.1 years with a range of 20–55 years. The mean duration of work absence at the time of initial assessment was 8.3 weeks.

Table 6 Multiple regression analysis predicting 1-year follow-up pain severity

	<i>B</i>	<i>R</i> ² _{change}	<i>F</i> _{change}	<i>P</i>	<i>r</i>
Dependent = Pain severity (0–10) at 1-year follow-up					
Step 1					
Initial pain severity	.01	.13	12.4 (1, 83)	.001	.36**
Step 2					
IEQ	.12				.52**
PCS	.48**				.56**
BDI-II	.10				.35**
TSK	.12	.21	6.3 (4, 79)	.001	.32**

Note: *N* = 85. For each regression, standardized beta weights are from the final regression equation

** *P* < .01

The majority of participants (94%) reported still experiencing pain consequent to their injury at 1-year follow-up. Table 6 shows the results of a hierarchical regression analysis examining predictors of pain severity at 1-year follow-up. Initial pain severity (MPQ-PRI) was entered in Step 1 of the analysis, and contributed significant variance to the prediction of pain severity at 1-year follow-up. Measures of depression, catastrophizing, fear of movement/re-injury, and perceived injustice were entered in Step 2 of the analysis. Examination of the beta weights from the final regression equation indicates that only catastrophizing ($\beta = .48$, *P* < .01) contributed significant unique variance to the prediction of pain severity at 1-year follow-up.

Slightly less than half the participants (41%) reported ongoing treatment for symptoms related to their injury at 1-year follow-up. The most frequently reported treatments included medication for pain (58%), physiotherapy (22%), massage (11%), and antidepressant medication (9%). A logistic regression was performed to examine the shared and unique contributions of pain severity, depression, catastrophizing, fear of movement/re-injury and perceived injustice to the prediction of ongoing treatment at 1-year follow-up. Results revealed that initial scores on these variables did not distinguish between participants who continued to receive treatment for their condition and those who did not.

As shown in Table 7, univariate analyses revealed that participants who remained unemployed at 1-year follow-up had obtained significantly higher initial scores on measures of pain severity, $t_{\text{MPQ}}(83) = 2.1$, *P* < .05, depression, $t_{\text{BDI-II}}(83) = 3.1$, *P* < .01, catastrophizing, $t_{\text{PCS}}(83) = 4.5$, *P* < .001, fear of movement/re-injury, $t_{\text{TSK}}(83) = 3.4$, *P* < .001, and perceived injustice, $t_{\text{IEQ}}(83) = 4.5$, *P* < .001.

A logistic regression was performed to examine the shared and unique contributions of pain severity,

Table 7 Initial scores on psychological measures and return-to-work status at 1-year follow-up

	Return to work		<i>P</i>
	Yes <i>N</i> = 60	No <i>N</i> = 25	
MPQ-PRI	22.7 (12.3)	29.8 (16.8)	.03
BDI-II	13.3 (10.0)	25.6 (14.7)	.01
PCS	20.2 (11.9)	32.5 (9.9)	.001
TSK	41.3 (9.4)	48.3 (5.2)	.001
IEQ	15.5 (11.1)	27.1 (9.9)	.001

Note: Numbers in parentheses are standard deviations

Table 8 Logistic regression examining predictors of return to work at 1-year follow-up

	Wald	OR	95% CI
Dependent variable = return to work (0 = no, 1 = yes)			
MPQ-PRI	2.79	1.10	.98–1.2
BDI-II	.01	1.02	.91–1.1
PCS	.32	1.01	.85–1.3
TSK	4.20	.58*	.35–.97
IEQ	4.11	.75*	.58–.99

Note: *N* = 85; OR = Odds ratio; 95% CI = 95th percentile confidence interval; * *P* < .05

depression, catastrophizing, fear of movement/re-injury and perceived injustice to the prediction of follow-up return to work status. As shown in Table 8, higher scores on the IEQ and the TSK were associated with a lower probability of return to work. Initial pain severity, depression and catastrophizing did not contribute significant unique variance to the prediction of follow-up return to work status.

Discussion

The results of Study 1 provide initial support for the reliability and validity of the IEQ. The alpha coefficient for the total IEQ (alpha = .92) revealed a high degree of internal consistency and all items correlated above .50 with the total score. The results of the principal components analysis yielded a two-component solution with several items loading on both components. Given the high alpha coefficient for the total IEQ score, the magnitude of the correlation between the two components (*r* = .45) and the number of items loading on both components, the IEQ might best be construed as a complex but unitary construct. Although, perceived injustice was discussed as comprising elements of injury severity/irreparability of loss and blame/unfairness as distinct dimensions of perceived injustice,

from an experiential perspective, unfairness and severity might be inextricably linked. In other words, it might be difficult to experience high subjective injustice for injuries appraised as minor.

The IEQ correlated significantly with measures of pain, depression, catastrophizing, fear of movement/re-injury and self-reported disability. These results provide support for the construct validity of the IEQ. The magnitude of the correlation between the IEQ and the PCS was higher than anticipated (*r* = .75) and raises concerns about conceptual confounds between perceived injustice and catastrophic thinking. It is likely that the severity of injury/irreparability of loss dimension of the IEQ maps to a significant degree onto the exaggeration of threat dimension of the PCS. However, blame is not reflected either in the conceptual basis of catastrophizing or in the item content of the PCS [41]. Thus, in spite of the high correlation between the measures, there is a basis for considering perceived injustice and catastrophizing as partially distinct constructs.

The discriminant validity of the IEQ was supported by the results of a regression analysis that revealed that the IEQ and the PCS each accounted for unique variance in the prediction of pain severity. The discriminant validity of the IEQ was also supported by the results of a logistic regression suggesting that high scores on the IEQ predicted failure to return to work. The PCS did not account for significant unique variance in the prediction of return to work, but the PCS did predict follow-up pain severity. Thus, in spite of the conceptual and psychometric overlap between the IEQ and the PCS, their differential prediction of long-term outcomes suggests that the IEQ might provide added predictive value to the repertoire of psychological measures currently known to be associated with pain-related occupational disability.

Study 2

The objectives of Study 2 were to examine the test-retest reliability of the IEQ and its sensitivity to change through the course of treatment. Patients enrolled in a rehabilitation program were asked to complete the IEQ, along with other pain-related measures, during the first week of their participation in a rehabilitation program, and again 4 weeks later. Of interest was the association between scores on the IEQ across repeated assessments. Also of interest was the manner in which changes in the IEQ correlated with changes in other indices of clinical improvement.

Participants

The study sample consisted of 70 (30 men, 40 women) who were admitted to a functional restoration rehabilitation

program. The mean age of the sample was 37.7 years with a range of 20–55 years. Participants were work disabled as a result of an occupational injury ($n = 45$) or a rear collision motor vehicle accident ($n = 25$) and were receiving salary indemnity from their insurer. The mean duration of work absence at the time of enrolment was 8.7 weeks with a range of 4–60 weeks. The sample for Study 2 was entirely independent from the sample for Study 1.

Procedure

Participants were invited to complete measures of pain, depression, catastrophizing, fear of movement/re-injury and perceived injustice during their first week of their admission to the rehabilitation program. Participants were also invited to complete a brief physical function evaluation. The rehabilitation program consisted primarily of physical and occupational therapy interventions aimed at maximizing tolerance for work-related activities. Four weeks after enrolment in the rehabilitation program, participants were invited to complete the same measures they completed during the initial evaluation. Participants received \$25 for completing the questionnaires.

Measures

The measures of pain severity (MPQ-PRI), depression (BDI-II), catastrophizing (PCS), fear of movement/re-injury (TSK), perceived injustice (IEQ) and self-reported disability (PDI) were the same as those used on Study 1.

A 5-min fast walk was used as a brief assessment of physical function. Participants were asked to walk at a quick pace between two markers on the floor, 10 yards apart. The total distance walked, in feet, in 5 min was recorded. This test has been shown to have high inter-rater reliability, high test–retest reliability, and to correlate significantly with other indices of disability [42, 43]. An index of objective (physical) clinical improvement was derived by computing the difference between the first (Week 1) and the second (Week 4) assessment periods on the measure of walking distance.

Analytic Approach

Construct validity was again evaluated by comparing individuals who had sustained injuries in an occupational accident and individuals who had sustained injuries in a motor vehicle accident on the IEQ and other pain-related measures. Test–retest reliability was examined by computing the correlation between IEQ scores obtained at Week 1 and Week 4 of admission to the rehabilitation program.

Sensitivity to change was examined by comparing treatment-related changes on the IEQ to treatment-related

changes on other pain-related measures. In order to compare the different measures on the same metric, percentile change scores were examined. The percentile score equivalents were drawn from the distribution of scores in Study 1. Finally, the clinical relevance of changes in IEQ scores was examined in relation to changes on other pain-related measures as well as changes in physical function.

Results

Sample Characteristics

Table 9 shows the means and standard deviations for demographic, psychological and physical function measures for participants who had sustained their injuries in the workplace or a result of a motor vehicle accident. As in Study 1, participants who had sustained injuries in motor vehicle accidents were younger, $t_{AGE}(68) = 3.2$, $P < .01$, and reported more pain sites than participants who had sustained occupational injuries, $t_{PAIN\ SITES}(63) = 3.2$, $P < .01$. Also consistent with Study 1, participants who had sustained injuries in a motor vehicle accident obtained higher IEQ scores $t_{IEQ}(68) = 5.4$, $P < .001$, but did not differ from individuals who had sustained occupational injuries on their scores on the PCS, $t_{PCS}(68) = 1.0$, ns, the TSK, $t_{TSK}(68) = .46$, ns, or the PDI, $t_{PDI}(68) = 1.1$, ns. Unlike Study 1, participants who sustained injuries in a motor vehicle accident reported more severe pain, $t_{MPQ}(68) = 1.7$, $P < .05$, and greater depression, $t_{BDI-II}(68) = 2.3$, $P < .05$. Participants who had sustained injuries in a motor vehicle accident walked a shorter distance in 5 min than individuals who had sustained occupational injuries, $t(68) = 2.4$, $P < .05$. Men ($M = 21.6$, $SD = 12.9$) obtained higher scores on the IEQ than women ($M = 14.8$, $SD = 12.0$), $t(68) = 2.2$, $P < .05$.

Correlations Among Measures and Test–Retest Reliabilities

Correlations were computed between the first and second administrations of all psychological measures. Test–retest correlations are represented on the diagonal of Table 10. Values on the off-diagonal are the correlations between Week 1 and Week 4 administrations of the different measures. As shown in Table 10, scores on the IEQ were very stable across 4 weeks ($r = .90$). The reliability coefficients for the other measures were comparable to those that have been reported in previous research [23, 28, 31, 35].

Consistent with the results of Study 1, the IEQ was significantly correlated with the PCS, the BDI-II, the TSK, the PDI, and the MPQ. Only the IEQ and the MPQ were significantly correlated with walking distance.

Table 9 Sample characteristics: Study 2

	Work accident N = 45	Motor vehicle accident N = 25	P
Age	40.2 (8.1)	33.1 (9.3)	.001
Number of pain sites	1.7 (.96)	1.0 (.69)	.01
MPQ-PRI	22.6 (12.9)	28.1 (13.5)	.03
PDI	41.0 (12.8)	36.8 (16.3)	ns
PCS	21.3 (13.3)	24.6 (11.2)	ns
TSK	39.9 (9.4)	40.9 (7.4)	ns
IEQ	17.3 (12.2)	25.1 (11.8)	.001
BDI-II	13.4 (10.4)	20.3 (13.6)	.05
Walking distance	337.7 (96.0)	277.4 (117.1)	.05

Numbers in parentheses are standard deviations

Table 10 Correlations among Pain-related measures (Week 1–4) and test–retest reliabilities: Study 2

Variable	1	2	3	4	5	6	7
1. IEQ	.90**						
2. PCS	.65**	.75**					
3. BDI-II	.67**	.58**	.75**				
4. TSK	.64**	.71**	.58**	.61**			
5. PDI	.28*	.46**	.32**	.47**	.77**		
6. MPQ	.49**	.36**	.46**	.41**	.60**	.66**	
7. Walk	-.23*	.03	.08	-.04	-.34**	-.06	.90**

Values on the diagonal are test–retest correlations

Note: N = 70; * P < .05; ** P < .01

Treatment-Related Changes

Table 11 shows the means and standard deviations on all measures taken at Week 1 and Week 4 of the rehabilitation program. Scores on all questionnaires decreased through the course of treatment, and walking distance increased significantly. Compared to other measures included in these analyses, the IEQ appeared least sensitive to change. Changes in percentile scores for all measures were examined in order to compare changes of the different scales on the same metric. Percentile score changes (e.g., changes in the participants’ rank within the distribution of scores; percentile equivalents taken from Study 1) revealed that the IEQ decreased by only 5% through the course of treatment, while scores on other self-report measures decreased between 12% and 15%.

Table 12 shows the correlations among change scores (Week 1–4) on the different pain-related measures. Reductions in the IEQ were significantly correlated with reductions in the PCS, the BDI-II, and the TSK. Reductions in the IEQ were not correlated with pain reduction. Of all the measures included in these analyses, reductions in the

IEQ were the most strongly associated with increases in walking distance. A direct regression analyses examining the contribution of reductions in the IEQ, PCS, BDI-II, TSK, PDI, and MPQ to the prediction of increased walking distance revealed that only the IEQ contributed significant unique variance, $R = .54$, $F(6, 63) = 4.2$, $P < .001$, $\beta_{IEQ} = .35$, $P < .01$.

Discussion

The results of Study 2 provide additional support for the reliability and validity of the IEQ. Consistent with the results of Study 1, individuals who sustained injuries in rear collision motor vehicle accidents obtained higher scores on the IEQ than individuals who were injured in occupational accidents. In other words, perceived injustice was greater under conditions where fault could be clearly ascribed to another person. In Study 2, individuals who had sustained injuries in motor vehicle accidents also reported more severe pain, more pain sites, and greater depression. These findings might reflect the increased complexity of injury that can result from motor vehicle accidents, particularly in individuals considered to have a symptom profile sufficiently severe to warrant enrolment in a rehabilitation program.

The IEQ showed a high level of stability over a 4-week period, with a test–retest correlation exceeding those of the PCS, the BDI-II, the TSK, the PDI and the MPQ. IEQ scores also showed little change through the course of treatment compared to the other pain-related measures. The modest change of the IEQ might represent a lack of sensitivity of the scale, or a marker for poor treatment outcome in a population where functional changes are generally modest. Given that changes in IEQ scores, compared to changes in other measures, were most strongly associated with increases in physical function, the latter explanation might be more tenable than the former.

As in Study 1, the magnitude of the relation between the IEQ and the PCS invites consideration of issues concerning operational or conceptual redundancy. However, the discriminant validity of the IEQ was supported by correlational analyses showing that reductions in IEQ scores were significantly associated with increased walking distance but unrelated to reductions in pain. Only reductions in PCS scores and PDI scores were significantly correlated with reductions in pain.

General Discussion

The negative effects of injustice have been discussed for millennia. For example, Plato asserted that injustice was a

Table 11 Treatment-related changes in pain-related measures: Study 2

	Week 1	Week 4	Raw score change	Percentile change (%)
MPQ-PRI	24.6 (13.3)	20.4 (13.5)	-4.1**	-12
PDI	34.9 (15.7)	27.3 (17.3)	-7.6**	-15
PCS	22.5 (12.5)	16.2 (13.3)	-6.2**	-14
TSK	40.2 (8.7)	35.2 (9.4)	-5.0**	-13
IEQ	17.7 (12.7)	14.9 (13.5)	-2.7**	-5
BDI-II	15.8 (11.4)	11.2 (10.2)	-4.5**	-12
Walking distance	315.7 (107.6)	337.2 (114.1)	22.1**	9

Note: Numbers in parentheses are standard deviations

** $P < .01$

Table 12 Correlations among indices of change: Study 2

Variable	1	2	3	4	5	6
1. ch-IEQ						
2. ch-PCS	.48*					
3. ch-BDI-II	.37**	.44**				
4. ch-TSK	.34**	.33**	.32**			
5. ch-PDI	.13	.42**	.30**	.31**		
6. ch-MPQ	.15	.36**	.15	.10	.23*	
7. ch-Walk	.51**	.46**	.31**	.21*	.21*	.19

Note: $N = 70$

* $P < .05$; ** $P < .01$

disease state that reflected an imbalance of the natural order [44]. The 12th century philosopher, Anselm de Canterbury discussed injustice as a state of mind that demanded retribution; where injustice could only be resolved when the order of retribution was equal to that of experienced loss [45].

Issues related to the defining features of justice have been debated in philosophy, and mechanisms for the resolve of injustice are represented at varying levels of social policy [12, 46]. In many industrialized societies, 'retribution' for losses incurred due to injury has taken the form of compensation or litigation [17]. Indeed, litigation is typically driven by the injury victim's perception that an injustice has occurred and must be righted [47].

It is interesting to note that the literature has been consistent in showing that compensation and litigation are associated with more intense pain experience and more prolonged disability [18, 21]. The act of 'blaming others' for one's situation appears to be sufficient to engender negative outcomes. DeGood and Kiernan (1996) found that chronic pain patients who blamed others for their pain reported more pain and more emotional distress than patients who did not ascribe fault for their pain condition [48].

Clinical anecdotes abound of persistent pain sufferers who feel they have been victimized either as a direct result of their injury, or indirectly by the sequelae of their injury [49, 50]. Verbalizations such as "I wish he could see what he has done to my life", or "Nothing will ever make up for what I have gone through" reflect at once elements of

unfairness and the irreparability of loss. One of the themes that emerged from the focus group discussions with clinical psychologists was that perceived injustice seemed to focus individuals' attention on the injustice of their injury or accident as opposed to focusing on their role in the rehabilitation process.

Despite the apparent centrality of themes of injustice in the experience of, and recovery from injury, perceived injustice has not been addressed directly within current biopsychosocial models of pain and disability. Themes of perceived injustice are implicit in discussions of the negative impact of compensation or litigation on recovery, or discussions of concepts such as secondary gain. However, the latter discussions have typically taken to the form of fixing blame on patients for their lack of rehabilitation progress as opposed to a platform for the systematic and rigorous exploration of psychological barriers to rehabilitation progress.

The primary objectives of the present research were to investigate the psychometric properties of a scale designed to assess perceptions of injustice subsequent to injury and to address the scale's predictive value in relation to recovery outcomes. The items of the IEQ were rationally derived, emerging in part from focus groups discussions with psychologists about psychological barriers to rehabilitation progress. Although these discussions did not proceed from a fully elaborated theoretical framework on injustice, they were nevertheless guided by the perspective that the phenomenology of injustice comprised elements of blame, magnitude of loss and irreparability of loss [11].

The results of two studies suggest that the IEQ may provide a useful additional tool to assess psychological risk for problematic outcomes following musculoskeletal injury. The IEQ showed high internal consistency and high test-retest reliability. The construct validity of the IEQ was supported by significant correlations with associated constructs such as pain severity, catastrophizing, depression and fear.

The magnitude of the correlations that were observed between the IEQ and the PCS (.65-.75) invites reflection about the degree of overlap between these measures. As noted earlier, the 'severity/irreparability of loss' dimension

of the IEQ likely overlaps to a substantive degree with the exaggerated negative orientated toward pain that characterizes catastrophizing. However, the 'blame/unfairness' dimension of the IEQ is neither reflected in the conceptual framework that underlies catastrophizing or the item content of the PCS. Catastrophizing has been discussed in terms of threat appraisals or communal coping; neither model entertains blame as a central element of the processes involved in catastrophizing [41, 51].

In spite of the high correlation between the IEQ and the PCS, the findings of Studies 1 and 2 support the distinctiveness of the IEQ. A regression analysis showing that the IEQ and the PCS each contributed significant unique variance to the prediction of pain suggests that perceived injustice might impact on pain in a manner distinct from catastrophizing. The IEQ was also shown to prospectively predict return to work even when controlling for catastrophizing (and other measures). Treatment-related changes in the IEQ were correlated with increased walking distance even when controlling for catastrophizing (and other measures). In addition, treatment-related changes in the IEQ were not correlated with changes in pain, while treatment-related changes in the PCS were significantly correlated with changes in pain. These results argue for a conceptualization of perceived injustice as a construct distinct from catastrophizing.

Perceived injustice was more strongly related to disability than to pain severity. Prospective analyses showed the PCS to be the best predictor of follow-up pain severity, while the IEQ was the best predictor of follow-up occupational disability. There are a number of possible mechanisms through which perceived injustice might impact on pain-related disability. An individual's appraisal or belief in the irreparability of losses that have ensued as a result of injury might contribute to symptoms of depression, compounding the burden of illness, and in turn, contributing to disability. Alternately, perceived injustice might contribute to excessive focus on pain symptoms, or focus on loss, thereby contributing to depressive reactions [19]. While plausible, the results of the present studies do not support a model that would place depression as the mediator of the relation between perceived injustice and pain-related disability. A logistic regression showed the IEQ to predict follow-up occupational disability even when controlling for depression.

Another possibility is that perceptions of injustice might leave individuals 'stuck' in their situation. Anecdotally, individuals whose discourse reflects perceptions of injustice also seem to engage in repeated expression of their sense of injustice. It is interesting to note that high levels of catastrophizing have been shown to be associated with 'disengagement deficits' such that high catastrophizers have more difficulty diverting attention away from pain-related thoughts [52, 53]. Similarly, high levels of perceived

injustice might be associated with 'disengagement deficits' in relation to themes of injustice related to their injury. It is interesting to speculate that a high frequency of thought intrusions related to themes of injustice might contribute to adverse mental health outcomes such as maladaptive anger or hostility, or post-traumatic stress reactions.

There is also research suggesting that blame attributions can give rise to revenge intentions [24, 54]. Social psychological research has shown that the blame attributions for negative outcomes are likely to trigger anger responses [55]. It has been suggested that perceptions of injustice can give rise to anger, and anger-driven motives to 'right the wrongs' of the unjust situation [22]. It has been suggested that a hostile attributional style and beliefs in a just world might predispose anger reactions to perceived injustice [16, 56]. Research on individual differences in perceptions of injustice and reactions to injustice suggest that a complex set of situational and intra-individual factors might play a role in determining whether sex differences will be found [57–59]. Anger has recently received more attention as an emotion that might be central to the experience of chronic pain [60, 61]. Research suggests that high levels of anger might be associated with more intense pain experience and more severe disability [62, 63].

A fruitful line of enquiry might involve exploration of the role of revenge motives or anger in mediating the relation between perceived injustice and pain-related disability, as well as the processes by which anger might impact on pain-related disability. There are indications that revenge motives are associated with a higher frequency of intrusive cognitions related to the victimization event [64]. Perceived injustice might focus attention on issues related to revenge and retribution and in turn fuel anger reactions. Under some circumstances, it is possible that 'disability' might become the only currency that will bring about retribution for losses sustained. The above discussion implies that at least some of the processes that are initiated subsequent to the perception of injustice might operate at a conscious level. In other words, in some cases, disability behaviour might be intentionally maintained in order to seek adequate retribution for losses. Given that the present study did not include measures of anger or revenge motivation, the above discussion remains speculative.

The focus of this paper has been on perceptions of injustice subsequent to injury. However, injuries are not the only conditions under which individuals might experience a sense of injustice. As noted earlier, situations characterized by human rights violations, violations of beliefs in a just world, transgression or breach of equity norms have all been associated with perceptions of injustice [14–16]. These factors might characterize the experience of several non-injury debilitating or life threatening health conditions such as multiple sclerosis, arthritis, cancer, HIV and many

others. It will be of interest to examine whether perceptions of injustice impact on adjustment patterns or illness trajectories associated with non-injury debilitating health conditions.

There is a dearth of literature on the effective management of perceived injustice in the treatment of individuals who have sustained musculoskeletal injuries. To the degree that anger characterizes the expressive dimensions of perceived injustice, cognitive behavioural approaches to anger management might prove useful [65]. To the degree to which focus on unfairness or retribution characterizes the phenomenology of perceived injustice, acceptance-based approaches to treatment might be considered [66]. Indeed, future research might reveal that perceived injustice and acceptance might represent different poles of a similar construct.

It is important to consider that perceptions of injustice are not merely mental constructions of the injured individual but might emerge from a reality that is characterized by some degree of injustice. In other words, the individual's perceptions of injustice might be completely justified. Aspects of the work environment, such as unsafe working conditions, that have contributed to injury should be considered as potential targets of intervention as much as the individuals' perceptions of injustice. Intervention approaches that target both environmental and subjective sources of injustice might yield the most promising outcomes.

In summary, perceptions of injustice have been neglected in current biopsychosocial models of pain and disability. The results of the present research suggest that perceptions of injustice might represent a risk factor for poor recovery outcomes, particularly as they pertain to physical function and return to work. Further research in this area might contribute to the development of intervention that might reduce the negative impact of perceived injustice on recovery and rehabilitation following musculoskeletal injury. A pre-requisite to the initiation of appropriate treatment for individuals with high levels of perceived injustice will be the reliable assessment of perceived injustice. The IEQ holds promise of playing an important role in the assessment of psychological barriers to recovery or rehabilitation progress where themes of injustice might be significant.

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